

LEARNING NETWORK DEVELOPMENT
FOR BIODIVERSITY CONSERVATION

SUWAREE SRIPOONA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF EDUCATION
(ENVIRONMENTAL EDUCATION)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY

2001

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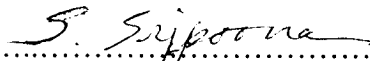
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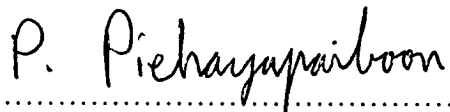
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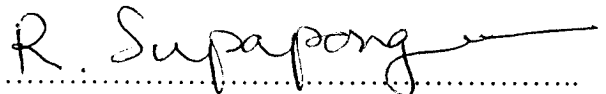
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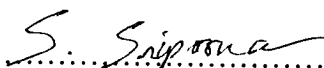
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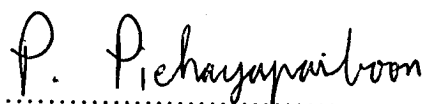
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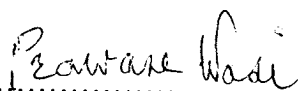
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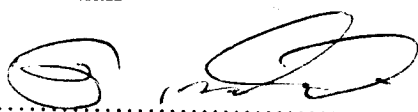
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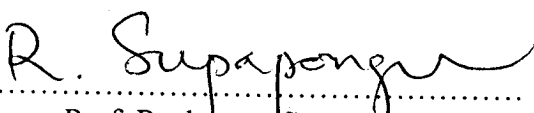

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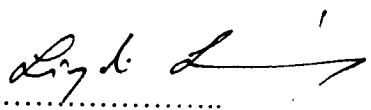

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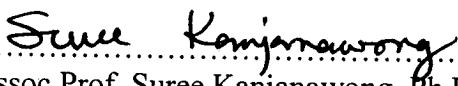

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I wish to contribute the thesis fruitful to my parents, teachers and for the good sake of our motherland for time without end.

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The objective of this research was to study model development of learning network, which plant diversity conservation networks was managed appropriately. Social phenomenon was studied in field research 3 networks included Inpang Center Network in Sakolnakorn Province, Thepnimit Ecological Agriculture Club Network in Chaiyapum Province and Organic Farm Group Network Wangnumkheaw in Nakornrachasima Province.

There were many methods of study employed. The first step employed qualitative methods, including 3 case studies. This data was described and interpreted and utilized to create a quantitative questionnaire. All data was then collaborated to create the proposal model. The proposal model was evaluated by experts.

The results obtained described the model of learning network development for biodiversity conservation and it was postulated through the following processes:

1. The development of the learning network for plant diversity conservation was developed from groups and linked into networks; subsequently causing sustainable biodiversity conservation. The method of network establishment was linkage among individuals, groups, networks, government and non-government organizations. The network organization would act as the point of central administration and collaboration of learning activity continuously, in addition simulation on research, seminars, meeting, training, and supporting and facilitating of both government and non-government organizations. The actual learning and saving were included in order to solve the problems of life quality, social, economic and environmental development in holistic view.

2. The learning network for plant diversity conservation was used to grow ecological agriculture, sustainable agriculture, or other agricultural systems that conserved the environment or environmental agriculture through natural agriculture without chemical utilizing in order to achieve sustainable development. The utility of plant diversity was applied for food, medicine, sale and plant products, while simultaneously, applying community forest conservation was used as natural study sources and genetic sources.

The findings suggest that first, learning networks should be used as important mechanisms for environmental education managing the environment. Secondly educational institutes and others should cooperate and support community in learning management to conserve biodiversity and for better management of environment, while simultaneously, providing social and economic development in order to promote self reliance.

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สุวารี ศรีปุณณะ : การพัฒนาเครือข่ายการเรียนรู้เพื่ออนุรักษ์ความหลากหลายทางชีวภาพ
(LEARNING NETWORK DEVELOPMENT FOR BIODIVERSITY CONSERVATION)
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การวิจัยครั้งนี้ มีวัตถุประสงค์เพื่อศึกษาและเสนอรูปแบบการพัฒนาเครือข่ายการเรียนรู้เพื่ออนุรักษ์ความหลากหลายพันธุ์พืช ศึกษาจากปรากฏการณ์ทางสังคม (Social Phenomenon) รวม 3 กรณี ได้แก่ เครือข่ายศูนย์อินแปลง จ.สกลนคร เครือข่ายชมรมเกษตรนิเวศน์เทพนิมิต จ.ชัยภูมิ และเครือข่ายกลุ่มส่งเสริมกิจกรรมไร้สารพิษวังน้ำเขียว จ.นครราชสีมา ศึกษาโดยใช้วิธีการเชิงคุณภาพและเชิงปริมาณ และประเมินรูปแบบโดยผู้ทรงคุณวุฒิ ผลการวิจัยพบว่า

1) การสร้างและพัฒนาเครือข่าย ทำได้โดยเชื่อมโยงความสัมพันธ์ระหว่าง คนกับกลุ่ม กลุ่มกับเครือข่าย เครือข่ายกับเครือข่าย เครือข่ายกับองค์กร และรัฐ ทั้งระดับท้องถิ่น ระดับชาติ และนานาชาติ โดยมีองค์กรเป็นศูนย์กลางเครือข่ายทำหน้าที่บริหารจัดการและประสานงานเพื่อจัดการเรียนรู้อย่างต่อเนื่องและสร้างพลังภายในเครือข่ายให้เข้มแข็ง กระตุ้นให้เกิดเครือข่ายขึ้นโดยเริ่มจากการวิจัยปฏิบัติการ การประชุมสัมมนา โดยองค์กรรัฐและเอกชนสนับสนุนและอำนวยความสะดวก จัดการเรียนรู้โดยผสมผสานภูมิปัญญาเดิมกับความรู้ใหม่ เน้นการปฏิบัติ สร้างพลังร่วมเพื่อเชื่อมโยงการฟื้นฟูและใช้ประโยชน์พันธุ์พืชกับการออมทรัพย์และกิจกรรมต่างๆ เพื่อพัฒนาสังคม เศรษฐกิจ คุณภาพชีวิตและสิ่งแวดล้อมควบคู่กันอย่างเป็นองค์รวม

2) เครือข่ายต้องจัดให้สมาชิกได้เรียนรู้และปฏิบัติเพื่อฟื้นฟูและใช้ประโยชน์ความหลากหลายพันธุ์พืช เพื่อขยายผลสู่การอนุรักษ์ความหลากหลายทางชีวภาพอย่างยั่งยืน โดยใช้ระบบเกษตรนิเวศน์ เกษตรยั่งยืนและเกษตรกรรมทุกรูปแบบที่ไม่ทำลายสิ่งแวดล้อม หรือเรียกว่าเกษตรสิ่งแวดล้อม(Environmental Agriculture) และแปรรูปผลผลิตเพื่อใช้เป็นปัจจัยสี่ ขยายเพิ่มรายได้ และอนุรักษ์ป่าชุมชนเป็นแหล่งเรียนรู้ธรรมชาติและแหล่งพันธุกรรม

ข้อเสนอแนะ 1) ควรใช้เครือข่ายการเรียนรู้เป็นกลไกหนึ่งของสิ่งแวดล้อมศึกษา 2) ควรสนับสนุนชุมชนให้สร้างและพัฒนาเครือข่ายการเรียนรู้เพื่ออนุรักษ์ความหลากหลายทางชีวภาพและจัดการสิ่งแวดล้อม ควบคู่กับการพัฒนาด้านต่างๆ โดยสถาบันการศึกษาและองค์กรต่างๆ ทั้งระดับท้องถิ่นและระดับชาติ ให้การสนับสนุนและอำนวยความสะดวกด้านทุน นโยบาย วิชาการ เป็นต้น

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CHAPTER I

INTRODUCTION

1.1 Rational and Justification

Biodiversity is the fundamental facilitation of life as well as the raw substrate of agricultural, and industrial products, including, the medical and handicrafts goods. It is also the valuable components of other manufacturial products for human consumptions and utilizations. Moreover, the biodiversity has upheld the balancing of ecosystem, and controlling the functions of soil, water, and air have been included. (Khatithamnit, W., 1994 : 276, and Santasombat, Y., & Punyakul, W., 1994a : 21). A large number of knowledge on natural resources, and social and cultural diversities, which accumulated in the biological system, are the assets for every society. (Wasi, P., 1993 : 24).

Tropical rain forest is the most important sources of global diversity, and in this boundaries contain living creatures more than 50 percentage of total species in the world (1.7 million species). From the survey, it was founded that there are plants 0.4 million species, and the eatable plants are not less than 5,000 species. It can be cultivated not less than 150 species. The major plants for world population feeding are only 20 species. Therefore, there is still numerous plant rests that can be used as foods more than present so people can take advantage more and more from biological diversity.

Global biodiversities have lost vigorously when the human being started to agricultural activities since 10,000 years ago. The biological diversity have been gone on losing at high as the rate of 30,000 species per year. From the 1995, it has started loosening more vigorousness about 3 species at every hour. Even though, there is only one plant species lost, it may cause the impact to other living species such as insects and animals more than 30 species. (Baimai, W., 1995a : 37-38, 71).

The forest in Thailand, containing numerous biodiversity, has been lost up to 2.5 percentages annually. Since 1961-1998 (37 years), Land-Satellite Image illustrated

that the of forest area has been deteriorated 89.9 million rais, or at average 2.4 million rais per years. Especially, the forest area of northeastern region is left the least 31 million rais, which equal to 12.34 % of total area that causes the plants and animals become extinction and some rare species are endangered. (Jaruppat, T., 1998 : 14, 103). In Thailand, there are about 15,000 plants species or 8 % of total plant species in the world, which have been identified are 1,657 species. It was founded that are 120 endemic species in this country, but only very few species that is about 2% of existing species in the country. The lost forest has caused the plant species loss is ongoing increasingly. One reason that the plants cannot be used effectively is caused by the natural succession process. However, human activities are more prominent roles such as firstly, the lacking of knowledge and understanding on local ecological system, secondly, lacking of basic knowledge before local development, thirdly, habitat deterioration (Ehrlich & Ehrlich, 1992 : 219-226).

The communities surrounding by the high biodiversity forest has accumulated indigenous knowledge in the plant aspect, and appropriate conservation pattern and process of each plant species, especially, the buffer zonal communities, which have biological resources and diverse cultures continually for long time ago. In Thailand, there are 12,360 buffer zonal villages; most of them in northeastern region are 5,144 villages. After the "Green Revolution" the community knowledge has been taken by modern gene connoisseurs. Therefore, the villager must urgently develop the pattern of right protection in order to protect their patent on indigenous knowledge. Simultaneously, they must recover the knowledge body and biological resources by setting the learning process on the community knowledge in order to transfer to next generation, particularly, in awareness raising and desired behavior on balancing resources utility and equality (Mc Neely et al, 1990 : 73). Global community has accepted the community right and local potential in community-base of natural resources conservation and management on the belief that it is the only way to save biological diversity as in the agenda 21, Convention on Biological Diversity, and in other agreements and conventions (Santasombat, Y. & Punyakul, W., 1994b : 94).

For the roles of community and people management on learning process have been accepted by Thai society generally, as being apparent in the constitution of the Kingdom of Thailand B.E. 2540, the National Economic and Social Development

Plan, the National Policy and Plan to Promote and Protect the Quality of Environment, the National Education Development Plan, and the National Education Act B.E. 2542.

The Thai knowledge on biological resources utilization has been accumulated in term of traditional healer, tradition agriculture, and preservation of edible plants genes and domestic animal genes. During the last three decades, Thailand has lost the indigenous wisdoms and traditional scholars, simultaneously, biological diversity due to neglect, and deterioration. Afterward, the western has turned to emphasize on sustainable development. The Thai developers have turned back to study the previous concepts and way of life in order to integrate with the modern knowledge without distorting nature and social current. The community people has recuperated the knowledge and learning management, including, connecting the learning network in order to interchange knowledge and cooperate in various activities in the form of local network in different part of country. Even though, there are no gatherings the number of local networks to be the database obviously, but it has been known widely by the academics, developers, and mass communicators that local community networks have established the learning management to provide for the networks, which are the members, including, individual network and group network as well, in order to recover knowledge and learning management by themselves effectively. There are local organizations to manage, in addition to; power of grass-root people has taken ecological amendments, environmental restoration, and sustainable development, subsequently, the bodies of knowledge are formed in a variety of aspects, especially, the biological diversity in the social dimension, and ecological dimension. It can be account to environmental education process, which is managed by people or it can be called as informal education, which is managed by people process. It is the most powerful process in changing environmental vision and policy that the Thai society has accepted more than ten years, because the pattern of process emphasizing on environmental and resources conservation are effective, for instance; the Ruk Muang Nan Group, the North Forest Community Network, Mai-reang Educational and Developmental Community Center, Song-khla People Network, Burirum Community School Project, Inpang Center, Wangnumkheaw Organic Farming Promoting Group, Thepnimit Eco-Agriculture Club, and Gud-chum Hospital Traditional Healer Club (Office of the National Education Commission, 1996 a : k-1).

The learning network in the community is operated by the people organization that is one dimension of environmental education management as informal education process that is congruent with the community roles supporting in the education management according to the National Education Act B.E. 2542 declared. The prior, it has still lacked of model and strategy research in presenting the environmental issues effectively, and not coping with topic of people development on knowledge gaining, awareness raising to environmental problem because it is the important issue and heart of the environmental education (Wongwanich, S., 1996 : 58-68). Especially, people learning process on the environmental aspect concerning to biodiversity conservation is the important and essential issue for present situation.

The diversity loss phenomenon of plant causes the occurrence of learning network in community, and the lack of environmental research on people learning process. Therefore, researcher was interested and curious to know that what is the model of learning management for villager providing by the community network and how to develop the network organization, what is the learning management process on plant diversity conservation for network members, and what factors support, and what is the limiting factor. How is the result of learning can causes network to learn, to aware, and to practice in order to conserve the plant diversity? How is network having model in conservation and how to benefit from the useful of plant diversity. What are strains and species conservation plants that can be used? The reason that causes the researcher had chosen to study the plant only because the plant is the actual producer in the ecosystem. They are the fundamental element to regulate the local and global environment, and the sources of containing biochemistry existing knowledge.

Human beings have interaction with the plant more complexity than other living creatures. They also have interaction among themselves on the plant diversity in the aspect of plant strains, which have caused the conflict interest, especially, on economic matter, more than other biological resources. Conserving plant strains is the first urgent biodiversity conservation in order to define the policy for all levels that are the community level, national level, and global level.

The researcher had defining the research problems with setting research question that what is the characteristics of appropriate model of learning network development for plant diversity conservation should be. The defining the topic in this

study is as “Learning Network Development for Biodiversity Conservation”, including, defined the dependent variables are 1) Behavior of network member in plant diversity conservation on knowledge, awareness, and practice aspect, 2) Patterns of plant diversity conservation, and defined independent variables 1) Characteristics of implementation to construct and develop the learning network organizations, 2) Process and method of learning of network for plant diversity conservation, 3) Factors involving on implementation of network organization and learning of network members for plant diversity conservation. The results of this research should be achieved the model of learning network development, which can be applied for other areas to create benefit generally.

1.2 Objectives of the Study

1.2.1 General Objective

To propose the model of learning network development that network can be implemented to conserve plant diversity properly.

1.2.2 Specific Objectives

- 1) To analysis the characteristics of learning network construction and development.
- 2) To analysis the process and method of learning of network on plant diversity conservation.
- 3) To analysis the behavior of network members on plant diversity conservation, which is the result from learning.
- 4) To analysis the pattern of method of network that conserves plant diversity.
- 5) To analysis the factors that involve the implementation of network organizations, and learning of network that crate on plant diversity conservation.
- 6) To synthesize the model of learning network development that conserves the plant diversity properly.

1.3 Research Questions

1.3.1 Main Question

The Model of learning network development for plant diversity conservation properly, how it should be?

1.3.2 Sub Questions

1) People organization, which is the main organization of the community network, implements to provide the learning to network member seriously and continuously, how the organizations develop and implement, until they become learning network, and how to connect. How the construction of organization, roles and functions within the organization, roles and functions among network, organizations, and other sectors at local level, and national level are look like. What the implementation of network that has objectives, criteria, and expectations should be. What aspects of body of knowledge are. How the learning activity between the networks are held, and what aspects that it effect to network members.

2) What are the process and method of learning network that encourage the member to be able to perform plant diversity conservation? What are the factors of learning, learning activities, achievement evaluation, monitoring ? How do they select the site and media for learning, and manage the curriculum? How do they define the roles and functions of involved persons? Who do involve ? What are the criteria of learning?

3) What are the factors that support and obstruct to the implementation of learning network , and learning process of members in order to conserve the plant diversity? What are the external and internal factors of network? Which are the major factors or minor factors? What are the specific factors or cofactors?

4) Can the networks members develop plant diversity conservation behavior, knowledge, awareness, and practice from learning process?

5) What are the characteristics of the agricultural areas that the learning network use to practice effectively in order to conserve plant diversity? How do they implement? What are strains and species of conservation plants? Where are

they brought? How are they spread? Where can they be grown? How and where are they cultivated? How much are plant diversity cultivated? What are they useful?

1.4 Scope of the Study

1.4.1 The research was the case study research about the community learning network, the main organization, which is the center of network, and network members both group network, and individual network. There is learning on knowledge gaining, awareness raising, actual practicing in order to conserve the plant diversity properly to location, and need for real action. At the beginning, it was studied from patterns and implementation of network organization, then spreading to study patterns and implementation of network members.

1.4.2 Geographical boundary, the study will be limited with three learning networks in the northeastern part of Thailand where they emphasize on plant diversity conservation through eco-agriculture process and organic farming consisting of both group and member networks, including, holding the learning process for them until they can conserve the plant diversity on their own land. These three networks locate in the “Buffer Zone” of the major mountain ranges of the region. Those are the follows:

1) Inpang Center, Ban Bau, Tambon Gudbag, Amphur Gudbag, Sakolnakorn Province, locate in the buffer zone of the connecting of Phuphan Ranges.

2) Thepnimit Eco-Agriculture Club, Ban Numlad, Na-yang-klug Tambon, Amphur Thep-sa-tit, Chaiyaphum Province, locate in the buffer zone of Phetchabun Ranges.

3) Wungnumkheaw Organic Farming Promoting Group, Ban Numsub, Wung-num-kheaw Tambon, Amphur Wungnumkheaw, Nakorn-rachsrma Province, located in the buffer zone of Sunkumpang Ranges.

1.4.3 The study search for the model of learning network development for plant diversity conservation through synthesizing Model from the following aspects:

1) Characteristics of construction implementation and learning network organization development.

2) Learning process and learning method of network for plant diversity conservation.

3) Supporting factors and limiting factors of implementation by learning

4) Network, and learning management for network on plant diversity Conservation, are considered together with specific factors and cofactors.

1.4.4 Research process is divided into 3 phases:

1) Defining and appraising concepts on model of learning network development for plant diversity conservation, and involving factor.

2) Analysis the model of learning network development for plant diversity conservation, and involving factor, including, cofactors, and specific factors.

3) Construction and presentation of model of learning network development for plant diversity conservation properly.

1.5 Assumption of the Study

1.5.1 The data were collected from the fields through in-dept interview, focus group discussion, observation, and questionnaires. The study was used to clarify the understanding on process of learning network development according to the actual circumstance from the emic view. However, the Proposal model of learning network development for plant diversity conservation was evaluated by connoisseurs. The academic conceptual framework was used by expert views and etic view in order to analyze and to synthesize to be universal academy.

1.5.2 Primary data were collected by in-dept interview, biographies, focus group discussion for sample groups, which are representatives of each network, and opinion data of sample group were claimed as the opinion of network committees and network members.

1.6 Limitation of the Study

1.6.1 Networks, which are used as the cases study are the community networks that its work copes with social, economic, educational religious, sanitation aspects. Each study case copes with more or less rely on context of the network. This study does not cover every aspects, but it concentrates only on learning on plant diversity conservation of network. Each learning network has no definite boundary, but it used the location of network organization and community, which has network members, to be the study area. Both network members, inside and outside community that network organization locates, were counted to be representatives of network members.

1.6.2 Biodiversity conservation is global issue, this investigation will narrow down to specific issue on plant diversity conservation because plant are biological resources that plays important roles to other living creature, and most role to human being. It is the resource that causes the conflict interest and impacts to the economic problem more than other resources in the world.

1.7 Definition of the Operational Terms

Learning network means individual and/or group and/or organization that interrelate and transfer knowledge each other when the villager organization, which is the main organization, act as network center to manage learning process for members.

Learning network development means the process of network organization construction, improvement, and changing in order to administrate and manage the learning process for network members to create knowledge, awareness, and actual practice toward their objectives.

Learning process and learning method means components, principles, contents, curriculum, personnel, media, learning activities, including to evaluation, and monitoring.

Model of learning network development means pattern and implementation of network organization development , and pattern of learning method management for network members.

Network organization means community organization, which is villager organization or people organization, acts as main organization and center for whole network members in both individual level and group level.

Learning network organization means individual or group of people who come to join together in order to set the organization with the structure and management system consisting of goals of learning development for networks.

Network member means individual or group of people who joins activities, and accepts to follow the setting regulations and agreements, and the network membership is still effective at present (during the research period). The individual network members are under the supervision of group network members.

Network committee means persons who were elected by network members or representatives, and group network according to the setting agenda to act as administrative committee.

Biodiversity means different and variable species and strains of plants, animals, and microorganism in the same and different ecosystem.

Plant diversity means different and variable species and strains of plants, which is the result of incessant evolutionary of plant, and humans are able to create plant diversity on cultivated land.

Biodiversity conservation means gathering, preserving, recovering, spreading strains and species, utilizing, of the plant, animal, and microorganism indirectly and directly.

Appropriate plant diversity conservation means gathering, preserving, recovering, spreading strains and species and preventing from extinction strains and species by dividing appropriate area for conservation of each strain and species for growing that is congruent to land circumstance, human demands, need for living at present and in the future, including to, wise use direct and indirect usefulness as long as possible.

Usefulness of plant diversity means bringing the different numerous plant strains and species to be used as raw material, transforming, value adding, in addition, economizing use, and maximizing use in order to convey to next generations through the process of agriculture, industry, medicine, nutrition, commercial using to improve the ecosystem and environment.

Behavior on plant diversity conservation means individual expression to illustrate knowledge, awareness, and being able to practice in order to conserve and utilize the benefit from the different numerous plant strains and species.

Knowledge on plant diversity conservation means ability to identify the value, usefulness, and importance of conserving and recovering the plant strains and species, including, important classification, benefit explanation, valuable utility of preserving and spreading of plant strains and species, and being able to identify its survival environment.

Awareness on plant diversity conservation means perceiving, accepting, and recognizing their obligation and responsibility to do activities in order to preserve and improve the diversity of plant strains and species for sustainability.

Practice for plant diversity conservation means doing the various activities in order to preserve the different and numerous plant strains and species in forest, house garden, orchard, and farm. Utilizing the benefit from each strain and species of plants is obtained properly.

1.8 Contribution of the Study

The usefulness is obtained from this study, there are three dimensions as follows: academic dimension, policy dimension, and practice dimension as in three aspects that are diversity conservation, especially, plant diversity aspect, learning development in community, by community and for community aspect, and environmental education aspect.

1.8.1 Academic Dimension Contribution

1) Obtaining the body of knowledge, presents the relationship feature of network at community level, and model of plant diversity conservation that appears in the present time.

2) Obtaining the model and guideline of learning development in community for biodiversity conservation through the strategy of learning knowledge.

3) Obtaining the guideline and method of environmental education management in term of non-formal education system through the villager process.

1.8.2 Policy Dimension Contribution

1) Being data for policy maker, planner, project manager use for defining the model and method of biological diversity, and other natural resources.

2) Being data for complementary planning of environmental education development in both national level and local level.

3) The involving agency in community learning management is able to bring model of learning development by villager process in order to plan and support.

1.8.2 Practice Dimension Contribution

1) Academics, developers, environmental educators, community leader, people are able to learn the implementing strategy of learning network, and pattern of biological conservation in order to use for application purpose.

2) Environmental educators and person who involved in environmental education management is able to learn process and method of learning through the learning network construction by villager process in order to use for environmental education management.

3) Performers on local educational management emphasize on resource and environment conservation, and are able to learn, Model of network, learning process, and learning method are brought to apply in non-formal education and informal education management.

CHAPTER II

LITERATURE REVIEW

Developing a system of learning that promotes the preservation of biodiversity must borrow from various disciplines, such as science, social science, and the art of instruction. This is so that an analysis of the most suitable form of learning can be made, as follows:

2.1 Related Literature

2.1.1 Learning in community and learning network.

Learning is a process that develops a person abilities and changes a person view of his surroundings. It is a powerful process of change: from ignorance to knowledge; from not knowing what to do something to being competent enough to do so. Learning also changes a person's behavior permanently and continuously. The ultimate goal of learning is to be able to modify and adopt various sources of information for the benefit of oneself and one community (Jaithiang, A., 1994 : 13; Samran, C., 1995 : 3 and Pothiyant, A., 1996 a : 18).

The process of learning within a community will happen by accident, happen because a person tries to learn by himself or happens within a group (Israwat, S., 1992 : 89-90). Learning can occur within the family and community or outside the family and community. To develop one abilities to discern and adapt to the surrounding environment, one must realize that the learning process includes the discernment of information, analysis of that information, setting up of questions and the process of trying to find answers to problems that occur. Problem solving skills start with the ability to diagnose the problem, analyze the alternate solutions available, and make a decision based on the best possible choice. (Wasi, P., 1992 : 9).

One of the best ways to develop a person abilities is to immerse the person in a group environment, or let him have hands-on experience in solving real life problems in a systematic way. This systematic way integrates observations, intuition,

and knowledge in such a way that questions can be posed. The answers to questions can then be searched for in textbooks, the internet, asked from superiors, research, experimentation, or other methods that incorporate real evidence. The answer that was found can then be used to benefit the self or the community as a whole (Wasi, P., 1993 a : 29).

The learning process in and of itself is a natural one, a process that is already incorporated into everyday life and in human socializations (Tansiri, W., 1993 : 60). The learning process is dynamic and never-ending; it is never static or finished, and knowledge gained is knowledge that is relevant to the community, such as history, herb lore, animal lore, culture, and such. Therefore, the usage of the learning process is threefold: 1) to have knowledge of the truth, 2) to develop the ability to integrate various sources of knowledge together, and 3.) to develop a conscience, as a person who understands the relationship between himself and his surroundings. There are three ways of learning: 1) learning from the five senses (from the environment), 2) learning from thinking, observation, and listening, all the while developing the ability to make good assumptions, and 3) learning through the conscience, which lets a person make shrewder decisions based on morality (Wasee, P., 1996 : 26-50). This makes the learning environment of a community become a stimulant for a person to continuously learn for the rest of his life. Humans by nature never stop learning the process of thinking can therefore be thought of as the key to developing an educational system in society (UNESCO, 1992 : 181 and Archara Pothiyanont, 1996 b : 5).

Traditional learning is one system in use by communities. This method of learning is taught through real hands-on experience, and is mostly taught to groups by a qualified, respected elder. There is a basic understanding that humans are a part of nature, that humans desire to know, to do, and to be or to become. Learning follows five simple facts: 1) it can happen anytime, anywhere, 2) learning should focus on actually learning the knowledge and not just teaching, 3) there is a relationship between the learner and the environment every person must understand his duty, 4) the result of learning is behavior acceptable to society, and 5) once a person learns, that person can take his knowledge and adapt it to various situations and that person is also able to teach others. Two strategies to learning include 1) self-learning, which is

learning by observing and imitating and 2) learning through others, which is more systematic, and either with or without a plan.

Components of the learning process include people, knowledge, the resources of that community, content, and activities that the community can offer. This is a natural way of learning simple, straightforward, and fast, covering practically every aspect of life. This learning includes the following parts:

1) People : connoisseurs, community leaders, people with specialized knowledge, role models.

2) Knowledge : traditions, experiences, and the ways of life that a community developed (including all academic knowledge that comes from outside the community).

3) Resources : tangible resources such as money, land, wood, water, animals, and plants, as well as intangible resources such as knowledge, morality, culture, and other customs and tradition (Office of the National Education Commission, 1996b: 28).

Group learning is a more recent method of learning that incorporates four strategies, which include 1) learning in a group that encourages questions, activities, and creativity to flow among members, 2) developing an environment inductive to learning, 3) providing advice and using psychology as an aide, and 4) analyzing the results.

Not only should group learning be encouraged individual learning within that group setting should also be emphasized. The three steps of self-learning within the group include 1) using one imagination and ability to project “what if” scenarios, 2) cooperating with others in the group and being willing to share ideas and have friendly competition, and 3) developing the ability to independently search for information and being able to share one’s experiences with the others to gain new knowledge (Promboot, S. and Pornseema, O., 1997 : 23-20).

From the theory of Kolb, D. A., learning through experience is learning that incorporates the mind, emotions, values, and thinking process of various individuals involved. The resulting knowledge is therefore an integration of experiences that change through time. The process of learning thus can be divided into four types, which include the following: 1) experience through hands-on work/experience, 2) decisions that are made from the exchange of ideas, 3) the birth of a new thinking

process or principle, and 4) the use of the knowledge in the context of a new situation (Kolb, 1984 : 41; Arends, R. I. 1994 : 499-501).

Besides this, the process of learning is also dependent on each individual learning style and environment. Important supporting factors within the environment are 1) opportunities for the learner to grasp a problem and have the freedom to pursue the search for answers, 2) immediate feedback after an action, 3) letting the learner set his own learning pace, 4) giving the learner a chance to find new relationships among different factors in any given situation, and 5) letting the learner find cultural and social components. (Suwan P. & Suwan S., 1993 : 52).

Social learning is a theory of Bandura (1977 a :1-16). Later on this theory was developed into the social cognitive theory. An important facet of this theory is that modeling has a great impact on the learner. A model can be a living thing, such as a person, or it can be a symbol or non-living thing, such as the information in a book, for example. The learner will observe whatever the model is giving out and will develop corresponding behavior. This can be a theory of imitative behavior as well as a cognitive theory, as it deals with observation that then ultimately leads to action. A person must be able to think and use his imagination to symbolize the various actions that can take place, and then use reasoning or educated guessing to predict the likeliest outcome. Lefrancois (1994 : 68) states that motivation is the force behind actions and that both the learner and the environment have the power to interact with each other.

Bandura (1977 b : 9-16) summarized the theory by saying there are two behavior determinants that will determine whether or not an action is taken:

- 1) Antecedent determinants are previous experiences that have continually impacted the situation. Those with good reasoning ability will be able to foresee the outcome and choose the best option possible.

- 2) Consequent determinants are those that occur when the action has taken place; any positive or negative results that happen are noted and the person will later behave accordingly.

There are two ways of social learning:

1) Learning by response consequences is learning from experience, and any negative outcomes will result in the action not being done again. Support and encouragement for a choice (called reinforcing contingency) comes from inspiring, motivating, or authentic information.

2) Vicarious learning is learning through the experiences of others. It is through observation of other people that the learner experiences the positive or negative and thus either imitates or avoids the same actions.

The importance of the model is summarized as follows (Bandura, 1977 c : 40-50):

1) The model makes it possible for the learner to observe and modify behavior through observation.

2) The model has a part in discouraging or encouraging a certain behavior in the learner by letting the learner see which action will result in a positive outcome and which reaction will result negatively, without the learner having to do anything (vicarious reinforcement).

3) The model can influence the attitude or emotions of the learner and therefore subtly pull or push the learner to do or not do certain things.

Learning through experience is thus intensely supported by society because the model has such a lasting impact on the learner. Besides this, social support encourages the interchange of information and the development of relationships within society. Important features of social support for a person include the following:

1) Satisfaction in social relationships

2) Individual pride in participation of activities

3) Feeling that the outcome of social experiences are positive

4) Feeling that there are resources that society gives, such as information or labor, that sends out positive outcomes for everyone involved

5) Outcomes are the results of cues or the result of positive consequences from acceptable actions

6) Support from one's peers when one does right, or punishment when one does wrong

7) Participation in society because of acceptance and because a person finds value in society.

Support must be on the same level as the needs and values of an individual, else the person will not accept any help. Supporting positive outcomes is good for developing society overall; it makes relationships and networks become even more integrated (Cobb, 1976 : 350; Cohen & Syme, 1985 : 4; Power, 1988 : 41; Bomar, 1989 : 91; Pender, 1996 : 257 and Miltenberger 1997 : 528).

A network of learning will start because a group of people band together to fight a common cause to solve a problem of survival. It is a co-dependent relationship, and when people get together into a community, learning happens learning about the environment, about the natural resources and forestry, for example. (Wasi, P., 1993 b : 29) The important aspects of community learning include fairness, freedom, cooperation, and equality. The national education development plan of the B.E. 2535 has mentioned that community learning is a new dimension of education, and has the following important characteristics:

1) It is learning that happens to everyone regardless of age and sex. There is an exchange of information within the community itself.

2) Previous knowledge is used as a base for modification and development of further knowledge.

3) There is an organization within the community that arranges educational activities, wherein the community members come to exchange knowledge and help solve problems.

There are many types of learning networks, two of which are the vertical network and the horizontal network. Local networks consist of members that are a part of the same community. The expansion of learning starts from coordinators and connoisseurs within the community network who stimulate the search for knowledge and the exchange of information, both within and outside the community. Knowledgeable people will be the ones to integrate traditional knowledge with new. They build up a new learning organization that is useful in everyday community life, with support from governmental and non-governmental networks (Office of the National Education Commission, 1990 a : 2-9). A network life cycle is like a living

organism: there will be a period of integration, expansion, prosperity, decline, and come-back .(Chareanwongsak, P., 2000 : 53).

A community learning network is a place where an individual can develop his own learning capacity. This creates new ideas and a broader perspective. (Senge, 1990 : 2) An organization will make learning convenient for its members and continuously develop the system of learning and stimulate its members to use their own abilities. (Pedler et al., 1991 : 1-2) When mistakes or successes occur, there will be an opportunity for the organization's members to discuss and analyze the outcome, which becomes a learning experience for all. This is the reason why the entire country would benefit if there were learning networks all throughout the land; it would stimulate people to do better and be more knowledgeable.

Learning about biodiversity is best done along with learning about the physical world, the social sciences, and spirituality, as these will help develop one's conscience and help a person to live morally. (Wasi, P., 1993 c : 20-24) There are times when resource management has pushed more than one community join together to form a learning network for the benefit of both sides, and they set rules to control themselves. (Nakboot, A., 1993 : 9) This phenomenon has occurred only within the last few years, when resources have become scarce and communities must work together to manage earth, water, and forest that are within their boundaries.

From a national meeting held in 2538 (Buddhist calendar), it was said that learning networks connect people in different social classes together, making them accept one another so as to share ideas and knowledge about different issues a process passed on to later generations. (Office of the National Education Commission, 1995 : 226) Building and connecting learning networks can start from environmental work such as the preservation of forests, animals, and plants. The link between such networks is the exchange of resources and information as well as plants. One group started in Panga province, where there was an expansion of knowledge about plants and vegetables through seminars. Future communities will be news centers, willing to share information and exchange experiences to avoid fighting for natural resources (Boonchai, K., et al., 1995 : 5-26).

There are many related documents, such as the research dissertation of Grudens Schuck, Nancy (1998 : Abstract). In her work, it was found that in environmental conservation it is best to work as a team it is best even in farming. As for the work of Hassaniein and Neva Emily (1997 : Abstract) in Wisconsin-Madison, USA, it was discovered that no two communities were alike in knowledge and ability; the arranging of activities for members is a way to exchange and expand knowledge, ideas, and beliefs.

In Thailand, the work of Tantawooto, W., et al., (1997 : 7/10-7/12) states that the learning process is done best if it is not confusing and if a respected person teach and let the members have experience with the subject. This is what Boonchai, K., et al., (1995 : 23-27) said in their work as well, that the learning of communities is best done when there is a good system, when there is feedback, and a time and place is officially set for the exchange of knowledge and the solving of problems. U-thai Doolayakasem and Ornsri Ngarmwitayapong (1997 : 12-28) also found that an important part of learning is the environment and family where the learner is; the subjects learned should emphasize more on doing than theory, and there must be a variety of ways to learn.

The work of Chiangkol, W., (1998 : 15-20, 65, 71) regarding the crisis and the IMF found that the crisis happened because learning in Thailand was more a matter of remembering, without any analysis, critical thinking or anything else that would develop people's brains. It is therefore important to develop quality people to direct the country toward change. This concept is in agreement with the work of Chuchart, W., (1998 : Abstract), who studied the system of network building to preserve the northern forests. It was found that a learning network can be built from a person in or outside an organization, who will coordinate efforts between networks and expand the relationship through seminars and the exchange of information.

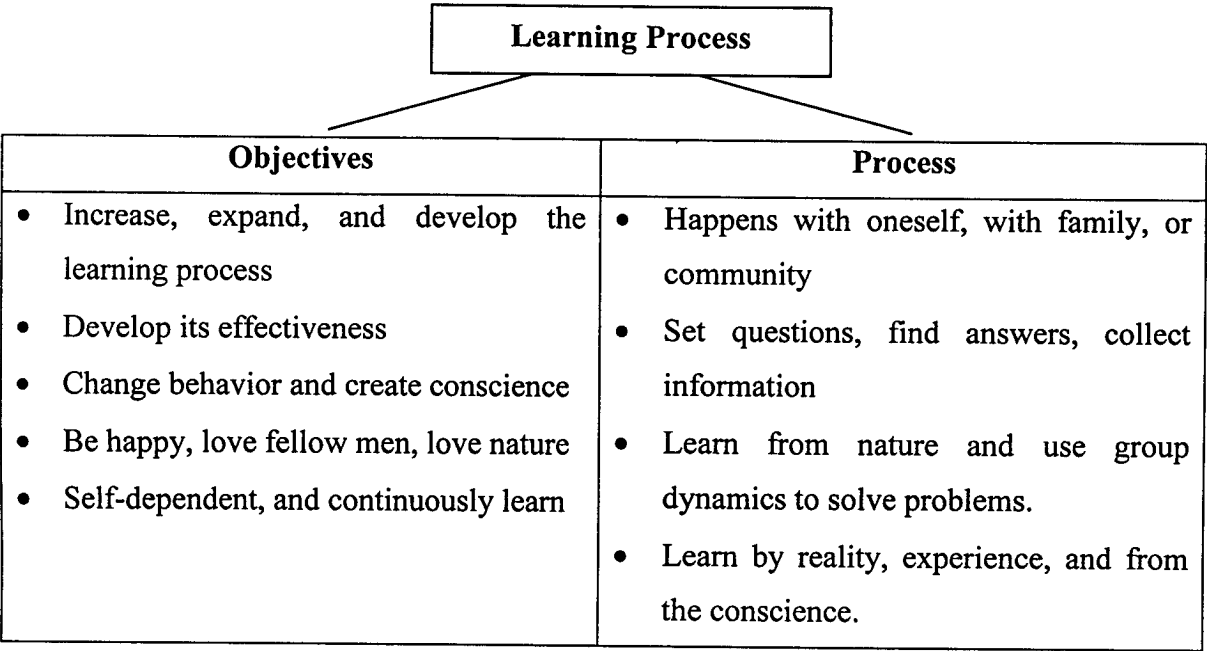


Figure 1 Summary of Learning Process

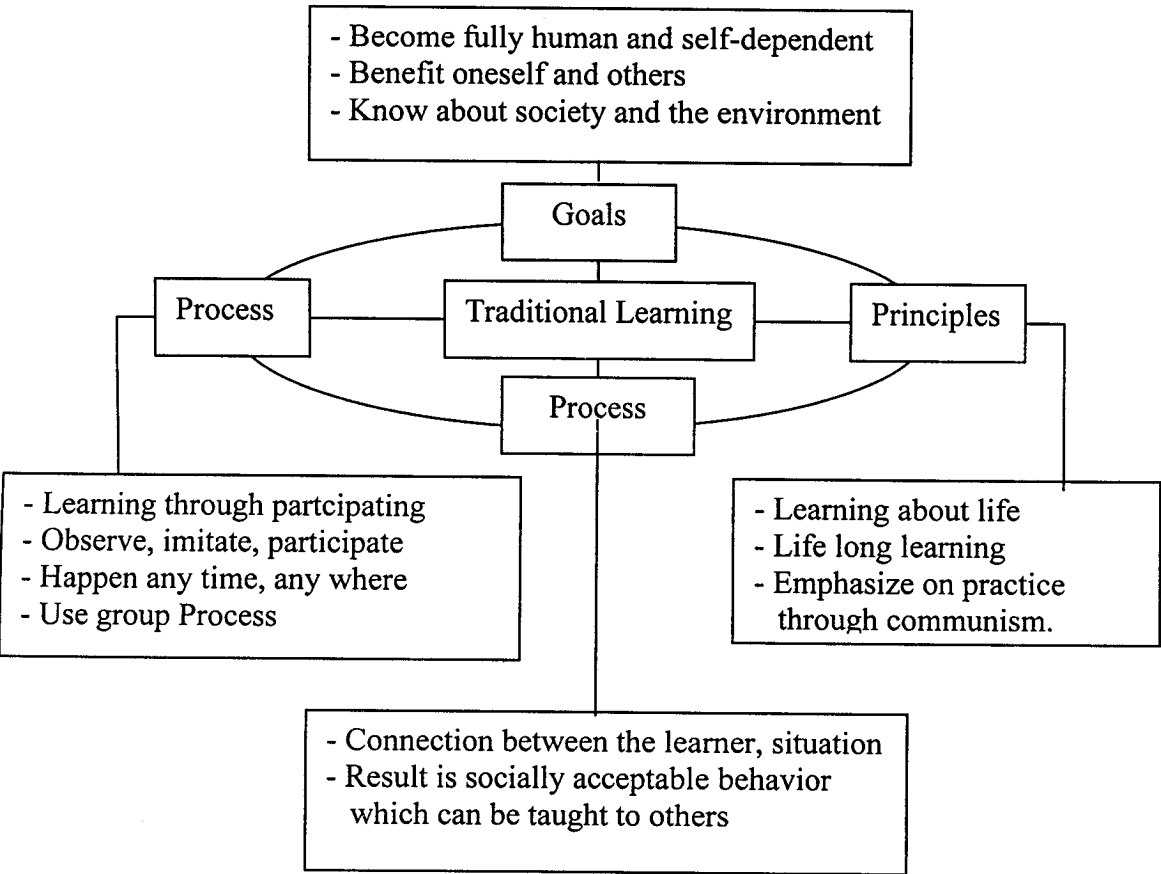


Figure 2 Summary of Traditional Education

- The learning process
- Learning the environment
- Learning by hands-on experience
- Learning through society

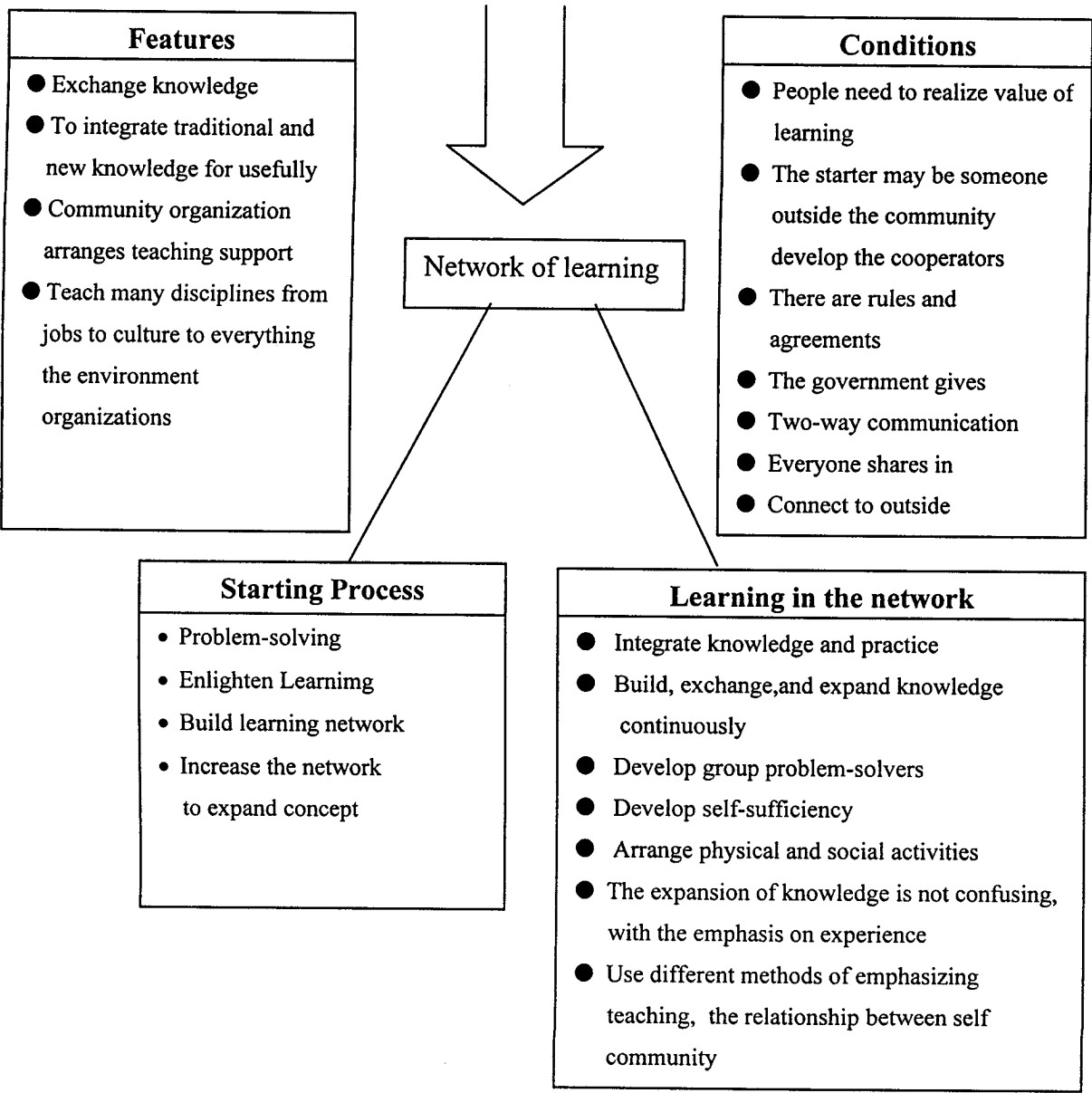


Figure 3 Summary of the Learning Network

2.1.2 Biodiversity Conservation

Biodiversity is the variety of different life within different ecological systems throughout the world (Reid and Miller, 1989 : 3; Chanapat Winyawat, 1995 a : 11 and Jiraporn Kochasenee, 1994 : 19). Biodiversity can be divided into three levels: 1) species diversity, 2) genetic diversity, and 3) biodiversity. Biodiversity is useful in the areas of farming, medicine, industry, culture, science, and economy such as through consumption (Baimai,W., 1995 b : 37-38; Santasombat, Y., and Witoon Panyakul, W., 1994 b : 21).

The preservation of biodiversity is an important issue at present. There are many international contracts and agreements regarding the matter. The emphasis on biodiversity can be seen from the international agreement at the Earth Summit, where 157 countries including Thailand pledged to do all they can to preserve biodiversity within their own country.

In-situ conservation preserves natural habitats as well as helps in the conservation of the various plants and animals found within those habitats. This type of conservation is crucial to plant conservation, as plants need to grow in places they are adapted towards. It is for this reason that forest preservation is so important; it lets plants continuously grow together in their natural groups. An important part of conservation is to let the area close to the conservation become protected as well, with the support and help of the surrounding communities. They can help to revive the area by learning about it and respecting it plants can thus have a chance to survive from extinction.

Ex-situ conservation is conservation that takes place outside the natural habitat, for example placing seeds in a seed bank or a gene bank or animals in a zoo.

Sustainable use means being able to benefit from the use of biodiversity in such a way that it will not harm the biodiversity in the long run, all the while preserving it for use for future generations. A feature of sustainable use is not damaging or destroying that resource. Uses that come from resources include consumption (food) and use (national park), (Winyawat, C., 1995 b : 18).

Plant preservation is the responsibility of every level: the community can take care of plants within its area; in the national level, policies and laws can be regulated

to preserve plantlife. Plants are a valuable human heritage they come together and go together.

At present, local communities use natural resources for a variety of reasons, be it economical, cultural, or social. Each country ought to support the communities so that they can learn about environmental preservation; the communities need to realize that they are the ones who suffer the most or will benefit the most from changes in the environment (Winyawat, C., 1995 c : 75-78).

The dissemination of information regarding the conservation of natural resources and biodiversity must be given to people in every social class and in every profession. A variety of media should be used, be it radio, television, or documents. Eco schools can be established to teach the youth about environmental concerns. Group activities that promote preservation can be set up, and information should be shared through every medium possible so people will understand what the truth is (Office of Environmental Policy and Planning, n.d., : 6-15).

The research of Jacob (1982) and Myer (1988) in Santasombat, Y., (1999 a : 43) found that many biologists were interested in the impact that biodiversity had on culture. Anthropologists are enthusiastically studying about how communities use their surrounding environments, which is an argument in favor of the theory that humans are linked to the biodiversity found in the environmental surroundings. In Malaysia it was found that local communities made 1,200 uses for plants in the forest. Studies have been made that show that 80% of the people living in developing countries use local remedies and medicines, and 85% of those local remedies come from plants. This shows that 3.5 – 4.0 billion people use plants as medicines, and preserving the biodiversity of plants is a must.

The research of Boonchai, K., (1997 : Abstract) found that in preserving biodiversity, the ideal solution would be to set up a farming organization, youth medicine organization, and a conservation organization that can all help each other lay down a system to preserve the environment. From the research of Sampanpanich, P., (1997 : Abstract) , it was found that home gardens resembled natural forests the most. Even with crops, there is still a wide concentration of plant life, on the average of 1,275 plants per hectare, with almost 38 different plant species. Cheumsakul, S., (1999 : 27) researched the Mong method of farming and found that they have two parcels of

land; the first is for planting rice and vegetables for food, while the second is a poppy field where they will plant a myriad of plants and trees. This makes the food grown there taste better than the food in the rice field.

Santasombat, Y., (1999 b : Abstract 194-195) found that biodiversity and the living conditions and knowledge of the local community are very important for development. Knowledge about plants, food, and medicine, techniques for farming and resource management, and fairness within the society are all important conditions to the continual development of a preservation system. There are many types of preservation and they give the following benefits: 1) the preservation of the environment means the preservation of food and medicine, 2) the preservation of cultural heritage encourages the preservation of biodiversity, 3) preserving biodiversity is preserving the source of food for the community.

Type	Process
<div>1. In-situ conservation<ul style="list-style-type: none">• Conserve plant and animal life that is becoming extinct• Respect and preserve the environment and add that preservation attitude to local learning• Care for plant and animal life</div> <div>2. Ex-situ conservation<ul style="list-style-type: none">• Collect in seed banks, gene banks, zoos.• Develop the area surrounding the conservation place</div> <div>3. Sustainable use<ul style="list-style-type: none">• Use sustainably and reasonably• Use for present and future generations• Use in a way that it won't destroy or damage the environment• Use for consumption• Use in many forms, such as medicine and food• Let the local communities use it together with culture and tradition.</div>	<div>1. Use the process of learning<ul style="list-style-type: none">• Cooperation among the academics and field professionals.• Combine new and old ways of thinking.• Teach youth about conservation.• Connect biodiversity with other resources that the community uses.</div> <div>2. Use the media<ul style="list-style-type: none">• Disseminate information• Encourage learning for the purpose of conservation</div> <div>3. Use the law<ul style="list-style-type: none">• Create local laws• Improve and accept laws, policies, contracts</div> <div>4. Management<ul style="list-style-type: none">• Arrange group activities• Integrate governmental and non-governmental agencies with the community.• Preserve plants and animals and their environment.• Protect the earth, water, and forest• Use local knowledge</div>

Figure 4 Summary of Biodiversity Conservation

2.1.3 Environmental Education

Environmental education is for developing people to understand that they have a relationship with the environment and that whatever they do affects it. This education is there to help create consciences within people and stimulate them into responsible behavior by using technology of education to develop the quality of the environment. (Stapp & Dorothy. 1981 : 1; Schmieder & Allen, 1977 a : 25; Chunkao, K., 1993 : 715 and Veeravatnanond, V., 1996 : 15)

The principles of environmental education, as stated in the Belgrade Charter (UNESCO-UNEP, 1976 : 2) and at the 1977 Tbilisi conference (UNESCO, 1978 : 27), include the following: environmental education needs to be studied in totality, such as natural and man-made environments, technology, and social science. Environmental education is a life-long process and is interdisciplinary it enables a person to see from a larger perspective, from local to national to global. It emphasizes decision making, the acceptance of reality, and understanding the environment from past, present, to future. It is about developing critical thinking and problem solving ability from hands-on experience; it encourages the search for information. Environmental education combines social science and biology together, and it trains community leaders to become knowledgeable about the environment and to be environmentally conscience. (Schmider & Allen, 1977 b : 30) It is a systematic type of education that promotes problem solving ability that can be used in everyday life (Veeravatnanond, V., 1989 : 86-87).

The purpose of environmental education is to create awareness, knowledge, understanding, responsibility, problem solving ability, and the ability to analyze environmental outcomes. (UNESCO-UNEP, 1993 : 25) It is to integrate biology with social science and culture, to let humans live in harmony with nature. (Yong, 1982 : 264) Another purpose is to help people develop the ability to analyze environmental problems and to be willing to change their behavior accordingly. (Lozzi, 1990 : 47) The last purpose is to change the behavior of all groups of people in a society to be environmentally responsible, by using a variety of different ways to show their responsibility. (Toumsoboon & Sukwanich, 1998a : 61) This goes with the environmental slogan "Think globally, act locally." (UNESCO-UNEP, 1990 : 1).

To arrange environmental education, it is necessary to use techniques of both formal and non-formal education. (Toumsoboon & Sukwanich, 1998b : 61) The learning manager must be enthusiastic about changing behavior to reflect the purpose of study; success is dependent upon the learning process, the tools used, activities arranged, and the passing on of knowledge. (Peyton, 1977 : Sanchez, 1990) Information, knowledge, and beliefs about the environment need to be re-evaluated. (Novak, 1991 : 20) The student should be included in the planning process, learning process, and decision making on the basis of democracy with the learner being the center (Office of the National Education Commission, 1990 b : 4).

Environmental education should use a variety of ways and media to teach others, such as having field trips to let students experience the real thing, using photographs, slides, movies, videos, or accumulating information from experiences. Field training should also be implemented to let students learn to work with others and let them study the ecology of the environment, including topics as water sources, construction, and plant life. Environmental projects can be set up into group activities. An connoisseur can be invited to speak, interview, and do experiments; special activities such as debates or plays can also be arranged. (Veeravatnanond, V., 1994 : 155-157) Besides this, activities can be arranged between schools, communities, and various authorities, starting from working together to plan the restoration of the environment by making signs, developing awareness, creating a nature center, planting trees, or helping with the clean up of trash. (Sripahol & Seniwong Na Ayuttaya, 1995 : 107; Kamchaturat, P., 1987 : 738)

The measurement and analysis of the results of environmental education should be measured by various means, such as progress made. Also, tests and experiments about the environment can be set up to check the progress of individuals and groups. Observations, reports, and other methods can be used to find out the truth about the students knowledge, taking into consideration the students motives (Ministry of Education, 1989 : 99-101)

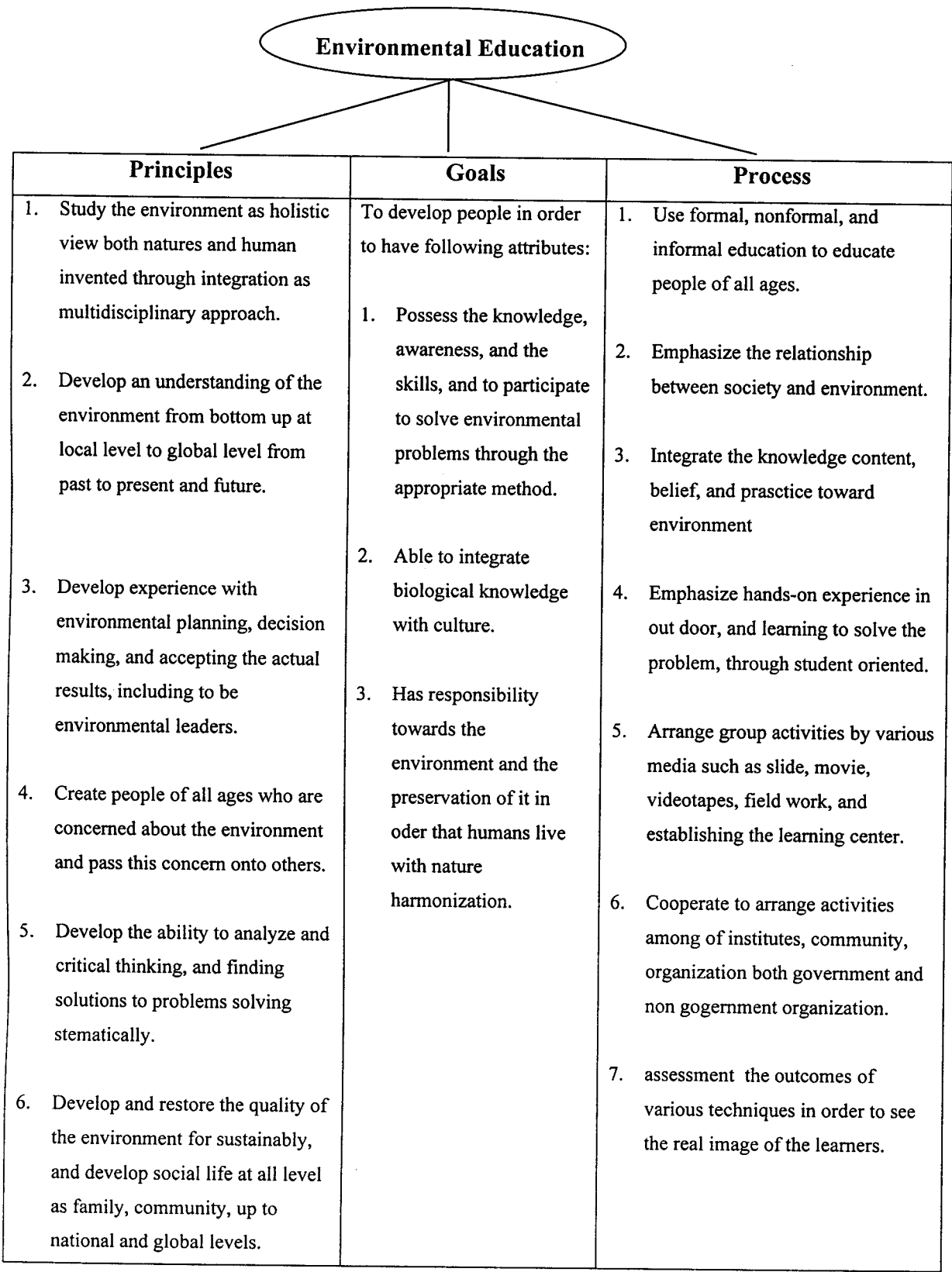


Figure 5 Views on Environmental Education.

2.1.4 Assessment and Auditing by Connoisseurs

The use of connoisseurs to examine and test the authenticity of new things that have been presented to the public is popular when those new things cannot be tested, either because of time, place, person, budget, or other constraints. The new things might be a technique, system, or process, for example, and the comments and critiques of connoisseurs in various fields is an accepted practice because those connoisseurs have accumulated much experience in their field. It can therefore be said that connoisseur opinion is a good analysis tool. This process of analysis was developed from the thinking of Eisner and the researchers at Stanford University, (Pahner, 1992 : 18). The basic, important features include the following:

- 1) Emphasis is placed on analysis in every aspect that is brought up, regardless of whether that aspect has anything to do with the purpose of the study or the people involved, or the decision making process. It can, however, be integrated with the main analysis depending on the decision of the connoisseurs so as to have a quality analysis that is effective.

- 2) Specialization is the emphasis on the analysis of details by connoisseurs. It is popular in academic circles where specialized connoisseurise is highly valued.

- 3) Use the connoisseurs as tools, based on the belief that the connoisseurs are accurate in their analysis, and their experience and connoisseurise can become the judging standard.

- 4) Have flexibility in the selection of connoisseurs, looking at each individual's field of connoisseurise and ability.

- 5) The selection of connoisseurs should rely on the status of the connoisseur's work, his experience, and high credibility within that field (Eisner, 1976 : 192-193).

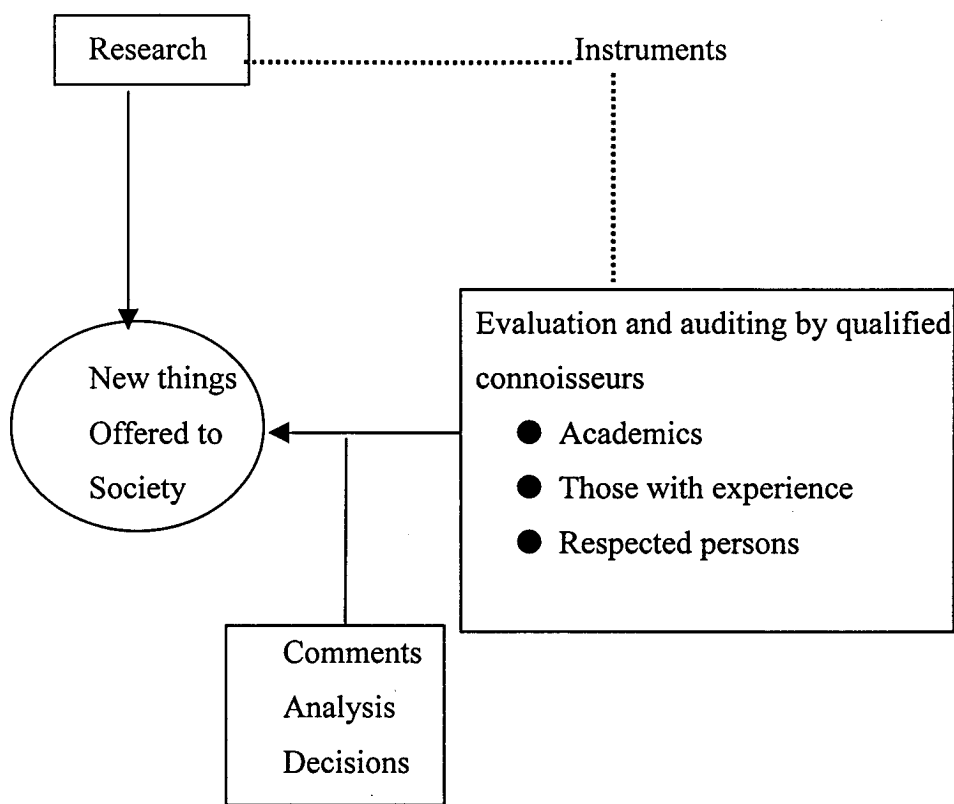


Figure 6 The evaluation of qualified connoisseurs

2.2 Conceptual Framework

The research conceptual framework in developing a network of learning to conserve biodiversity by emphasizing plant diversity comes from scientific thinking, social sciences, and education, as well as related research. Besides this, there has been evaluation by connoisseurs who have evaluated the new techniques. Therefore, this makes the research a thorough analysis of the problems and solutions broadly found. The researcher thus set their own framework of research and conceptual framework of thought in the analysis of Figures 7 and 8, as follows:

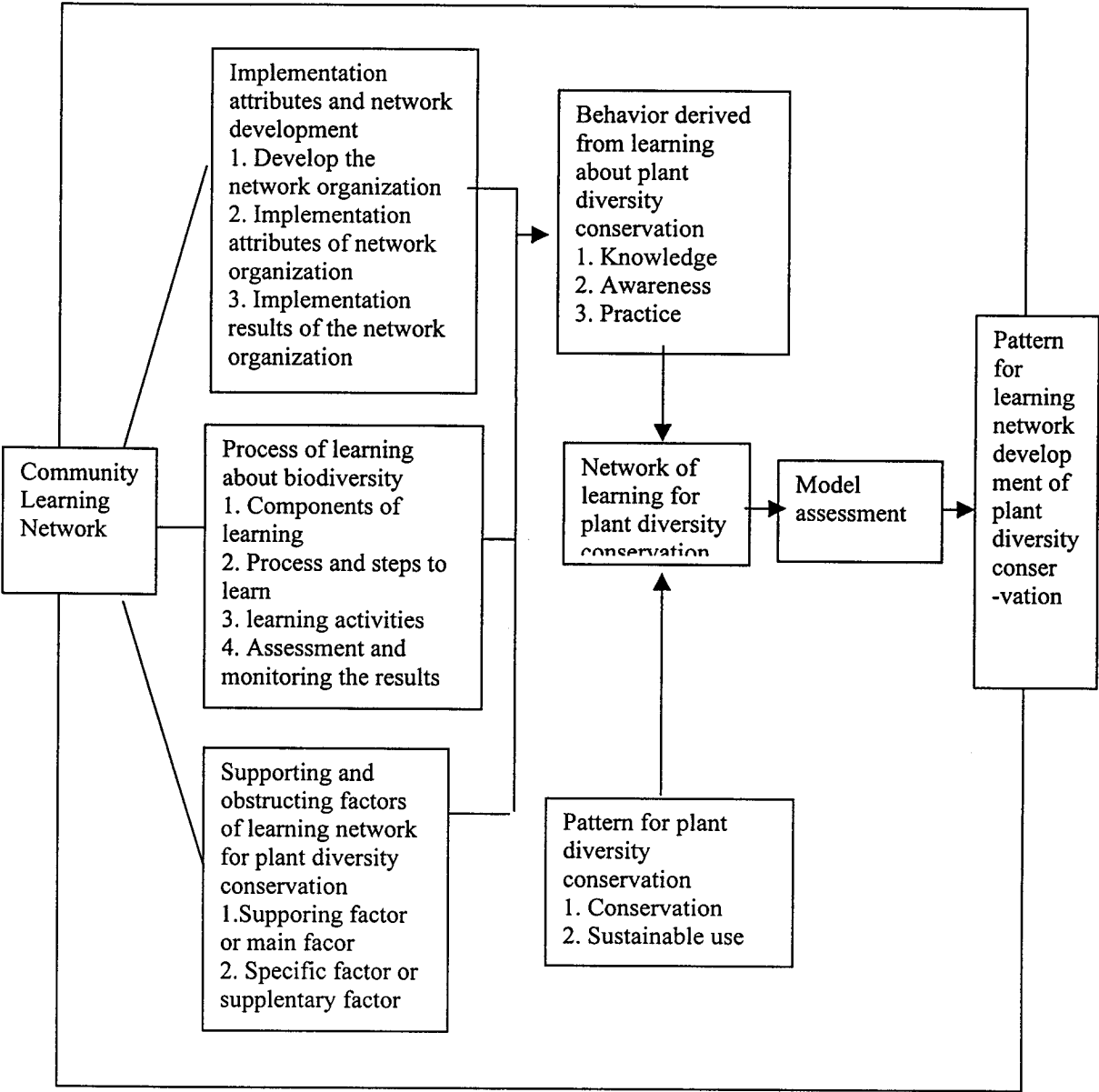


Figure 7 Conceptual Framework

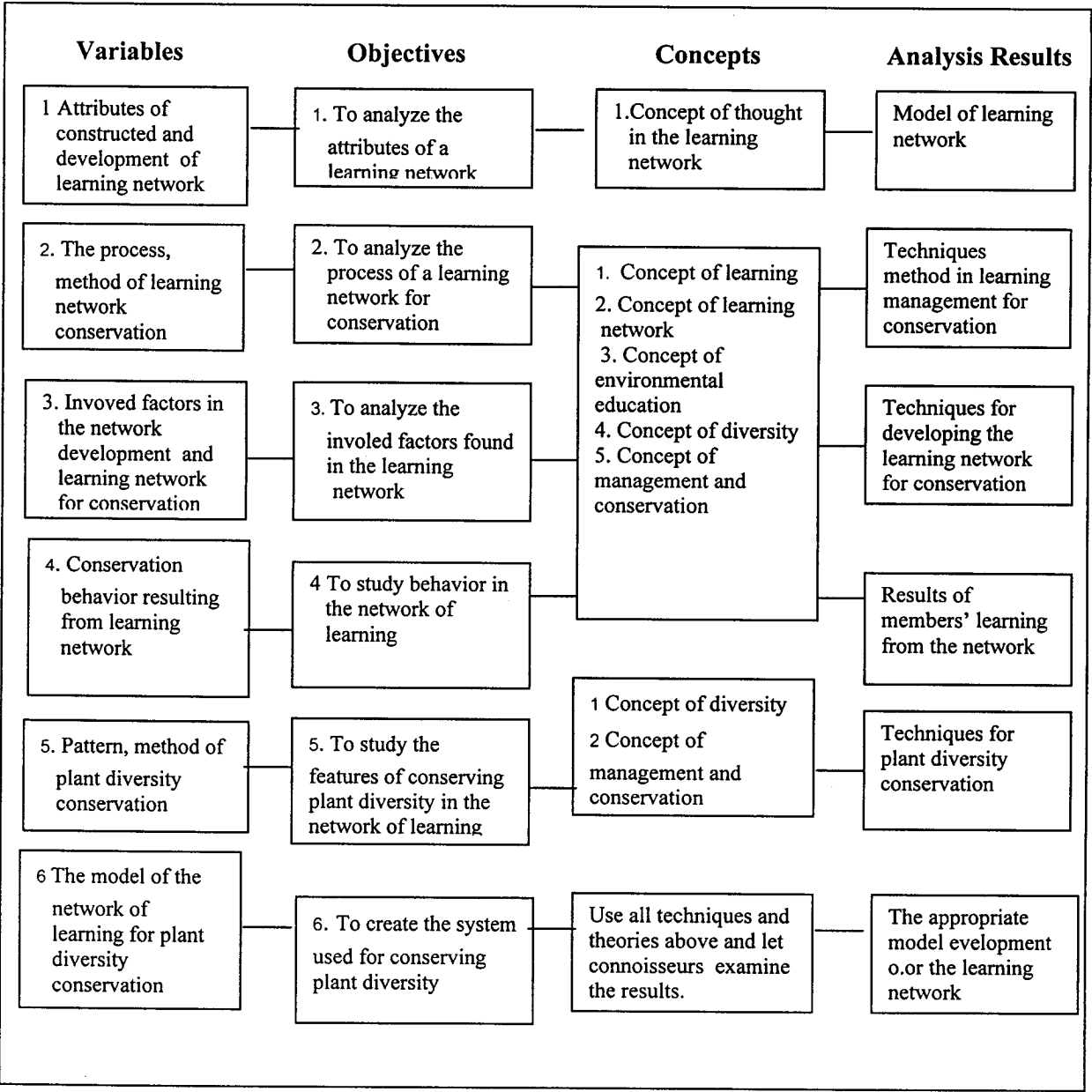


Figure 8 Conceptual Analysis Framework

CHAPTER III

RESEARCH METHODOLOGY

The study on “ Learning Network Development for Biodiversity Conservation”, it searches for the model of learning network development for plant diversity conservation, through the analysis the construction and improvement of characteristics in order to sustain learning network, process, learning method, including, the factors involving on learning network development for plant diversity conservation cause behavior changing, subsequently, pattern of plant diversity conservation occurred properly. The researcher defined research implementation, which composed of research model, study areas, population and sample, unit of analysis, data collection, research instruments, construction and model development, data assessment, and data analysis as follows:

3.1 Research Model

This research was social phenomenon study or phenomenology study that was done in the field where the plant diversity networks locate, and they are well known and are accepted by the different involved and groups in order to be used as a case study. Since it is real phenomenon that can be able to understand by mean of the historical education on selected area and community in according to research problems and objectives to understand the actual phenomenon at the base of social structure and the community learning network (Yodotdamnern-Actige, B., et al., 1990 : 112). However, the learning network must implementation at least not less than one year and still active function continuously, and acceptably both individual and those involved sectors. Results of the study will provide well understanding toward the real circumstance, which will benefit to society, especially, authorizers, decision maker, and organizational committee. Those are in the supper structure of society, and are able to define the structure, model, and policy that are congruent with the real circumstance in order to lead to social change into proper directions.

There are many methods of study that are employed, and the case study was used as a leading study, then qualitative perspective, data description, hypothesis was proved qualitative method incorporating with interpretation, The proposal model was evaluated by connoisseurs.

3.2 Study Areas

Northeastern region was selected to be the study area, it is the largest region of Thailand, which is 105.5 million rais or one-third of the whole country, its population is about twenty millions or one-third of total, and the capita income of region is 20,235 Baht, which is the lowest capita income when compare with other region that is about one-third of national capita income that is 61,335 Baht. In the previous time this region were enrich forests, which flourished biodiversity. There were forest area 44.3 million rais or 41.9% of the total area in 1960. However, the forest has been deteriorated continuously, therefore it was left 13.11 million rais or 12.43% when compared with before. During 37 years passing, the forest in this region has been deteriorated 0.84 million rais per year (Jarupatt, T., 1998 : 14). Therefore, at present the forest in this region is the least of the country by comparing between forest area and total area of region. Actually, the forest is the sources of biodiversity and origin of fresh water both surface and ground water. It is the essential factor to facilitate the human to meet the basic need of people, especially, the villagers who live nearby and the buffer zone community. The most of the left forest in this region is the announced being Wildlife Sanctuary, National Park, and Forest Park locate in three important ranges of region that are the follows: (Chulalongkorn University, 1997 : 1/1-1/5).

1) Petchaboon Range is the range that locates in the west frontier of the region in the North-South direction; it is the barrier against northeast, and north and middle.

2) Sunkumpang Range is the range that locates in the south frontier of the region in the East-West direction; it is the barrier against northeast, and middle and Republic of Cambodia.

3) Phuphan Range is the range that locates in the middle of the region in the Southeast-Northwest direction; it divides northeast region into upper northeast and lower northeast.

The mountains in northeast are announced to be Wildlife Sanctuary, National Park, and Forest Park more than fifteen sites according to ministry cabinet mandate at 10th and 17th of March 1992 (Department of Environmental Quality Promotion, 1999 : 28). It is surrounded by national protected forest area both economic forest and deteriorated forest. Deteriorated forest became the agricultural area that a large number of communities locate, including, both settled down before the announcement and latter habitants, 5,144 villages, which are the most in the country. The issued mandate defined that the buffer zone is that surrounds the national protected forest, it is used to protect the values in both physical aspect and biodiversity aspect, in addition, the usefulness for research, recreation, naturally hazardous prevention, irrigation, electrical production, and products for living.

The people of community in buffer zone must to adapt their earning by changing to conservation agricultures such as agro-forestry agriculture, integrated agriculture, forest farming, natural agriculture, or other conservation agricultural form, however, every patterns is emphasized on organic agriculture. Which type of agriculture type to be applied that is depended on each individual; understanding, value, environmental sustainability in order that they are capable to earn their families, simultaneously, they have enough product to sell for changing for things for their basic needs, supplementary with the concept of proactive for the community business, marketing, community business network, market for tourists, and other career that do not disturb and destroy the natural environment. It is the complete cycle of sustainable development because there is no new forest destruction further and innovation the new career conserving the forest. In this way ecosystem improvement and revival of succession would be possible. There are different measurements were issued, especially; let the community to manage to conserve (Puntasen, A., 1996 : 17). It is obviously seen that there are a numerous communities in the buffer zone in the north region have succeeded in implementing their learning network strongly, their competence was accepted by external people and organization. The researcher selected purposively the case study by using the following criteria:

3.2.1 Criteria for Site Selection to be Case Study

1) Site Criteria

(1) The site must locate adjacent to the conservation forest area or buffer zone surrounding the three important ranges of the northeast region those are Petchaboon Range, Sunkumpang Range, and Phuphan Range where has flourished with biological resources. One community from each range that there is the people organization implement learning network, is selected as representative.

(2) The site of the community was identified as a degraded forest according to the Ministry mandate at 9th May 1989 where it is less valuable wood left, and it is difficult to self-recovering in nature, including to, that area has not more 2 threes with size lesser than 100 centimeters with circle, per rai or not more than 8 threes when measure their circle 50-100 centimeters with circle at the height 130 centimeters, and it was announced by Agricultural Land Reform office (ALRO).

2) Network Organization Criteria

(1) It is the local organizations or people organizations that two people up come to join together to define the objectives, targets of group, defining the structures, roles, obligation criteria, co-agreement, work dividing, and work cooperation, having member of both individuals and groups from that community or from other community, simultaneously, it was accepted to member of organization network.

(2) It is the people organization that provide learning management for network, or as learning organization with targets to develop both individuals and groups that are able to conserve and use the plant diversity. By emphasizing alternative agriculture activities, especially, they are ecological agriculture, and organic agriculture, which have production process, product transformation, and marketing with complete cycle, simultaneously, it acts as social learning process for people.

3.2.2 Method to Select Network Organization as Case Study

Phase 1. From the documentary study, the researcher selected the northeast region as area of study because it is the region that the forest area is vigorous decreasingly, then the biodiversity has lost continuously, especially, the plant diversity.

Phase 2. Selecting the people organizations which have the networks and members that they have learnt, and having goal of plant diversity conservation seriously and incessantly not lesser than one year, including, it was accepted extensively. It was evident in the seminar document and connoisseur approving. are Inpang Center, Wungnumkheaw Organic Farming Promoting Group, and Thepnimit Ecological Agriculture Club as the representative of three important ranges, Petchaboon Range, Sunkumpang Range, and Phuphan Range.

Phase 3. After considering carefully, and with connoisseur recommendation the three networks were selected are Inpang Center, Wungnumkheaw Organic Farming Promoting Group, and Thepnimit Ecological Agriculture Club as the representative of three important ranges, Petchaboon Range, Sunkumpang Range, and Phuphan Range. Their characteristics are as follows:

Table 1 Important Characteristics of Study Case Network.

Network Name	Thepnimit Ecological Agriculture Club	Inpang Center	Wungnumkheaw Organic Farming Promoting Group
Site	Ban Numlad, Na-yang-klug Tambon, Amphur Thepsatit, Chaiphaphum Province	Ban Bau, Gud-bag Tambon, Amphur Gudbag, Sakolnakorn Province	Ban Numsub, Wungnumkheaw Tambon, Amphur Wungnumkheaw, Nakornrachshima Province
Original Operation	1986	1989	1998
Locate in Range	Petchaboon Range	Phuphan Range	Sunkumpang Range
Characteristics of Network			
1. Community learning network.	/	/	/
2. Network organization operation.	/	/	/
3. Network committee.	/	/	/
4. Ecological Agriculture operation or natural agriculture stress on plant diversity.	/	/	/
5. Complete cycle plant gene, production, transformation, marketing activities.	/	/	/
6. More than 20 communities network member.	/	/	/
7. Community forest or public forest management.	/	/	/
8. Plant gene fund.	0	/	0
9. Connection of activities and learning to other organization or network.	/	/	/
10. Operation by stress on local wisdom.	/	/	/
11. Supported from the Royal Initiative Project.	0	0	/
12. Supported from government and private sectors.	/	/	/
13. Publication through mass media.	0	/	0
14. Representative has been invited to present paper, and to be committee of other network.	/	/	/
15. Community leaders have been raised and recognized.	/	/	0

N.B. Mark / means have network characteristics, 0 means have no network characteristics.

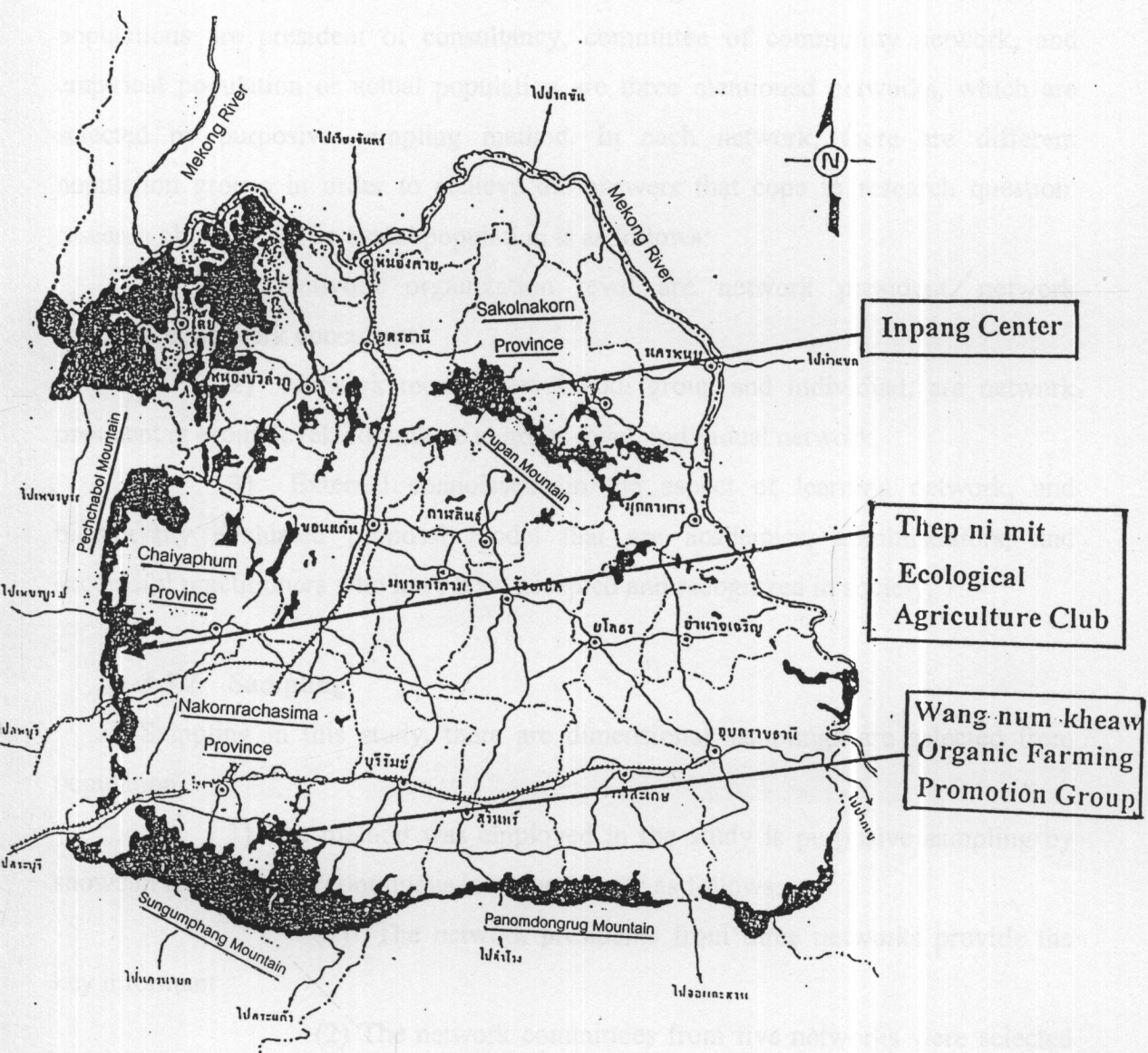


Figure 9 The Location of Three Networks in Northeastern of Thailand

3.3 Population and Sampling

3.3.1 Population

This study emphasized on analysis of organization level. The theoretical populations are president of consultancy, committee of community network, and empirical population or actual population are three mentioned networks, which are selected by purposive sampling method. In each network, there are different population groups in order to achieve the answers that cope to research question, research objectives. The actual population is as follows:

- 1) Network organization level are network president, network committee, network consultant.
- 2) Network member level both group and individual, are network president at group level, committee at group level, individual network.
- 3) External connoisseur in the aspect of learning network, and biodiversity evaluated proposal model that are academics, administrators, and successful practitioners who have been accepted and recognized in society.

3.3.2 Sampling

Sampling in this study, there are dimensional samplings are selected from population.

- 1) The method was employed in the study is purposive sampling by snowball technique, or continuous introduction are as follows:

- (1) The network presidents from three networks provide the key informant

- (2) The network committees from five networks were selected by snowball technique through the suggestion of network president and network committee in order to hold the focus group discussion.

- (3) Selecting one consultant from each three networks, in case of having more than one consultant, the one who the longest consultant is.

- (4) The presidents of network organization were from four groups, each group is 3 networks, so the total are 12 persons in order to in-dept interview method.

(5) The group network committees were selected by purposive sampling from the active network that implements activity on plant diversity conservation constantly and continuously. Two committees were selected from each network, five committees from two groups of each network, which locates in same location of network organization, and another from outside network organization location through the snowball technique. Since there are three networks, the total committees are 30 persons.

(6) The network members as individual level were selected from the member who has participated activity by purposive sampling constantly and continuously in learning practicing for plant gene conservation.

2) The ratio sampling was employed to study the learning results of network at individual level by questionnaires, plant recording form that 20 persons from each network, there are three networks, and then the total are 60 persons.

3) The connoisseurs were selected by purposive sampling according to the characteristics of connoisseur in order to evaluate the new proposal model of learning network development the connoisseurs must be qualify either of the following criteria:

(1) The academic who is graduate at doctoral level, and plays role on rural development, sustainable development, learning management, learning network, local wisdom, environmental management, people organization, ecological agriculture, natural agriculture, biodiversity, and plant diversity conservation with the academic paper such as documents, textbook, research reports, seminar organizer, seminar participant, and being recognized at national and international levels.

(2) Administrator in the government or public sector who is graduate at master degree, having the leader in changing the policy level of learning network management, plant diversity conservation, community organization and network development, ecological agriculture, natural agriculture, and local wisdom.

(3) Practitioner who has the direct experience and is successful, including, being recognized and invited to be visiting lecturer or committee at the national and international levels or award receiving from government or public organization through the work in the aspect of community development, learning

management, community network implementation, environmental management, plant diversity conservation, ecological agriculture, natural agriculture, and local wisdom.

The sample groups of connoisseurs were the academic group, practitioner group, there were three groups, and three from each group, the total are nine persons as present in the following table 2.

Table 2 Total Sampling in This Study

Total Sampling in This Study				
Type of Sapling	Number			Method of Study
	Inpang	Thepnimit	Wungnum kheaw	
1. Purposive Sampling and Snowball.				
1.1 President of the network organization.	1	1	1	In-dept Interview
1.2 Committee of network organization	5	5	5	Focus group discussion
1.3 Consultant of network organization	1	1	1	In-dept Interview
1.4 President of the at group Level (4 groups in each network, one person from each group)				
- group in network site (2 groups).	2	2	2	In-dept Interview
- group outside network site (2 groups).	2	2	2	In-dept Interview
1.5 Committee network at group level (2 group of each 5 group).				
- group in network site	5	5	5	Focus group discussion
- group outside network site	5	5	5	Focus group discussion
1.6 Network at individual level	2	2	2	Biography record
2. Proportion and Simple Sampling				
61 years old up	5	5	5	Questionnaire
41-60 years old	5	5	5	
21-40 years old	5	5	5	
0-20 years old	5	5	5	
Total 3 networks	43	43	43	
3. Purposive Sampling according to connoisseur quality				
- Academics	3	3	3	Model evaluation Questionnaire
- Administrator	3	3	3	
- Practitioner	3	3	3	
Total (Connoisseurs) 9				9
Total Sampling				138

3.4 Unit of Analysis

Unit of analysis in this study is people organization both group level and individual level in the various communities, there are learning management for network members in order to be able in plant diversity conservation.

3.5 Data Collection

Data collection in this study was divided into 3 phases as follows:

3.5.1 Documentary Collection

The researcher had collected papers, textbook, writing, information from mass media communication, policies, act of concerning concept of learning in community, learning knowledge, biodiversity conservation, environmental education, evaluation and monitoring by connoisseurs, research methodology, field research technique, related literature studying, and primary data concerning learning network for case study.

3.5.2 Field Data Collection

There are different methods for different groups, for precision and reliability, the following process are employed:

- 1) The researcher entered in the field to survey the real circumstance, and requested for cooperation from presidents and committees of network organizations, simultaneously, inform the objectives, method of study, and educational cooperation.

- 2) The researcher entered in the field to collect data in order to be familiar, and be good rapport with the people in community, committees, and network members, and stay in community to study including data collection in each network for 45 days in 3 networks, total time 5 months. To collect data in each network organizations are implemented as follows:

- (1) Documentary data were collected from the network organization such as meeting record, seminar, activity holding, document concerning

operation, various data for construction and network development, and learning process of network.

(2) The researcher played role as a be participant observation through observing the construction implementation of network organization, activity management, learning process, learning factors, behavior and pattern of plant diversity conservation of network members in the agricultural areas such as house garden, farm, orchard. There were defining the frame of observation, simultaneously, interview, group discussion and biography record.

(3) Individual in-dept interview, the key informants were presidents of network organizations, committees of network organizations, and presidents of group level. This issue was the characteristics of implementation construction, network development, process and method of learning for plant diversity conservation, factors effecting to learning and implementation of network, results from learning, and pattern of plant diversity conservation.

(4) Holding the small group discussion, there were 5 persons in each group for two hours. Focus group discussion in small group was held among those who were selected at both individuals and groups levels. The issues were set according to the group that gave the information. There were the follows:

(4.1) The focus group discussion for committees of network organizations was held for study on the characteristics of construction implementation and network development, learning process of network, factors concerning, results of learning management, and pattern of plant diversity conservation.

(4.2) The focus group discussion for committees of group level was held for study on development of group level, learning of member, factors concerning, learning results of members, and pattern of plant diversity conservation.

(5) Biography recording of member at group level through interview by unstructured method with informal style, but defining the outline about to participate with network, content, body of knowledge, process and method of learning, concerning factors, and pattern of plant diversity conservation.

(6) The questionnaires with rating scale, and open-ended questionnaires were tested on the learning results of individual about behavior, knowledge, awareness, practice in plant diversity conservation.

(7) The plant diversity, and analyzing the diversity of plant strains conservation were recorded as plant types, usefulness, plant dispersal according to the method that the members practice, and production resources. It was divided into three groups as follows:

(7.1) Product gathering from forest (depending on forest).

(7.2) Production gathering from both forest and agricultural farms such as farms, fields, orchards, and house gardens (depending on forest and self-production).

(7.3) Production gathering from agricultural farms such as farms, fields, orchards, and house gardens (not depending on forest and self-production).

The plant diversity of member’s orchards were analyzed to explain the plant diversity by counting on the amount of total trees, and plant species in the experimental orchard. The were two orchards in each network, the total were 6 orchards in the similar time, area, and environment of the parallel areas through the analysis with the formula of plant diversity conservation, which was richness index (R_2) of Menhinick or Menhinick’s index (Menhinick, 1964 cited in Sampunpanich, P., 1994: 21).

Formula

$$R_2 = \frac{S}{\sqrt{N}}$$

R_2 = Plant diversity
 S = Number of total types of plants in the studied orchard
 N = Number of total plants in the studied orchard

3.5.3 The Evaluation on Model of Learning Network Development for Plant diversity Conservation

The researcher collected the data from connoisseurs by herself through the constructed questionnaires to evaluate by the connoisseurs with their own decision making on Model of learning network development from the field data analysis.

Table 3 Conclusion of Data Collection

Conclusion of Data Collection		
Variable	Method of Data Collection	Sampling
1. Characteristics of construction and network development 1.1 Network development 1.2 Characteristics of implementation of network organization 1.3 Implementation results of network organization	1. Documentary data 2. Observation 3. In-dept interview 4. Focus group discussion 5. Biography records	In-dept interview 1. Presidents of network organization 2. Consultants of network organization 3. Presidents at group level Focus group discussion 1. Committees of network 2. Committees at group level Biography records Network at individual level
2. Learning Process of network for plant diversity conservation. 2.1 Learning elements 2.2 Phases and techniques of learning 2.3 Learning activities 2.4 Evaluation and monitoring	1. Documentary data 2. Observation 3. In-dept interview 4. Focus group discussion 5. Biography records	In-dept interview 1. Presidents of network organization 2. Consultants of network organization 3. Presidents at group level Focus group discussion 1. Committees of network 2. Committees at group level Biography records Network at individual level
3. Involved developmental Factors of learning network for plant diversity conservation 3.1 Supporting factors 3.2 Limiting factors	1. Documentary data 2. Observation 3. In-dept interview 4. Focus group discussion 5. Biography records	In-dept interview 1. Presidents of network organization 2. Consultants of network organization 3. Presidents at group level Focus group discussion 1. Committees of network 2. Committees at group level Biography records Network at individual level
4. Behavior learned from learning of plant diversity conservation 4.1 Knowledge 4.2 Awareness 4.3 Practice	1. Observation 2. In-dept interview 3. Focus group discussion 4. Biography records 5. Questionnaire for knowledge test	In-dept interview 1. Presidents of network organization 2. Consultants of network organization 3. Presidents at group level Focus group discussion 1. Committees of network 2. Committees at group level Biography records Network at individual level
5. Pattern of plant diversity conservation of network organizations and network members 5.1 Conservation 5.2 Usefulness	1. Observation 2. In-dept interview 3. Focus group discussion 4. Biography records 5. Questionnaire for knowledge test 6. Synthesis of plant diversity	In-dept interview 1. Presidents of network organization 2. Consultants of network organization 3. Presidents at group level Focus group discussion 1. Committees of network 2. Committees at group level Biography records Network at individual level Recording form of plant diversity Network at individual level Survey form of plant in experimental farm- Network at individual level Questionnaire Groups connoisseur 3 groups 1. Academics 2. Administrators 3. Practitioners
6. Synthesis of model of learning network development for appropriate plant diversity conservation	1. Evaluation form on Model assessment	

3.6 Research Instruments

3.6.1 Research Instrument

There are different forms as the follows:

1) Observation form characteristics of construction implementation and learning network development, learning of network, involving factors, behavior and pattern of plant diversity conservation.

2) In-dept interview forms were used for interviewing presidents of network, consultants of network, and presidents at group level.

3) Focus group discussion forms were used by network committees and committees at group level.

4) Biography record form of network at individual level.

5) Questionnaire for knowledge test was used for testing learnt knowledge of network at individual level.

6) Recording form of plant diversity were tables that were used for presenting type of plants, usefulness, plant dispersal according to the method that the members practice, and production resources.

7) Survey form of plant in experimental farm was table to present types and amount of plants, and for analyzing of plant richness.

8) Questionnaire form was used to evaluate the model of learning network development, which contained both closed-end and open-end questions in order to connoisseurs to evaluate the proposal model

9) Map of network organizations and network members

10) Materials and Instruments were notebooks, files, drawing kits, tape recorder, camera, and video camera.

3.6.2 Questionnaire Construction for knowledge test of network

1) Questionnaire was constructed from conceptual framework of study and search about knowledge achievement, awareness raising, and practice for plant diversity conservation of network at individual level, and then was present to dissertation advisor committees to examine the questionnaire for improvement. The questionnaire composed of 4 parts as the follows:

Part 1. Questionnaire about general information of respondent was sex, age, marital status, education level, occupation, length of network membership, and frequency of participation in learning management process of networks.

Part 2. Questionnaire measured about knowledge on conservation and usefulness of plant diversity. It was multiple choices with 3 answers, 20 items.

Part 3. Questionnaire measured about awareness on conservation of plant diversity that was 5 rating scale with 10 items.

Part 4. Questionnaire measured about practice on conservation of plant diversity that was yes or no with 20 items.

2) Determination of Questionnaire Quality Determination of Questionnaire Quality was implemented as the follows:

(1) Determination of Validity : Questionnaire was examined by the dissertation advisor committee and environmental education connoisseurs about content validity, criterion related validity, construct validity and language.

(2) Determination of Reliability : Questionnaire was tried by the group that has the similar feature to the sampling group, which were 20 members of Integrated Agriculture Group, Ban Sri-ubol, Amphur Wangsapung, Loie Province, and it was selected by purposive sampling technique. The reliability was determined by using the KR-21 formula, result of knowledge achievement on plant diversity conservation equals to 0.82, result of awareness achievement on plant diversity conservation equals to 0.86, and result of practice achievement on plant diversity conservation equals to 0.82 (Taweerat, P, 1993: 136). It concluded that the questionnaire was reliable.

(3) The questionnaire has improved and employ with the sampling group.

3.7 Construction and Development of Model

3.7.1 Phases for Construction of Model of Learning Network Development

1) Studying about documentary data, theories, principles, method of learning network development, and method of construction and evaluation of model of learning network development for plant diversity conservation were done.

2) Studying existing situation of network organization, which was learning network,

including process and method of learning of networks, supporting factors, and obstructing factors of learning network, results of behavioral learning, and pattern of plant diversity conservation of three networks.

3) Analyzing the documentary data, and existing situation, there was construction of model of learning network development for plant diversity conservation.

3.7.2 Phases for Model Evaluation

1) Model of learning network development for plant diversity conservation was constructed and proposed model and questionnaires were examined by the dissertation advisor committee on content validity, model improvement, and questionnaires.

2) The proposed model of learning network development for plant diversity conservation was examined by 9 connoisseurs.

The proposed model of learning network development for plant diversity conservation was examined by 9 connoisseurs about quality on suitability and congruence of components as follows:

(1) Considering on of each component of network was problems and needs, principles, goals, objectives, suitability characteristics of construction and network development, process and method of learning on plant diversity conservation, pattern and learning management for plant diversity conservation.

(2) Examination on suitability of each component of network whether it was congruent or not.

3.7.3 Model Conclusion.

The improved model of learning network development was examined by dissertation advisor committee for completeness.

3.8 Data Assessment and Data Analysis

3.8.1 Reliability Construction and Data Quality Assessment

1) Reliability and Validity Construction in this study was implemented at starting stage of instrument construction, data collection, the reliability and validity were done as three methods.

(1) Content validity from in-dept interview and direct observation were double checked carefully.

(2) Good rapport between researcher and sampling participants had been spontaneously built up for trust, and repeating observation was employ for controlling the research situations in order to obtain the validity.

2) Criteria on validity measurement in this study were measured on two aspects as follows:

(1) Internal validity was phenomenological validity, ecological validity, and contextual validity.

(2) External validity meant the research work that was able to distribute and to be referent in general.

3) Assessment of data validity was done through the Triangulation technique by considering on data of different times, places, and people. The data were still similar.

3.8.2. Data Analysis

Data analysis composed of two parts as follows:

1) Qualitative Analysis : The qualitative data were collected through direct observation, in-dept interview, focus group discussion, biography records, and daily field data records. They were classified, and primary Analyzed by analytical induction method, and Constant comparison (Jantawanich, S., 1991: 137-142), and then relative comparison of each group as the following phases:

(1) Incidents comparison was identified as categories according to defined variables.

(2) Field data were compiled and classified of its properties were connected with defined variables.

(3) Extending incident comparison wider scale beyond the defined variables in order to discover the key incidences or meaningful incidences in the real situation then screened out those unimportant incidences. The selected important incidences, which were meaningful to learning network development, including to considering on data relationship, make the conclusion.

Data analysis was done by descriptive analysis, using map, and complementary charts.

2) Quantitative Analysis

(1) Knowledge test of plant diversity conservation were 20 items. The participants would do after they had participated to learning process of network. Scores would be ranged and ordered in accordant with the Ministry of Education criteria:

- 80-100% (16-20 marks) means Highest knowledge
- 70-79% (14-15 marks) means High knowledge
- 60-69% (12-13 marks) means Moderate knowledge
- 50-59% (10-11marks) means Low knowledge
- 0-49% (0-9 mark) means Lowest knowledge

(2) Awareness test of plant diversity conservation were 10 items with 5 levels of rating scales for the positive meaning question would be ranged as strongly agree, agree, uncertain, not agree, strongly disagree that equal to 5,4,3,2,1 scores orderly, and for negative meaning question were interpreted in opposite direction. The scores were determined for arithmetic mean (\bar{X}), and standard deviation (S.D.) both individual item and as a whole. Interpretation would be ranged and ordered as follows:

- | | | |
|-----------|-------|--------------------|
| 4.50-5.00 | means | Most awareness |
| 3.50-4.49 | means | More awareness |
| 2.50-3.49 | means | Moderate awareness |
| 1.50-2.49 | means | Less awareness |
| 1.00-1.49 | means | Least awareness |

The scores were classified in accordant with the Ministry of Education criteria:

- 80-100% (40-50 marks) means Most awareness
- 70-79% (35-39 marks) means More awareness
- 60-69% (30-34 marks) means Moderate awareness
- 50-59% (25-29marks) means Less awareness
- below 50% (10-20 mark) means Least awareness

(3) Practice test of plant diversity conservation were 20items.

The participants would do after they had participated to learning process of network. Scores would be ranged and ordered in accordant with the Ministry of Education criteria:

- 80-100% (16-20 marks) means Most practice
- 70-79% (14-15 marks) means More practice
- 60-69% (12-13 marks) means Moderate practice
- 50-59% (10-11marks) means Low practice
- 0-49% (0-9 mark) means Least practice

(4) Comparison on knowledge, awareness, and practice about of plant diversity conservation, were classified in accordant with network membership such as sex, age, marital status, education level, occupation, length of network membership, and frequency of participation in learning management process of networks.

(4.1) T-test was used for two groups comparison.

(4.2) One-Way ANOVA (Analysis of variance with only one independent variable (type of data should be at least interval scale up, sample size of each is not equal) was used for more than two groups through Scheffe test, if it was statistically significant that meant there were different among arithmetic means, then the t-test was employed for further test for each pairs.

(5) The correlation among knowledge, awareness, practice and participating in network were analyzed Person Product Moment Correlation Coefficient.

(6) Questionnaire was used to evaluate on suitability and congruence with the components of model structure of learning network development

for plant diversity conservation. The connoisseurs analyzed the data as the following features:

(6.1) The connoisseurs analyzed the suitable components through 5-rating scale, and each item scores must be 3.5 score, which would be accepted.

(6.2) The connoisseurs analyzed the congruent components through the measurement, if the item was congruent, the score would be 1, for uncertain item, the score would be 0, for not congruence item the score would be -1.

The data were analyzed by Index of congruence (IOC) formula.

$$IOC = \frac{\sum R}{N}$$

When $\sum R$ = Summative score of connoisseur opinion

CHAPTER IV
RESULTS

The data presented here, which emphasizing on the plant diversity, was came from analyzing the development of learning network for biodiversity conservation and could be classified into 4 parts as follows:

Part 1 The results of the learning network development for plant diversity conservation of the 3 following networks: Inpang center network; Thepnimit Ecological Agriculture Club; Wungnumkheaw Organic Farming Promotional Group were analyzed in the following aspects:

- 1) The characteristics of network operation and development.
- 2) The learning process of plant diversity conservation network.
- 3) Factors related to network organization development and network for plant diversity conservation learning.
- 4) The plant diversity conservation pattern.

Part 2 Analyzed results of behavior of network learning for plant diversity conservation.

Part 3 Analyzed results evaluation of proposal model of learning network development for plant diversity conservation.

4.1 The Results of The Learning Network Development for Plant Diversity Conservation.

The followings are the analytical results from the studying of the community network that were operating and managing the learning to the members in 3 Northeastern networks: Inpang network center, Sakolnakorn Province; Thepnimit Ecological Agriculture Club, Chaiyapum Province; Wungnumkheaw Organic Farming Promoting Group, Nakornrachasima Province.

4.1.1 Inpang Center Network

4.1.1.1 The Characteristics of Network Establishment and Development.

1) The Network Development

1.1) The original establishment of Inpang network was Banbua, Tambon Kudbak, Amphur Kudbak, Sakolnakorn Province the village that was the birthplace of the network and still the place that Inpang network was currently established. The village was located on the Pupan range shoulder, 6 kilometers away from Amphur Kudbak center on Kudbak Amphur-Pupan Amphur road, having 3 kilometers laterite road connecting, and had 350 raiss community area. Natural resources was initially fertile: there are 3 sub-streams assembly here to be Ekon Stream, which separated between Banbua, Kudbak village; a dike storing water for farming and supplying foods; an open forest on the hillock nearby the village; valleys and 3,000 raiss of mixed deciduous forests are supplying food and farming cattle. The ancestor of Banbua was Kalerng Tribe, which had origin in Puvanakradeng City, Lao Country. At first they settled at Sakolnakorn Province, then moved to Banbua, because of the flourish forest here. Afterward there was diarrhea disease, they moved to Loei Province. Furthermore, they came back to Banbua again, and that time there was Tai-Lao Tribe from Tungklong, Amphur Kumbaung, and Kalasin Province come to join together. Subsequently, Phor Junkman had merge the family 'Achaeon' and 'Wongsrikaew' to be 'Kudwongkaew', which is the family name of the majority Banbua people at present.

The village settlement Banbua was formally promoted to be a village by the government authority in 1922. In 1938, the first school and small rice mill was established. In 1965, some villager was arrested in communist annihilation policy of government. In 1966, government encouraged villagers to planting the economic crops, the villagers chose to raise hemp but the hemp price was unsatisfactory. In 1970, villagers chose to farm cassava because the price was better than hemp, the forest invasion from cassava farming was reducing the area for cattle farming, subsequently, village had to depend on food from market. In 1976, the street from Ban Kudhad to Banbua was cut and the first bus was operated. In 1979; rapidly expansion of agricultural area; electricity reached the village; villagers valued the

electricity appliance; villagers fashionably dressed, smoking cigarette, drank liquor, lifestyle and thought of villagers was changed from “eating for living” to “trading” and from self-dependency to external-dependency. In 1985, Bank of Agriculture and Agricultural Cooperatives, (Thor Kor Sor) granted loans for villagers to agricultural investment, but investment result was unsatisfactory. From advisory of Ajarn Manas Polchom, teacher in Banbua School, Phor Lek Kudvongkaew, assistant village leader with his neighborhoods has opened coop store and operating until today.

During 1987-1989, Ajarn Surat Varankarat from Local Information Center of Sakolnakorn Teacher College (currently named Rajabhat Sakolnakorn) came to do action research in studying local culture. Tawatchai Kunnavong was a permanent researcher in the village by cooperation and supporting from Village Foundation, this is the triggering event led to group forming and developing to network.

Presently, Banbua was separated to 3 villages: Mu 5 Banbua; Mu 6 Ban Sai; and Mu 8 Banbua with the total population of 2,636 people consisted of 1,272 female and 1,364 male. In Banbua: there are 593 households; a school teaching from grade 1 to 9 with 23 teachers and 563 students; there are 2 monk monasteries with 5 monks.

Socio-cultural system: villagers of Banbua were Kalerng Tribe that maintains the unique culture and tradition but some adapt to the change of external society. Some villagers went to find job in the capital city but almost the villagers still depend on relative and supportive network, maintain conventional tradition, believe in Buddhism and spirit that protect the natural environment, value nature, and live by folk laws or community constituent (Lek Kudwongkaew, Interview).

Economic system: Farmer, plant grower and crop grower were the traditional careers of the villagers. Before the government encouraging the development of economic monoculture such as hemp, corn, and cassava, the villagers farming animals and farming various crops especially sticky rice for consume. When finish farming season, villagers will do woven, handicraft, and hunting. There is 4,000 raiss area of forest for villagers to seek foodstuffs from forest.

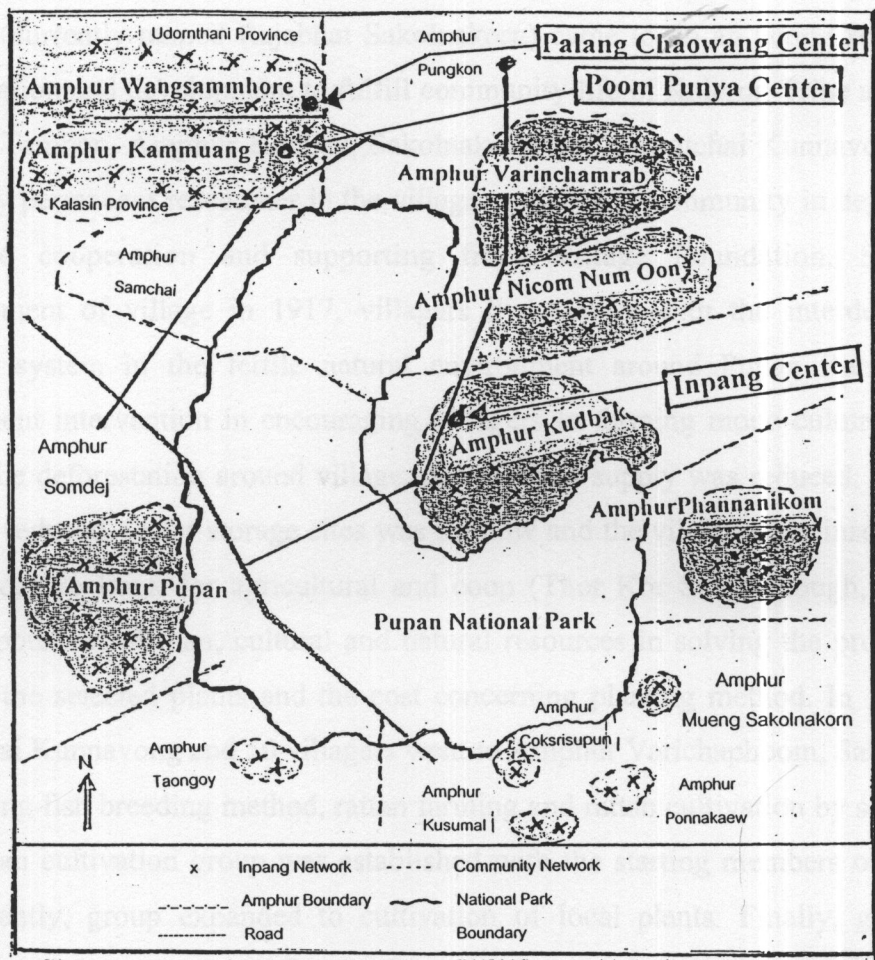
Mountain: Water resource around the Pupan Range is part of food supply for Banbua and other villages. Therefore, the area around Pupan range is the buffer zone for Pupan range and also the area in the Agricultural Land Reform Office (ALRO). Villagers have right to farming on the land according to Sor Por Kor 4-01 document.

Pupan Range is the mountain that lies from Nongkhai province to Ubonrachathani province in the Northeastern part, the mountain has an average range of height about 300-500 meters from the medium sea level. On 7 October 1959, the cabinet notified in the government gazette volume 92 section 106 that some parts of Pupan Range located in Sakolnakorn and Kalasin is the Pupan Mountain National Park. On 6 June 1973, Pupan Mountain National Park was named Pupan National Park by government. This national park has 699 km² area or 436,875 raiss, the area covers territory in 9 Tambons 5 Amphurs 2 provinces, topography of the area is sand-rock mountain and have 3 types of forests as follows:

1.1.1) Dry Dipterocarpus Forest spread throughout the decayed sand-rock area and has 1-2 meters of humus, the deeper was the red clay. The important plants in this type of forest are *Dipterocarpus obtusifolius* (Hiang), *Dipterocarpus tuberculatus* (Paung), *Terminalia alata* (Rokfa), *Shorea obtuse* (Teng), *Shorea siamensis* (Rung), *Pterocarpus macrocarpus* (Pradu), *Melanorrhoea usitata* (Ruk), *Cratoxylum formosum* (Maitue), *Careya Sphaerica* (Kradone), *Melientha suavis* (Pukwan), *Curcuma sparganifolia* (Krajeaw), *Zingiberaceae* (Khapa) and etc.

1.1.2) Evergreen Forest that found at the edge of stream that has adequate deep of humus and found in the center of Ton Num Oon Forest and Ton Num Yoong Forest. The important plants are *Pterocarpus macrocarpus* (Pradu), *Lagerstroemia* (Tabak), *Azelia xylocarpa* (Makhamong), *Xylia xylocarpa* var. *kerrii* (Maidaeng), *Bambusa arundinacea* (Paipa), *Gigantochloa albociliata* (Pairais), and etc.

1.1.3) Mixed Deciduous Forest is the forest that found on hill slope between Dry Dipterocarpus Forest and Evergreen Forest and has a mixed of plants from the above 2 forests as illustrated in figure 10.



Figur 10 Location of Inpang Center

Pupan National Park: This national park is the origin of many rivers that stream to Oon River, Amphur Nonghan, Sakolnakorn Province. There are many waterfalls, caves and animals around Pupan National Park. Pupan National Park has territory covering: the followings 7 Amphurs in Sakolnakorn Province; Amphur Kudbak, Amphur Pupan, Amphur Nicom Num Oon, Amphur Varichaphoom, Amphur Phannanikom, Amphur Pangkone and Amphur Mueng: 3 Amphurs in Kalasin Province; Amphur Kuchinarais, Amphur Somdej, Amphur Kammuang: and Amphur Wangsammor in Udonthani Province. Presently, almost all Amphurs around Pupan National Park are members of Inpang Network.

1.2) Network Organization Development

1.2.1) The origin of Inpang Center is stated since 1987, when Ajarn Surat Varankarat from Local Information Center of Sakolnakorn Teacher

College (currently named Rajabhat Sakolnakorn) came to do an action research on the education and development to fulfill community life of Kalerng Tribe at Banbua, Kudbak Tambon, Amphur Kudbak, Sakolnakorn. Mr. Tawatchai Kunnavong was a voluntary permanent researcher in the village to studying community in depth aspect with the cooperation and supporting from Village Foundation. Since the establishment of village in 1917, villagers live simply with the interdependence relatives system in the fertile natural environment around Pupan Range. After government intervention in encouraging villagers to farming mono-culture in 1966 caused the deforestation around village, natural food supply was reduced, quality of soil was reduced, water storage sites was shallow and the villagers are insolvency to paying loan to Bank for agricultural and coop (Thor Kor Sor). Though, there are enough potential of man, cultural and natural resources in solving the problems by farming the selected plants and the cost concerning planting method. In 1989, Mr. Tawatchai Kunnavong and 50 villagers went to Amphur Varichaphoom, Sakolnakorn to studying fish breeding method, rattan farming and rattan cultivation by seed. After that, rattan cultivation group was established with the starting members of thirteen. Subsequently, group expanded to cultivation of local plants. Finally, group was developing to Inpang group to Inpang Center and currently to Inpang Network.

In 1990, Village Foundation granted rattan cultivation group 2,500 Baht and group decide to purchase black bag for lending to group members with the condition that 100 black bags borrowed, 10 cultivated rattan bags return. Group will sell a cultivated rattan for 15 Baht. From the activity, group foundation was expanding and naming the group as "Local Plants Fund Group". Until 1993, group members arise to 33 households with several hundred thousands of rattan in the farm, which in turn reduce the area for farming cassava and corn. Members also develop the rattan cultivation method by reducing the day of rise to 7 days. Banbua village was well-known from selling rattan and rattan cultivation with sales of over 1 million Baht and fund of Local Plants Fund Group was raised to 300,000 Baht.

Successful from Local Plants Fund Group improved members' morale to developing group by exchanging experiences with each other. From meeting with Um Choo Thai Esarn Club the group conceived ideas of establishing local pig farming fund and artificial stream fund to draw water into farmland. Banbua was

reputable because mass media such as newspapers (Matichon) and television stations disseminated successful works of the group. From fertility of land, water, forest and various plants cultivation method, in 1991, Buasri Srisoong elderly scholar of Um Choo Thai Esarn Club stated that “this land is fertility as created by Indra, thus the group should use the name Inpang”.

In 1993, Inpang group acquired 5.5 rais land price 35,000 Baht with 20,000 Baht granted from Northeastern Rural Development Association (NERDA) to build learning center and the group was called Inpang Center thereafter. The constructions in the learning center domain are; a meeting house, an herbal transformation house, a fruit transformation house, a guest house, a canteen, a staff house, a reservoir and a plants cultivation house. In the cultivation center, there are 39 species of plant total 11,000 units for sales (survey at 3 October 2000) and there are ordinary and new cultivated plants of 130 species total 1,180 units.

1.2.2) In 1990, Inpang Center joined Um Choo Thai Esarn Club, which it has members spread throughout northeastern part, for a membership. In 1992, Um Choo Thai Esarn Club in the corporation with Department of Environmental Quality Promotion initiated Environmental Conservation and Development in Rural Community Project and granted 25,000 Baht fund to community in trial the project operation. The fund was used in acquiring cows to feed. The group also sent 16 members to combination agricultural training conducted at Eto Noy Group in Burirum. There is a numbers of subsequent training conducted by Um Choo Thai Esarn Club such as saving group, community business, rice mill and etc thereafter.

In 1993, Um Choo Thai Esarn Club obligated members to developing and expanding task individually by adhering to the principle of cost, time and resources. Then, Inpang Group initiated group management structure and joined national network activities such as the donation 1 million cultivated plants to temple; this allowed Inpang Center reputation propagate to people and mass media.

1.2.3) The expansion of Inpang Center to Inpang Network started after Inpang successful in plants cultivation form concept “move forest to house orchard”, the other villages start to interest and follow. At the same time, Inpang succeed from managing pond fund amount 100,000 Baht granted by

Canadian embassy in 1993. Inpang's members incorporated with Northeastern Rural Development Association decided to return pond fund to establish circulated fund lend to other members. Altogether, Agricultural Land Reform Office (ALRO) derived from the royal initiative project granted Inpang fund for pond digging. Inpang group determined that the person who received pond have to pay back 500 Baht to fund for pond digging. The Inpang's practice was accepted by Agricultural Land Reform Office (ALRO) and leader of Inpang Center was asked to suggest other villages around Pupan range in managing fund for pond digging. The informal network was formed after that time, the villages also exchanging knowledge especially in plant cultivation and variety planting.

1.2.4) In 1995, Inpang Network was formally formed after the meeting of 60 villages leaders from 15 villages around Pupan conducted by Agricultural Land Reform Office (ALRO) incorporated with The Third Agro-forestry Agriculture Development Office of Forestry Department which located in Pupan at Rajabhat Institute. The 3 days meeting was aiming at brain storming to find the way to conserve Pupan forest. Simultaneously, with Inpang leader's speech on successful experience and means to conserve forest by move forest to house orchard and management program in managing fund and learning. Ecological Agriculture Network was established after mutually agreement of village leaders with the supporting of Agricultural Land Reform Office (ALRO) and The Third Agro-forestry Agriculture Development Office of Forestry Department and appointed Inpang Center as operational center and assigned Phor Khian Srimukda as network president. After that, Forestry Department and ANOVA company ordered Mun Pla Tree and other plants from Inpang and Ecological Agriculture Network. Plants cultivated from Inpang were populated because price is low and healthy. There are many plants such as herbal plants and edible plants cultivated and price range from 2-3 Baht to 20-30 Baht according to size of plants. Network plant shop at Amphur Pupan, border of Kampeom-Sakolnakorn Road started to operate after 600 shares valued at 100 Baht each were collected from members. After successful expansion project of Ecological Agriculture Network, Inpang Network became a central organization of network that connected members in exchanging knowledge and also expanding the network. At the end of 1997, there are 50 villages with 600 households

in Inpang Center Network and 900 plant species were studied, sales was hike from 12 popular species. After 1998, Inpang Center with academic and production technology support from Rajamonkala Research Center and Agricultural Training expanded the plant transformation product to produce transformational fruit juice from surfeit fruits such as Mak Mao, Mak Ngaw, Mak Khor, tamarind juice. Transformation group was established with 600 shares valued 100 Baht each collected from members as capital also with 150,000 Baht fund supported from Agricultural Land Reform Office (ALRO) in building transformation house. Mak Mao water 5,600 bottles price 20 Baht each were sold and other fruit juices were produced according to seasonal appropriateness. In 1998, Global Environmental Fund by United Nation Development Programme (UNDP) granted fund to support in producing dried banana with sun energy. Therefore, Inpang Center conducted totality of activities such as agricultural production, transformation, and sales. During 1999-2001, Ministry of Agriculture and Cooperative collaborated with Village Foundation and fund supported from United Nation Development Programme (UNDP) assigned Inpang as role model in Performance Improvement Project for Sustainable Agricultural Development in developing Sustainable Agricultural Network in pilot areas of 12 Tambons 10 Amphur in Sakolnakorn. Inpang Center acted as Collaboration Center in learning management to villages participating in project and there is one Inpang leader responsible for each Tambon, this expanded another 5 Amphurs in Sakolnakorn joined Inpang Network.

1.2.5) The existence of Inpang Network, presently Inpang Network as Provincial Network Center has an area covering in 3 provinces, 12 Amphurs, 19 Tambons, 86 villages with over 1,000 households as members (survey at 31 March 2000). In 1999, another 2 centers Poom Panya Center in Amphur Kammuang, Kanlasin and Palang Chaowang Center in Amphur Sammore, Udonthani were established as members of Inpang Network Center and adhering to the operation procedure of Inpang Center. Various funds were raised as group wills and requirements within community network but there is at least a saving group in every community as shown in table 4.

Table 4 Inpang Network Names and Fund of Networks (31st March 2000)

Province	Amphur	Tambon	Fund	Applied year
Sakolnakorn (Inpang Center)	Kudbak	Kudbak Kudhai Namong	Dek Hug Thin Saving Women, Agriculture, Plant species, Herbal medicine	1993
	Pannanikom	Nanai Rai	Dek Hug Thin Saving Agriculture, Herbal medicine	1996
	Varichaphoom	Varichaphoom Kambor	Agriculture Saving	1996
	Nikomkam-oon	Nongbua Nongpling Suwannakarm Nikomnum- oom	Saving	1996
	Pupan	Coke-phu Kokplasew	Saving	1996
	Ponnakaew	Chiangsue	Saving	1999
	Mueng	Kamin	Saving	1999
	Tauguay	Janpen	Saving	1999
	Kusuman	Oomjarn	Saving	1999
	Coksrisupan	Madnatom	Saving	1999
Kalasin (Phoom Pannya Center)	Kammuang	Natun	Agriculture Saving Plant species	1996
Udonthani (Palang Chaowang Center)	Wangsammore	Phasuk	Saving Agriculture	1996
Total	12 Amphurs	20 Tambons	86 Villages, 1,000 Households	

2) The Operation Characteristics of Network Association.

2.1) The Important Operation Components of Inpang Network Center.

2.1.1) Human Resource involved in creating and developing Inpang Networks are academics, leaders or managers of Inpang Center, permanent volunteers and consultants.

(1) Academics: The first group of academics that motivates Banbua's villagers to learn and enlighten are Ajarn Surat Varankarat from Sakolnakorn Teacher College (currently named Rajabhat Sakolnakorn) who came to conduct action research and Mr. Tawatchai Kunnavong was a permanent researcher for 1 year. Presently, Mr. Tawatchai Kunnavong is a coordinator of Inpang Center.

(2) Community leaders: Most of them are natural leaders that understand problems and culture of community. Most of leaders were respected by villagers and used to be ex-leaders or ex-assist leaders of village such as Phor Lek Kudvongkaew, Phor Sirm Udomna, Phor Yan Kongveha, Phor Pong Srimukda, Phor Da Kudvongkaew and Phor Ou Kudvongkaew. After the expansion of Inpang network, number of leaders was greaten and most of them were male but there still successful female such as Mrs. Vilai Kudvongkaew one of the first thirteen people that established the group and cultivated seedling for sales and Mrs. Chalee Songsiri the housewives leader that cultivated local plants and woven natural-colored fabric.

The wide accepted and prominent leader is Phor Lek Kudvongkaew the leader of group at the beginning, first president of Inpang Center and currently the advisor of Inpang Center. He invited people in the communities around Pupan to join the network, and presented Inpang Center's works to society through meetings, seminars and mass media. After discussing with Mr. Tawatchai Kunnavong and other leaders, Phor Lek Kudvongkaew conceived the ideas of rattan seedling after went to study the rattan farming at Amphur Varichaphoom in 1989. At the first year, 2,300 of rattan were seedling; 1,000 were implanted, sales 1,000 and the left 300 were distributed to villagers for free. The rattan production in the first year enhance morale of Phor Lek Kudvongkaew and members, then they agreed to seedling more 100 local plants for consuming and sales at the cheap price. Phor Lek adhering to the

principle “Implant every thing that can eat, eat every thing that can implant, has to reform the natural environment, move forest to orchard is way to conserve because this will not harm forest, but first thing is to improve man in turn man will reform forest, has to encourage man to think, we can not reform economic if we are not reform man, man has to live harmonically with the nature” (Interview, Phor Lek Kudvongkaew).

Phor Lek induced neighbors to join Plants Seedling Group and bestowing and teaching the thought to new generation by establishing Dek Hug Thin Group with fund supported from Northeastern Rural Development Association (NERDA) to build the learning center. Phor Lek proposed that “Forest is home, stream is life, friend is power, nature give lives on earth, today we fail because we depend on others, yesterday we depend on ourselves, we have to develop quality of life bit by bit, we fishing and sales for 20 Baht, we bring this to buy chickens to feed and sales, we buy pigs to feed and sales, then we sales pigs to build house” (Interview, Phor Lek Kudvongkaew). Phor Lek received Kondeesrisangkom Award, Honorary Degree in Environmental Science from Rajabhat Sakolnakorn and appointed an wisdom teacher of National Education Committee Office, committee of Agricultural Land Reform Office (ALRO) and executive committee of Social Investment Funds (SIF), committee of Village Foundation, vice president of Phoom Panya Thai Network and senior committee of Rajabhat Sakolnakorn.

Some of prominent leaders of Inpang Network whose are thinkers and performers diffused in network such as Mr.Prayat Toetumpol, Mr.Khian Srimukda, Mr.Nau Buakaew, Mr.Sompong Srimukda, Mr.Somporn Thapankaew, Mr.Wanchai Pilajan, Mr.Veerawat Tassamee, Mr.Phaimanee Rajrongchai, Mr.Polawat Thodasa, Mr.Jareon Somchai, Mr.Prayoon Pibutr, Mr.Thongchai Pornmaha and etc.

Leaders of Inpang Network can be classified into 2 groups; leaders that appointed to be committees and leaders that are performers. Most of committees will proceed the diversity of plants in cropland and analyzing the situations before identify the way to developing the network from meeting conducted monthly or bimonthly. The performers will emphasize on diversification farming.

(3) Inpang’s members: There are various levels of membership

level, Amphur level and provincial level. Presently, Inpang Center is management center of Inpang Network, which connected members from Phoom Pannya Network, Kalasin and members from Palang Chaowang Center, and Udonthani since 1999. Most of memberships application are supporting by government organization such as in 1996 Agricultural Land Reform Office (ALRO) and The Third Agro-forestry Agriculture Development Office of Forestry Department initiated Pupan Forest Conservation Project and expanded Inpang Network naming Ecological Agriculture Network Project to 10 Tambons in 4 Amphurs around Pupan Forest.

In 1999, Ministry of Agriculture and Cooperative initiate the in Performance Improvement Project for Sustainable Agricultural Development and assigned Sakolnakorn to be a pilot province in higher part of Northeastern by using development method of Inpang as role model and assigned Inpang Center and Inpang leaders as supporter. This added another 5 Tambons and 5 Amphurs into Inpang Network. Some people applied for membership by themselves and some people, whom are not members of the network, imitate the plant cultivation technology. Some people educational visiting and studying the diversification farming and local plants seedling. Currently, about 1,000 households who are members of Inpang Network live in Sakolnakorn, Kalasin and Udonthani as shown in figure 11.

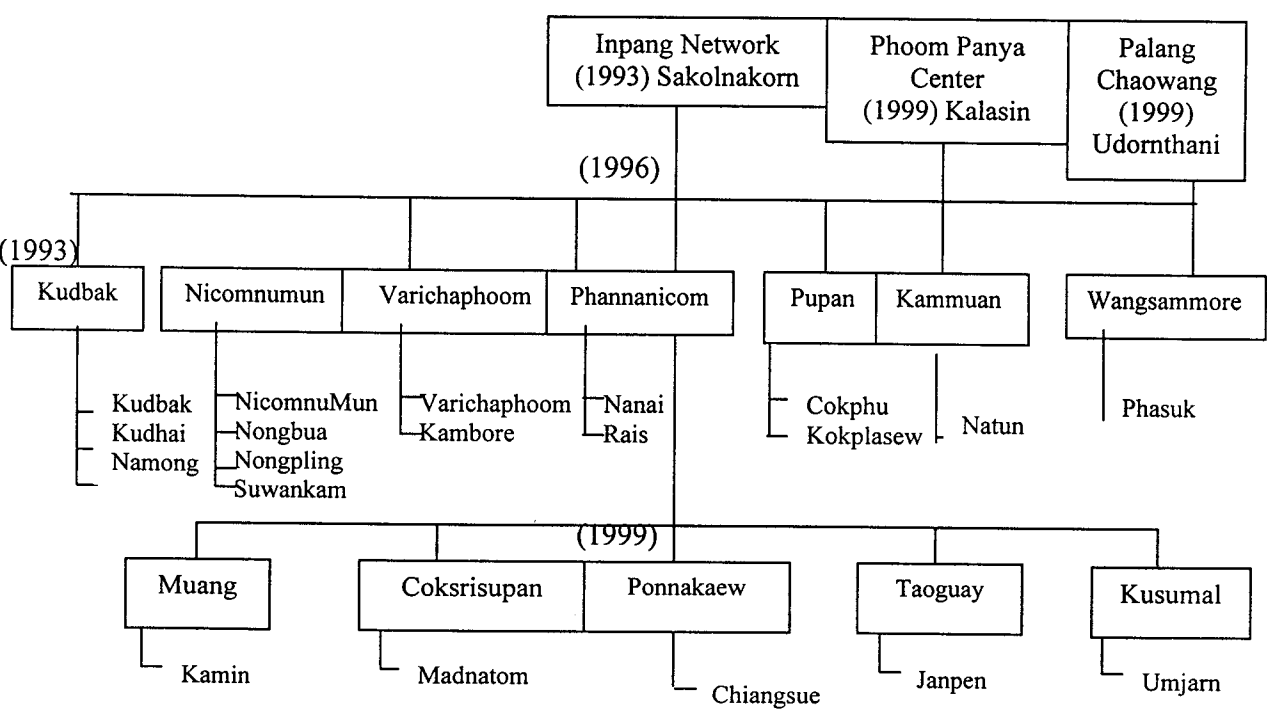


Figure 11 Network Member of Inpang at Amphur-Tambon Level

(4) Developers: Inpang Network was supported by developers both from government and private in motivating, supporting, providing knowledge to leaders, proliferating works, interfacing with external organizations and external network in provincial and national level of connection. The important developers are Dr. Seri Pongpit, Mr. Tawatchai Kunnawong and Mr. Pratuan Pikultong from Village Association and Mr. Yongyut Trinuchakorn from Northeastern Rural Development Association (NERDA).

(5) Volunteers in Inpang Center: Most of volunteers are network members' successors who interested in rural development activities. They assisting in making an appointment, learning the network tasks and responsible work according to their aptitudes. Currently, there are 5 volunteers they are; Mr. Prasert Songsiri, Mrs. Kampun Kudvongkaew, Mrs. Varaporn Onkhiew, Mrs. Vacharaporn Kudvongkaew and Mrs. Suwadee Totumpol.

(6) Inpang Network Consultants: There are capable and successful consultants s both from internal and external network such as Phor Lek Kudvongkaew, Mr. Sompaj Somboon, Mr. Yongyut Srinuchakorn and Mr. Pornwich Taraporn.

2.1.2) Knowledge: Inpang leaders settled learning objectives in order to improve living quality, assigned Inpang Center as Life University, and distinguished knowledge into 4 areas of study; Health Science, Dek Hug Thin Science, Food Science and Life Science.

(1) Health Science is aiming to educating about herb cultivation, utilization, transformation and educating about primary health caring by wisely consume nutritional foods. Knowledge about traditional healing such as massage, herbal streaming, herbal patching was also educated to members. Moreover, there is an interchange of knowledge among traditional healing, Sabai Sabai Medical Association of Japan and Northeastern Local Healer Club along with Ajarn Yongyut Trinuchakorn, Inpang Center advisor as a facilitator. Mrs. Kampun Kudvongkaew, who learning traditional pharmacy from Phor Tongon Sithikraispong at Khonkaem and traditional medical certificate of pharmaceutical from Ministry of Health, is a Health caring officer of Inpang Center. In 1996, drug factory was established with the 300,000 Baht fund supported from Ministry of Health and Postal

Department of Japan Fund to produce powder medicine, patch medicine, tablet medicine, Ya Dong Loa (alcoholic mixed with herbs), Numman 108 (multipurpose oil). The medicine products were marked up about 10 percent and granted for free to scanty people, healing methods are; prescription, nutritional self-care, exercise and breathing therapy. In 1999, this activity was expanded to other villages in the network but massage is more emphasize and massage club was established.

(2) Dek Hug Thin Science is aiming to embed children and youth in community in self-dependency by beginning to love local and pride in community lifestyle. Network leaders will teach children on Saturday and Sunday emphasize on understanding community lifestyle, history, tradition, culture, moral and folktale. Other activities such as educational excursion members' family, biography of successful and failure people, studying ecology and biodiversity through nature and environment in community and forest. The management fund was established to provide career training such as farming, farming, transforming, sales and building. Other training such as saving, sacrificing and exchanging knowledge with people in society and Japanese children. The important person in casting the learning structure of Dek Hug Thin Group is Phor Lek Kudvongkaew, subsequently Phor Khian Srimukda took over and operate the group successfully.

(3) Food Science is emphasized on educating members to nutritionally consume local food by cultivating plants necessary for consumption for instance rattan, it believes that rattan has high nutrients and rattan can cook for many recipes. Transformation of excessive food by adding value to products for example excessive bananas could be transformed to dried-banana, transforming excessive fruits to wine. The corporation from Rajamonkala Agricultural Training and Research Institute, Sakolnakorn in integrating knowledge in nutrition, agriculture, transformation and management assisting group in cultivating consumable plants and cultivating variety of plants to create interdependence among plants, which in turn this will leads to sustainable ecology. Forest produced food for example ant egg and bugs will be gathered appropriately. Group also conducted training and exchanging knowledge in local recipe and modern cooking by using local materials.

(4) Life Science is accentuated on harmonically teaching in life management and living together in the community for instance morals, ethics and local culture. The important content is the relationship between people in the community and environment to managing life both physically and mentally, relationship with each other and life management. Group method is applied to enhance knowledge and learning altogether with direct experience from practicing to understand nature and apply it to day to day life. The process is started from cultivating variety local plants thereafter constitutes life, community and environment sustainingly and steadily.

2.1.3) Natural Resources: Natural resources that support the operation of Inpang Network is Pupan range which is the range that biological fertility and has plenty of plants and animals. Pupan range has biodiversity which is the essential factor for natural food to exist and also essential for Inpang's members to live. Pupan Range is origin of stream, which is necessary for consumption and agriculture. Soil around Pupan Range is silicate soil but it is fertile enough for agriculture.

2.1.4) Funds: Inpang Network received funds in supporting the operation from 2 sources: funds from external organization both government and private firms such as Village Foundation, Northeastern Rural Development Association (NERDA), Department of Environmental Quality Promotion, Agricultural Land Reform Office (ALRO), Social Investment Funds (SIF), United Nation Development Programme, Ministry of Health, Ministry of Agriculture and Cooperative, Postal Department of Japan Fund and Global Environmental Fund; internal funds came from operating profit of network's members and shares collected for establishing funds as concluded in the annual report of 1999 shown in table 5.

Table 5 Inpang Network Funds

Funds	Number of Members	Capital/Bath
Dek Hug Thin	132	80,000
Agriculture	818	127,642
Savings	805	811,810
Moreya	17	78,000
Plants Seedling	25	57,000
Total	2,113	1,154,452

2.1.5) Technology: Both local technology and modern technology were used in Inpang Network. Local technology that villagers reform for new use are for instance loom, digging well with pipe and pump handle, farming cattle in the field instead of hay, natural ecological plantation, using charcoal in heating, diversification plantation and using banana tree as moisture absorption for plants seeding in dry season. For modern technology, most of them are supported by external organization for example herbal mixing machine, juice transforming instrument, solar energy oven for drying banana, plant breeding by patching method, group and fund management, Sabai Sabai health maintenance of Japan. Some management technology derived from other communities such as an establishment of Dek Hug Thin Fund was came from idea of Phor Yai Soi Sraklang, Etonoy Group, Burirum and method of seedling rattan in 7 days by stroking rattan seed and keep in moisture ware covering with thin fabric the idea was came from Amphur Varichaphoom, Sakolnakorn.

2.2) Management structure and role specification in Inpang Network

2.2.1) Inpang Network is managing by cooperating between members and proxy in meeting and conferencing of each network level from low to top as follows

(1) Group level is the collection of 5-6 individuals and households in each group with a leader that interested in the same subjects, in a village or Tambon may has more than one group.

(2) Community level is consisted of more than a group in the same village or Tambon, there are community executive committees who collaborate with Amphur level in budget allocation, providing of welfare, training members and propose the problems of members to community committees conference which will conduct once a month by alternately rotate to every village.

(3) Amphur level is the collection of networks at the Amphur level, committees at Amphur level will come from president of each community network and conducting a conference once in 1-2 months by rotating to each Amphur. The conference matters involve planing, problems solving, project consideration and conducting of leaning and activities.

(4) Province level or Central Network is Inpang Network, committees consists of president of each Amphur network and will has meeting every 2 months in order to analyze the problems, finding the way to support network activities and cooperate with province level network and government and non government organizations in order to collaborating and exchanging the guidelines for development. Monthly meeting will alternately conduct with meeting of Amphur level network. Board of committees in province level network has 2 years life and consists of 15 central committees which are; a president, a vice president, 2 treasurers, 9 committees and 2 secretaries and has 4 advisors, 5 volunteers and a collaborator from Village Foundation as shown in figure 12.

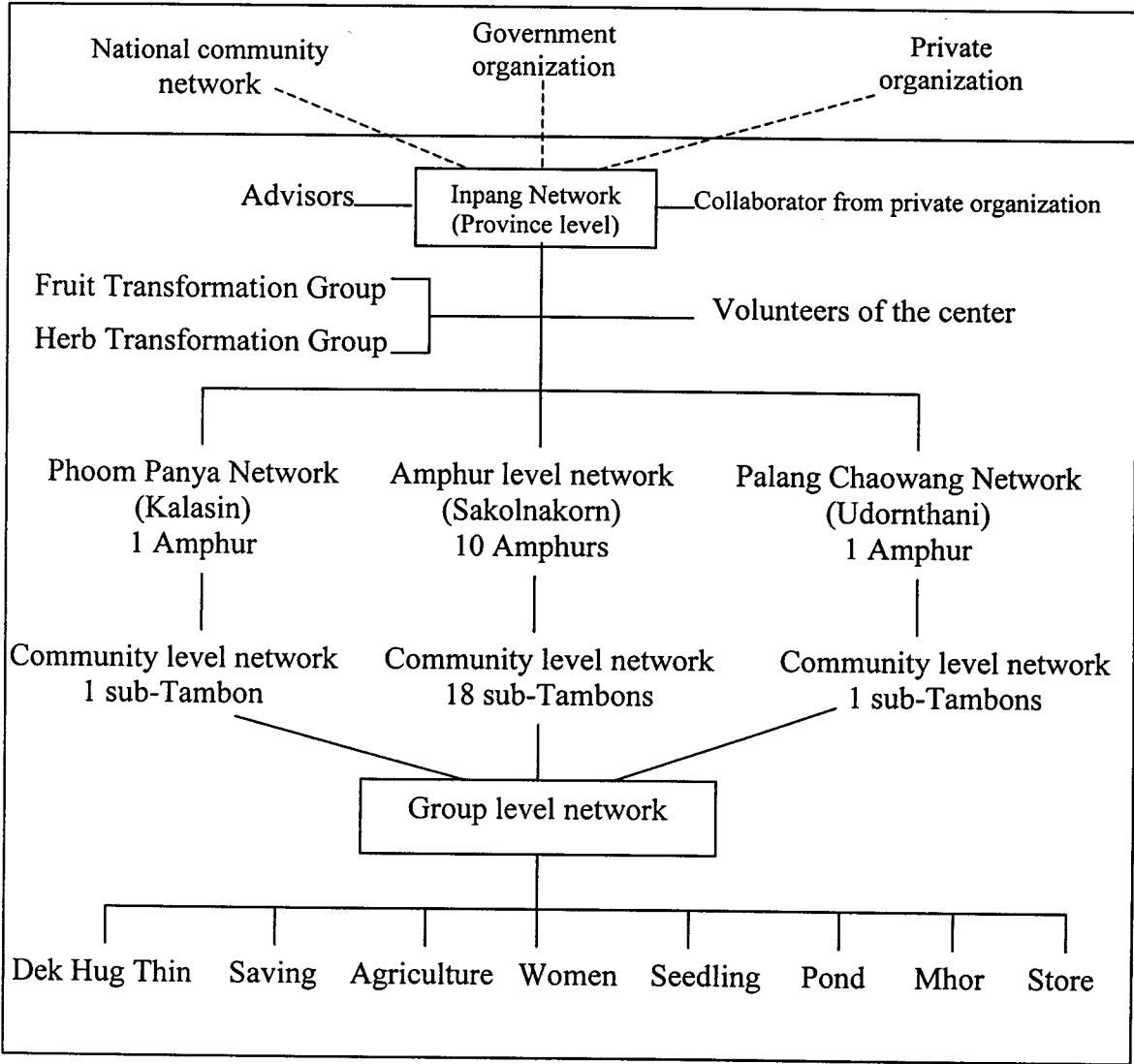


Figure 12 Management Structure of Inpang Network

2.2.2) Interrelationship within network started with relationship at individual level supported by community culture in living together as kin and relative network. Initially, interconnection of origin members was created from respect to group leaders and Phor Lek Kudvongkaew works thereafter expanded to network. Relationships among groups were more systematic from activities for instance conducting formal monthly meeting appointment, reducing of relationship among relatives network, increasing of benefit-oriented and reducing of meeting and educational educational excursion among committees of Amphur level network and province level network because of time constraint.

2.3) Disciplines, regulation, objectives and goals of Inpang Network were widely identified as people that interested in applying membership of Inpang have to contribute benefit to society, diligent, honest, participate in activities, present in meeting, participate in workshop provided by network, ready to exchange knowledge with other members and put afford on developing network. For disciplines at each level of network or at each activity group may identify by consider on the basis of appropriateness for example:

Disciplines and regulation of saving group, Banbua, Kudbak Tambon, Amphur Kudbak, Sakolnakorn.

2.3.1) Period of application from February to May.

2.3.2) 10 Baht honest fee/month/person.

2.3.3) Absent of 3 months fee paid, welfare will not grant.

2.3.4) If member sick could reimburse hospital fee 500

Bath / year / person.

2.3.5) If member death could reimburse 1,000 Baht.

2.3.6) Could borrow up to 2 fold of deposit amount from saving funds.

2.3.7) Borrower will be charged 1% interest per month.

2.3.8) Time of loan borrowing at most 1 year.

(1) Borrower could pay principal monthly according to contract.

(2) Borrower could pay principal as identified in contract.

(3) Borrower could pay principal in the whole amount.

(4) If borrower is ready to repay the whole amount of principal contract in (1)-(3) could be terminated.

2.3.9) Profit will be distributed as

(1) 60% share dividend.

(2) 30% welfare fund.

(3) 10% management.

At the first time, goal of Inpang Network is aiming to encourage villagers conserve Pupan Range and it biological resources by bringing forest seeds for

cultivated. Subsequently, the network was expanded and widely accepted, it's broadening the goal of the network also especially in development perspectives for instance Performance Improvement Project for Sustainable Agricultural Development supported by Ministry of Agriculture under the cooperation of Village Foundation and United Nation Development Programme from 1999.to 2001 as stated on supervisory board in Inpang Center "Attempting to compile villagers who carry out agriculture activities nearby Pupan Forest, conduct provincial leaders and networks meeting every 2 months to review past agriculture performance, initiate ideas and exchange experiences for the reason that improving agriculture method in cultivating both vegetable and fruit for consumption primarily and transformation and sales if there is an excess production, encourage villagers to carry out ecological agriculture, establish funds for example saving, conservation and reformation local plants, found Dek Hug Thin group, collect local herbs for usage and transformation, transformation local fruit juice, educational excursion and exchanging experience."

2.4) Wisdom and learning activities of Inpang Network.

2.4.1) Wisdom transferring in the network are:

(1) Wisdom about ecological agriculture about agriculture that congruence with natural condition as to equalize ecological system in cropland by harmonizing activities in cropland as a model of combination agriculture, Agro forestry agriculture or new theory agriculture since to accomplish sustainable agriculture which means emphasize on cultivation of local plants that appropriate with environment as to achieving succession to next generation and sustainable in short and long term reaping from both edible plants, medical plants and utilizable plants.

(2) Wisdom about plants utilization in the medical, consumption, usage, transformation and breeding aspects. Employ the cultivation method of certain plant that congruence with its optimal natural condition.

(3) Knowledge about technology in agricultural production transformation that emphasis on transforming excessive local fruit to juice by using modern equipment.

(4) Herbal medicine will be produced the form of pill, capsule

and boiling. Health care activities according to local healer tradition for instance massage and steam bath will be incorporated with primary diagnosis of Japanese Sabai local healer that stress on electric wave in the body.

(5) Knowledge about group management will be instructed on managing group in the village, community level and network level.

(6) Knowledge about community history, local wisdom, lifestyles, local culture, believes system and relatives network living relation is also conveyed to children.

2.4.2) Learning activities conducted in Inpang are:

(1) Monthly meeting that alternately rotates to members' house or group proxy.

(2) Meeting and training will be conducted according to occasion and situation.

(3) Seminar conducts to exchange experience.

(4) Educational excursion and studying within and between networks.

(5) Learning from virtual natural setting.

(6) Learning from local wisdom for instance through folktale or Pay community history.

(7) Being a learning site will increase the chance of knowledge exchange between educational educational excursion ors and network members.

3) The expansion of Inpang Network in number of members, area, goals and activities over the past 10 years was came from the reputation obtained from works. The followings are conclusion of important work aspects:

3.1) Societal aspect: Successful interconnection between individuals, groups and other networks both in region and national level was created. Inpang members have chances to cooperate with officers from government, private and international sector which widening vision of Inpang members and obtaining direct experiences for example Dek Hug Thin project that operating since 1992.

Interrelationship within networks is the result of cultural reformation, local thinking and lifestyle reformation which emphasis on interdependency among

relatives network, bringing back kindness, sympathy and mercy. Presently, Inpang have members spread throughout in 86 villages, over 1,000 households around Pupan and create at least a community network leader who is a specimen in demonstrate diversity plantation.

During 1999-2001, Inpang network is being a role model in nation wide expanding in Performance Improvement Project for Sustainable Agricultural Development. Communities that are role models various aspects as follows:

Inpang Network, Sakolnakorn	Type of role model
1. Kudhad community,Amphur Kudbak.	Sustainable agriculture.
2. Cheongdoi community, Amphur Kudbak.	Natural resources and environmental management.
3. Nongsanai community, Amphur Kudbak.	Community welfare and funds.
4. Noenhuachang community, Amphur Pupan.	Community business.
5. Banbua community,Amphur Kudbak.	Community industry.
6. Inpang Network, Amphur Kudbak.	Learning.
7. Dadphuvong community, Amphur Varichaphoom.	Community health.

3.2) Economic aspect: The ultimate goal of network is aiming to assist members in repay debt from cultivating mono-culture by emphasis on saving and funds establishment and convey self-sufficiency concept to network members. Most of members could employ ecological agriculture and self-sufficiency living even cannot repay the whole amount of debt but can aggregate cultivated plants and reap plants production such as rattan, banana and pineapple to sales daily. As an example of Phor Khian Srimukda, before his network entering in 1992 he had debt amount 60,000 Baht caused from cultivating mono-culture for instance cassava and hemp, but after his entrance network for 6 years with his 6 rais area that cultivated 167 type of plants amount 10,693 trees together with farming fogs, ducks, chickens and pigs for consumption and using manure from animal as natural fertilizer he could

repaid all debt, purchase another 20 rais which cultivating variety of plants and has over 100,000 Baht in saving account. There are other members who live like Phor Khian were living throughout community for example Phor Nao Buakaew, Phor Sirm Udomna, Mrs. Chalee Songsiri, Mr. Polwat Kodasai and Mrs. Vilai Kudvongkaew.

At community and group level, Inpang network had establishing variety of funds that came from saving of members and return from investment. There are more than 8 types of funds but fund that every community has is saving fund for other types community may establish according to readiness and necessity. Now a day, there is total capital of 1,154,452 Baht from every fund in Inpang Network. Moreover, juice production factory value 60,000 Baht was constructed from members' shares with production capacity of 5,600 bottles in 1998 and 13,000 bottles in 1999.

Inpang received funds supported in conducting projects for instance in 1989, Village Foundation granted 2,500 Baht local plants cultivating fund after 3 years fund increase to 35,000 Baht and purchase land area 5 rais to establish Inpang Center. Thereafter in 1996, cooperative of Dakuka, Japan provided local herbs production instruments and 300,000 Baht fund granted from Office of The Permanent Secretary for Public Health. and Postal Department of Japan to acquire factory and herbal production equipment. In 1997, Ministry of Health granted 160,000 Baht AIDS fund. During 1997-1999, Global Environmental Fund by United Nation Development Programme (UNDP) granted 5,000,000 Baht fund in Pupan Forest Conservation Project by establishing Ecological Agriculture Network and 309,000 Baht fund in Energy Enhancement and Appropriate Technology in Ecological Agriculture Project in 1998. Since 1999 to present, United Nation Development Programme (UNDP) incorporated with Ministry of Agriculture and Cooperative in providing fund in Performance Improvement in Sustainable Agriculture Development Project. During 1999-2000, Social Investment Fund supported 15 million Baht fund to conduct welfare activities and loan granted throughout Inpang Network.

3.3) Environmental aspect: Inpang Network executes Ecological Agriculture Model that moves forest to orchard by breeding local plants for nurture and sales at the same time reducing area in cultivating mono-culture which in turn indirectly conserve and reform Pupan Forest the origin of stream. While, reforming soil in cultivation area by imitating the plant diversity in the nature, this increase fertility of soil and supporting biodiversity in the cultivation area and as production from orchard increase forest is less interrupted. Ecological system in forest, orchard, plants, animals and man is equilibrium as Phor Khian stated that “the harder the certain plant breeding, the higher love and care” Inpang Center could cultivated over 150 local plant species both nurture and sales at price ranging from 2-30 Baht according to species and size amount 20 million units or average revenue of 200 million Baht. But things more successful than economic aspect is fertility of natural resources, safety of environment from Non-toxic Natural Agriculture System. During 1996-1999, Inpang Network build Ecological Agriculture Leader of 20vcommunities, 10 households in each community, total 200 households a year and at the end of project each orchard has more than 100 plant species, amount 800,000 trees a year, total 2,400,000 trees for 3 years, this increase food, herbal, and reform ecological system in orchard.

The biodiversity is the subsequence result of plant diversity in orchard of network members. In Kudhad village, there are Inpang Network members that execute Ecological Agriculture with size 2-3 rais 100 households and size 3-20 rais 34 households. The followings are exceptional members in cultivating Ecological Agriculture:

Name of Member	Area in rais	Species cultivated
Mr. Khian Srimukda.	6	167
Mr.Sompong Srimukda.	5	50
Mr. Saman Srimukda.	6	22
Mr. Amnaj Sukchom.	16	21
Mr. Prapan Srimukda.	2	15
Mr. Hirm Srimukda.	1	25

The popular plants cultivated are rattan, Khar, banana, bamboo, pineapple, tamarind, longan, Mak Mao, Tam Lung, lime lemon, papaya, groundnut, corn, jackfruit, mango, coconut, guava and tomato.

3.4) Knowledge and technology aspect: There is an exchange of knowledge among members in meeting, training, and educational excursion each other in the network. Inpang is the learning network that has more and more scholars and knowledge form action research, explore through elderly local wisdom and exchange of knowledge among educational excursion ors and members. As Inpang was accepted as a role model in learning and community prototype in agriculture and community industry. Inpang concluded the knowledge of sustainable agriculture as the agriculture system that concern with fertility of nature and avoiding agricultural techniques that harm natural system, sustainable agriculture systems for instance Combination Agriculture, Self-sufficiency Agriculture, Integrated Agriculture, Agro-Forestry, New Theory Agriculture and Ecological Agriculture by emphasis on bringing local plant seeds from Pupan Range to cultivate primarily for consumption and grant and exchange the oversupply (conclusion from Ecological Agriculture Network Committees meeting at Inpang Center, 16 Nov 1998).

The important knowledge of Inpang Network is: knowledge about lifestyle; local tradition, pattern and norm; knowledge about nature, biodiversity, Ecological Agriculture, fruit transformation, herb transformation, local plant breeding method, woven natural soaked color, educating members, community funds, community business, Dek Hug Thin and etc. Inpang's learning process is emphasis on practice, provide direct experience that congruence and appropriate with community lifestyle. Inpang Network became Life University that providing knowledge in Food Science, Health Science, Dek Hug Thin Science and Life Science and Phor Lek Kudvongkaew the Inpang leader was assigned to be the first generation of wisdom teacher of Office of National Education Commission in 1999 and network is expanded to be learning center of Phoom Panya Center and Palang Chaowang Center.

Since 1997, there are average of 150 group, total 5,000 educational excursion come to educational excursion Inpang Network a year and

Inpang leaders were frequently invited to be instructors or participator in various meeting and assigned to be committees in various national organization.

3.5) Management and organization aspect: Inpang Network is developed from small village organization to network. Inpang Center is the central of the network at provincial level and 2 subordinate networks Phoom Panya network and Palang Chaowang Network was established in 1999 as collaboration and learning center for members. Currently, Inpang Network has network members in 3 province, 12 Amphur, 20 Tambons, 86 villages, 1,000 households within 12 years (1989–1999), it is managed by group system which compile thinking potential and fund in community with continual collaboration from both government and non government organization. Network members had learned management of life, family, group and network, and educated members in self-dependence, work sharing, live together on appropriate regulations and practice in cooperation. Network could build potential leaders who spread throughout numerous communities, this also contribute to national development of human resources and for the management training for youth in the form of Dek Hug Thin Group in order to maintain community generation after generation.

4.1.1.2 Network Learning Process for Plant Diversity Conservation.

Inpang Network that it operating in many different fields works was accepted and became source of learning and studying of members and interested people. One of the most important works is plant diversity conservation by imitating natural forest in doing agriculture, which enable conservation forest to naturally restoration itself (Succession). Network also conducting a learning process, which enables the conservation forest to be a source of learning and plants genetic.

1) Learning Components

1.1) people involve in learning for plant diversity conservation
Inpang Network are scholars who obtain knowledge transferred.

1.1.1) Scholars: Scholars are both came from external and internal network. Initially, the idea about cultivating traditional plants for consumption was urged from educational excursion at rattan orchard of Phor Preecha Srisamsan at Amphur Varichaphoom in 1989 and knowledge of Integrated

Agriculture from Phor Phairoy Sraklang at Amphur Lampraimas ,Burirum Province. Then integrate knowledge gathered from educational excursion with original knowledge that parent and predecessors had proved by successfully research. The result is that members are enable to manage and cultivate orchard according to Ecological Agriculture following by the derivation of plant diversity. The most prominent Inpang Network scholars is Phor Lek Kudvongkaew, Banbua; Phor Khian Srimukda, Ban Kudhad; Phor Nao Buakaew, Ban Ninhuachang; Phor Kamsan Nontadara Ban Tadbhuva; Phor Prayul Pibutr Ban Dongsuan; Phor Somporn Thapankaew, Ban Nonsai, Phor Sompong Srimukda Ban Kudhad, Phor Sawai Sritiangtai Ban Phakkampoo; Phor Sawat Hankate Ban Nongsan. These scholars are in charge of instructor with their orchard as learning source. Moreover, there are many scholars of Inpang Network spread in communities that are network members. After the initiation of Agriculture Sustainable Project, new batch of scholars is more rapidly educated because the elderly scholars are specimen in process of learning and studying.

1.1.2) Successors: They are network members and other interested people, most of new network members will be invited to join network by network collaborators and former members. Members will be instructed the development that emphasis on self-dependence by using agricultural system that cultivate various plants essential for basic needs. There are 2 types of knowledge transferring; first is formal transferring by participate in training and meeting conducted by network, this may considers as relationship between individual with group; second is transferring from scholars to individual, this may concerns as relationship between individual with individual. Therefore, successors are both adults that are network members and children in Dek Hug Thin Group, but both of them will learn both thinking method and virtual practices from training and visiting orchards of scholars. After training was finished, network will provide members plants seedling to further cultivating.

For other interested people that interesting in network development for instance people in the community, people outside community, developers, students, government officers, teachers, cops and etc, they can make an educational excursion both in group and individual. Most of the visitors were coming to study

and purchasing back seedling plants, they came from every parts of the country and variety of departments as Inpang Center staff will responsible for providing information needed by visitors.

1.2) Knowledge about plant diversity conservation of Inpang Network.

1.2.1) Contents of knowledge consist of knowledge about types of traditional plants, method in breeding plants, method in nurture seedling, method in cultivate plants for self-sufficiency, Ecological Agriculture, Sustainable Agriculture, utilization of plant diversity in form of food medicine usage and transformation, based on relationship between man, soil, water, forest and biological resources and equilibrium of ecological system and plant diversity.

The important content that Inpang Network emphasizes is cultivating traditional plants with natural method in order to achieve plant diversity conservation nature. Most of plants are bred by seeds as to gain strong grassroots seedling, but some plants are difficult to breed therefore the study of plants and forest nature is essential for instance from the study Makha seeds that was heated by forest fire a little bit will growing faster because the seed shield was cracked, after the observation Makha seeds will be hollowed a little hole to stimulate the growing rate. In dried sand clay the method of plant cultivation is to use banana body install at the bottom of the hole dug and then cultivated plants will not died because the moisture from banana body will foster the plants. Another example is when cultivating bananas it should raised other perennial tree such as mango Mafai, when bananas growing and producing benefits, while perennial tree are small, after 7 years banana will wear out then cut them off but substitute by perennial tree, at the ground level of perennial tree should cultivate short-live vegetables. Moreover, the other important knowledge crucial to members is:

Plant cultivation by Ecological Agriculture, which contribute to plant diversity and also train members to be diligent and as a basis for development both in societal and economical aspect. As the followings local principles stated. (Khian Srimukda, Interview)

- Cultivate and feed things essential in local.
- Cultivate both edible short-live and long-live plants.

- Cultivate 6 level of plants that dependent to each other and utilize land efficiently. (underground, floor ground, shadow provided, sun reached, upper climber, lower climber, aquatic)

- Feed chicken to eat insects and shovel soil for plants.
- Not go market but wait for market.
- Eat the production first the remainder grant, exchange, transform and sales.
- Saving a million before retire.
- Work multi-functions.
- Ecological Agriculture is the most reliable career.
- Establish water system, fertilizing soil consume 80% of time, but at most 5 years, sustainable begins.

In breeding rattan, bring extreme elder rattan seeds lightly hit by stick to make cracks on seeds, then wash the seeds to peel the skin off, after that soak them in water mixed of 1 spoon of vinegar to water half of basin, after that put seeds at air ventilated place for a night, preparing smashed coconut skin to boil or steam in order to kill micro-organism and soaking in the water, put rattan seeds under soaked coconut chaff, when a leaf is exist put the seedling in black bag that contain with soil or burned chaff and dung fertilizer, nurture them for a month then bringing them for cultivate, this method could also apply to other seed types.

For breeding Mak Mao, washing Mak Mao take seeds out and dry them (dried seeds could keep for a long time), roast seeds in the basin covered with plastic for 2 weeks before breeding, then sow seeds in the plot, after seedling has 2 leafs move them to black bag and nurture them for a month before cultivating.

In increasing the production of papaya, If the papaya is very big, cut upper half off, and cover with plastic at the top and tighten it, papaya will spreading the branches and give more output.

In making anti-inflammatory herbal medicine, mix rinds of rubber tree, Plao tree, Lin Fah tree, Daeng tree portion 1:1:1:1 and grinding them, wrap the ground rinds with fabric and steaming it until the temperature is rise, bring the hot wrapped rinds patch on the infected point (recipe of Yai Yod Kudvongkaew Banbua, heal more than 200 people).

The example of medicine recipe that restoring health and restoring fatigue, use Mahkratuebrong, Khao Lam roots, Kamin Krua, Namtao root, Khem Pa root, portion 2:1:1:1:1 boil together at 100 Celsius degree for 15 minutes, drink 2 cups a day at the morning and evening (recipe of Yai Lun Kudvongkaew Banbua, heal more than 100 people).

In making Mak Mao juice, bring red and black Mak Mao 3 kilograms each in portion 1:1 wash them, blend them with 6 kilograms of clean water and purify the blended water with fine net fabric, result in 10 kilograms of Mak Moa water, put another 2.5 kilograms of clean water and put sugar in a preferable amount. After that boil it at 80-85 Celsius degree about 15-30 minutes, bottling the water while the water is warm. The property of this drink water is to adjust hormone and increase body immunity, it also protect the disease about uterus, testicles, restore eyes and light laxative.

The usage of plant diversity for coloring cotton, and woven nature color fabric, by extracting the color needed from the following plants:

Yellow from forest mango tree, Phaega, and jackfruit.

Dense Yellow from forest mango tree and Poon Daeng.

Dense Green from forest mango tree and clay.

Black from Mai Wha rind and clay.

Red from Tra Kraw rind and Pradoo tree and Hua Malangwan tree.

Bronze from Kabo Red brown from Ngew tree.

Dense brown from Daeng tree mixed with rust.

The example of yellow coloring, the ingredients are: mange tree rind 1 kilogram, lime, copper sulfate, clay, cassava powder, detergent powder, shampoo, fresh water for coloring 2 kilograms of cotton. In coloring method, prepare cotton by boiling cotton in detergent dissolved water for 15 minutes in order to detract oil from cotton, after that wash cotton with cold water, at the same time soak 1 kilogram of Mango tree in lime dissolved water adequate amount for coloring 2 kilograms of cotton for 15-20 minutes, boil at 100 Celsius degree for 1 hour, filtrating only water, put 1 spoon of copper sulfate, put prepared cotton in boiled color water for 30 minutes, then put cotton at the air ventilated place until cotton cool down, after that wash cotton in shampoo dissolved water, then put cotton in cassava powder dissolved

water and lightly scrape in order to set cotton, then put cotton at the air ventilated place.

Sustainable Agriculture on the meaning of Inpang means agriculture for living and sustain nature environment in the land area. This make a natural forest in the orchard or plot to have plant diversity both usages plants and plants for consumption. This also bring back soil fertility and forest to sustain life and community while timely developing other aspects for instance fund and welfare, community business and industry, community learning and health, reintroduce agricultural knowledge that embed in conventional culture lifestyle, but knowledge about business, industry and fund is new knowledge obtain from external sources.

Biological Diversity on the meaning of Inpang means respect to all living things, soil, water, forest, plants those are live together and make productivity in food, medicine and things necessary for living both people in this generation and the next. Conservation of biodiversity means cultivating variety of plants, ensuing other things such as earthworm, termites, insects and variety of mushrooms. Interdependence between living and non-living organism will emerged with the emphasis on protection rather than correction for instance insects from different species will control the population of each other in orchard, breeding variety of plants in a bag or hole. Recovering plants in the condition as in the nature such as cultivating all: large tree, middle tree, shrub and grass, when the system is equilibrium, microorganism is automatically controlled.

1.2.2) Traditional wisdom and scholars' knowledge about plant diversity in the community mostly came from direct experiences for example hiking in the forest, cultivating plants in the orchard, learning by practicing, listening from elders and scholars in the community about nature through folktales. Bring traditional wisdom and past experiences apply to the present situation. Phor Khian Srimukda implied that "wish to gain more gain less, wish to gain less gain more" (Khian Srimukda, Interview), this could articulated as don't be greed, start from small thing such as cultivating rattan and expanding later. Therefore, knowledge would be accumulated from direct experience, learning in scholars' orchards, learning from environment surrounded the community, imitating neighbors in diversification cultivation, participating in training conducted by Inpang Center for

example Ecological Agriculture Sustainable, fruit transformation and knowledge from external community is mostly came from educational excursion to other network or participating in seminar and meeting.

1.2.3) Knowledge Transferring in Inpang emphasis on transferring of knowledge from network scholars that succeed in life and transferring of experiences of life and family management, cultivation management and agricultural production management by monthly meeting, training and seminar.

1.2.4) Knowledge was developed from practicing and from succeed elder that enlighten from reality practices, thus the existing knowledge is practicable for example succeed of traditional breeding is came from rattan breeding and cultivating plant in orchard available around house area. Most of cultivated plants are invaluable plant that it is not essential for today life but the future life too.

1.3) The important learning sources about plant diversity conservation of Inpang network are: virtual media, instrument and man for example scholars who breeding tradition plants and initiate Ecological Agriculture; black back, soil and burned chaff are instruments in breed seedling; network members seedling and breeding method from three network: Inpang Center, Phoom Panya Center, Palang Chaowang Center, are virtual media necessary for learning. Furthermore, traditional lifestyle in community based on nature loving and relationship among neighbors is reviewed and reintroduced for further transferring of knowledge from scholars to network members both children and adults altogether with external knowledge from government and non government organization.

The budget supported in learning was come from saving of members and from funds supported from government and non government organization.

Learning schedule is the monthly meeting day and the other days that conduct informal meeting, training and seminar.

1.4) Goals and objectives of Inpang Network in learning for plant diversity conservation. The goals of conducting the learning is to achieve plant diversity conservation in the Pupan Forest conservation project by establishing Ecological Agriculture Network, promotion of traditional plant cultivation project for transforming industry in the community and performance improvement for sustainable agriculture development project. The goals of learning about plant

diversity conservation are: enable all level of network members in learning in conducting Ecological Agriculture and Sustainable Agriculture in their land; enable traditional plants diversity for self-sufficiency; reducing the destruction of natural resources; encouraging plant diversity conservation on Pupan Range by cultivating and breeding plants in the orchard.

The objectives of learning for plant diversity conservation is to creating learning process and encouraging Ecological Agriculture career by establishing network of community organization around Pupan area and support in seedling and breeding of traditional plants in Pupan Forest. The expansion of conservation and biodiversity in the agricultural area of members is one of ways to searching for knowledge about relationship of community and environment. The establishment of programs in Ecological Agriculture experiences enhancement and organizational management by using network process in developing traditional plantation to plantation for transformation industry with full line business supported by managing resources and environment, establishing of fund and community welfare beside with health care activities.

2) Learning phases and procedures about plant diversity conservation.

2.1) Phase of learning start from thought systematically, villagers of Banbua will be encouraged in reviewing problems and finding potential from culture community by exchanging and analyzing knowledge among villagers. The result founded from analyzing is that debt is caused from planting mono-culture and modern value, the solution is that the turn back to traditional culture of living self-adequacy and cultivating plants versatility instead of cultivating mono-culture crop such as cassava and hemp.

After understanding the problems and solution, then the educational excursion to studying the method of breeding rattan, cultivating rattan orchard which is the traditional food of the community. The first rattan breeding group consists of 13 people consume time about a year (1989–1990) to get seedling for plantation, after the development of plantation method the breeding time reduce from 1 year to 7 days. The developed knowledge was provided to network members widely.

As conclusion the phases in learning started from understanding problems, finding the way to solve them, searching for the model that suit to the situation of problems, experimenting and developing the model and methodology, expanding the group and network of cultivating plant diversity and conservation to society and country. Then expanding the connection of Sustainable Agriculture network to national level and to be a prototype for other interested people and network.

2.2) Procedures of learning about plant diversity conservation of Inpang Network are: informal learning by tracking the problems and finding of potential in community culture by exchanging knowledge between community leaders and Mr. Tawatchai Kunnavong, researcher; educational excursion to the successful rattan orchard; by learning from nature such as hiking in the forest and studying the system of nature.

When Inpang was accepted from other organization and departments, then formal learning like bureau learning method is applied by conducting training and seminar both inside and outside Inpang Center. The learning is more emphasis on versatility in gathering knowledge by integrating traditional wisdom with modern knowledge.

2.3) Development procedures of learning about plant diversity conservation Inpang Network was developing from traditional learning by understanding community culture and natural system to learning of product transformation, group management in both societal and economical aspects and using plant diversification as a collaboration and exchanging of knowledge with both government and non government organization. This assist in integrating method and procedures of learning to the situation occurred.

3) Learning Activities for Plant Diversity Conservation

3.1) Inpang Network initiate various activities as follows:

3.1.1) Pattern of activities happening in everyday lifestyle of members are talking in the morning, evening or holidays. Learning is mostly automatically obtained from practicing activities between individuals, called cultural community learning.

3.1.2) Learning activities that network conducted for members are group activities and network connecting activities for instance

alternately rotate of monthly or bimonthly meeting in members' orchard as to exchanging knowledge by talking and exchanging experiences, problems and cultivating method. The compilation of thinking and moral in continual developing activities for instance establishes partnership to juice product transformation and herb medicine. Almost learning activities are done in natural setting practices for instance exercising management, business and industry activities. The indirect learning activity is fund establishing for saving purpose and welfare for example Dek Hug Thin fund, plant diversity conservation fund, traditional plants fund.

Training new members is one of the important activities that educate new members before conducting activities. Training also motivate thinking ability and broadening vision obtained from scholars' experiences on managing orchard, life and connection within the network

Activities conducted when visitors came for educational excursion for instance leader presenting a speech, visitors lodging with network members this enable visitors in gaining experience about plant diversity conservation.

3.1.3) Supporting activities from external organization for example action research supported from Sakolnakorn Teacher College (Sakolnakorn Rajabhat Institute) which stimulate leadership skills activities and restoring potential of community. After that, the educational excursion the rattan breeding and experiment the method of breeding and expanding to breeding other traditional plants thereafter. The other supporting projects from others department such as; the expansion of Ecological Agriculture network project supported by Agricultural Land Reform Office (ALRO) and The Third Agro-forestry Agriculture Development Office of Forestry Department; Performance Improvement Project for Sustainable Agricultural Development in developing Sustainable Agricultural Network supported by Ministry of Agriculture and Cooperative; academic seminar about planting traditional vegetable conducted by Rajamongkala Agriculture Institute.

3.2) Method of conducting learning activities about plant diversity conservation are versatility for instance observing, talking, interviewing, collecting data and explaining history of community. The successful project such as Pupan Forest conservation project by using Ecological Agriculture network, which has training activities as follows:

3.2.1) Method in conducting activities.

Year 1 (1996) Staff of Inpang Center selected 10 farmers from each village that conducting some part of Ecological Agriculture to join the network and provide training for 5 days 4 nights with the following activities:

Day1 Initiate thinking : Conducted at Inpang Center by exchange of experiences between training participators and leaders networks.

Day 2-3 Educational excursion at orchards of Phor Lek Kudvongkaew, Phor Khian Srimukda and Phor Nao Buakaew to studying thinking development and method in managing orchard and income-expenses.

Day 4 Participators discuss the results of educational excursion and exchanging the method of orchard plantation planning to others.

Day 5 Assessment the feeling of each participator and engaging in traditional gratitude party (Bai Sri Soo Kwan), go home.

After training was finished, each member will receive 500 rattan breeding and other 500 breeding traditional plants such as edible plants, medicine plants or usage plants. Moreover, each village will receive 5,000 Baht black bag fund and for annual assessment and selection of leaders, 2 villagers from 24 villages that have prominent experience and leadership skill will be participated in group training and management.

Year 2 (October 1997 – September 1998) expanded more 24 villages, 10 participators each village total 240 participators, 2 training groups 120 participators participated in each group for 5 days 4 nights.

The selection of new members is done by first batch of group leaders of network proposed new members names and Inpang Center committees will study biography and interview and receive training that has training session as follows:

Day 1 Initiate thinking: Conducted at Inpang Center by exchange of experiences between training participators, members that participated in 1st batch training and Phor Lek Kudvongkaew et al.

Day 2-3 Educational excursion: Participators will be arranged in to 9 groups, 12-13 people in each group to go to different educational excursion at orchards of Phor Lek Kudvongkaew, Phor Khian Srimukda, Phor Nao Buakaew, Mr. Kamsan Nontadara, Mr. Prayul Pibutr, Mr. Somporn Thapankaew, Mr. Sompong

Srimukda, Phor Saeai Srithiengtai, Phor Sawat Handkate to studying thinking development and method in managing orchard and income-expenses.

Day 4 Life planning (same as 1st batch)

Day 5 Assessment (same as 1st batch)

Same as 1st batch, each member will receive 500 rattan breeding and other 500 breeding traditional plants such as edible plants, medicine plants or usage plants. Moreover, each village will receive 5,000 Baht black bag fund. Leaders in community who were 1st batch will visit members twice a year in order to encouraging and solving the problems, for annual assessment and selection of leaders, 2 villagers from 24 villages that have prominent experience and leadership skill will be participated in group training and management.

Year 3 (October 1998 – September 1999 expanded more 20 villages, 10 participators each village total 200 participators. Inpang Network committee at Amphur level will propose names, study the biography and interview. Training will be conducted under the responsibility of president and committee of Inpang Network thoroughly by using the same curriculum used in 1st and 2nd batch, for educational excursion the appropriate orchard will be chosen based on consideration of Amphur level network.

Supports after training is the same as batch 1 and 2, for black back fund of 268,000 Baht Amphur level network will allocate according to proportion of training participators in each Amphur as follows:

Amphur Varichapoom	40,000 Baht
Amphur Nicom Numum	30,000 Baht
Amphur Kammuang	50,000 Baht
Amphur Wang Sammore	60,000 Baht
Amphur Pannanikom and Kudbak	43,000 Baht
Amphur Pupan	45,000 Baht

Committees at Amphur level network are responsible for tracking and assessing new members twice a year. Two community leaders each village from 68 villages, total 136 leaders will be selected, with annual assessment by meeting conducted at Inpang Center for 2 days 1 night and has meeting activities as follows:

Day 1 Speeches on the topic “diversity in the Inpang’s perspective” by assistant professor Surat Varangkarat from Sakolnakorn Rajabhat Institute, Mr. Sutut Kleebbua from Agricultural Land Reform Office of Amphur, Suthiam Namvong from Rajamongkala Agricultural Research and Training Institute and Mr. Yongyut Treenuchakorn from Northeastern Rural Development Association (NERDA). Members will group into 4 subgroups that each group will seminar in 4 topics: leader development will conduct at Phor Lek Kudvongkaew’s orchard; creation of agricultural scholars and learning of family agriculture at Phor Khian Srimukda’s orchard; community fund at Inpang Center by Mr. Prayat Totumpol; and community business at Phor Nao Buakaew’ orchard.

Day 2 Group representative recommend the conclusion in each topics and future patch of Inpang and Mr. Sonpoj Somboon, minister of Northeastern Rural Development Association concluded training and members participated in traditional gratitude party (Bai Sri Soo Kwan) till night.

3.2.2) Learning activities resulted from Pupan Forest Conservation Project through Ecological Agriculture network that developed from learning network to network organization which has members from 68 villages tight together with idealistic relationship and joint benefits. Diversification plantation conducted by members is one of the ways in conserving and restoring biodiversity in Pupan Forest. Amphur level networks has full authority in managing budget and cost in conducting activities based on brain storming, practicing and jointly concluded learning.

Learning process from Pupan conservation project through Agriculture Ecological network is the production from Inpang Network wisdom, which subsequently as model in learning method of Inpang for example:

- (1) Emphasis on individual relationship
- (2) Aiming to assist each others rather effective allocation to exploit benefits.
- (3) Participating in activities naturally will reduce tension and ready to devote the effort.
- (4) Continual learning with monthly meeting at the Amphur level and bimonthly meeting at the province level.

(5) Conducting Zoning Area was done in order to utilize production and sales from group system, community network system, Amphur level system and province of central network system and has supporting system that is center volunteers responsible for documentation, secretary and cooperation in finding funds, results assessment and accounting report.

4) Learning assessment and Monitoring: Learning assessment and Monitoring about plant diversity conservation of Inpang Network is operating as follows:

4.1) Assessment of learning quality of members.

4.1.1) Assess from practicing for example family-level agriculture, leadership ability in conveying. The criteria used in judging are; the diversity of plant cultivated; compactness of plant per area; equilibrium of ecological system in orchard; efficiency production for consumption and sales; plants breeding for grant or sales. The assessors are group members of committee network at each network level. But for training in expanding network of plant diversity conservation is Pupan Forest conservation through Ecological Agriculture network was assigned to group leader and committees at Amphur level collaborate with central committees as assessors, the most important is self-assessment of each member.

4.1.2) Assessment methods are observation and survey by counting number of plants and compactness in members' orchards, visiting and observing behavior of each member, constantly participate in activities, assess the leadership skill by acceptant from group and who is the one that pass the above criteria will be promoted to be group leader and scholar and could be promoted to scholars of Amphur or province network level.

4.1.3) The most important assessment tool is human but questionnaires may be applied in some situation or project that required document report.

4.2) Learning Tracking of Inpang Network members by network committees at each level in visiting members' orchard and use monthly meeting in presenting work, for central committees and network level leaders will visit according to request from community network level and Amphur level.

4.1.1.3 Factors Related to Network Learning and Development for Plant Diversity Conservation.

1) Supporting Factors

1.1) Organization network development aspects.

1.1.1) Inpang Network is located Pupan which initially has fertile soil, water and forest but monoculture crop deteriorate the fertility, anyway the it could be restorable particularly Pupan Forest still has biodiversity. Thus, Pupan forest is the source of natural knowledge and seeds of traditional plants of Inpang, moreover the seedling of seeds from forest is one of the ways in conserving Pupan because villagers could reap the plant production by not disturbing forest and also freeing forest to restoring itself.

1.1.2) Inpang Network structure is mighty because relationship system that connect each level of network from group to community to Amphur to province orderly by delegating management authority to each level, directing benefits to members, supporting committees management team by developers and volunteers.

1.1.3) Continuously tracking by monthly meeting, monitoring, educational excursion and assessment of members' performance were done.

1.1.4) Solving fundamental problems by conducting activities such as savings and establishing of variety of funds for instance diversification cultivation for consumption which is the way to increasing income and reducing expenses. The establishment of welfare and living based on traditional community lifestyle also congruence with the concept of self-sufficiency economy.

1.1.5) Application of thinking to gather but individually practice to enable flexibility and also practice democracy in level of group and community.

1.1.6) Plant cultivation is based on self-sufficiency agriculture which is harmonize to Sustainable Ecological Agriculture that emphasis on multi-usage of plants cultivated for in stance consumption, medicine and transformation.

1.1.7) To continually exchange of knowledge through seminar and emphasis on living simplicity.

1.1.8) Linkage and collaborate with government and non government organization at regional and national level and also with international which enable network in requesting for funds and academic support.

1.1.9) Stability of culture, believe and traditional wisdom bounded with relatives system enable the interrelationship among members and among man and forest. This is a fundamental of linkage and collaboration of network also.

1.1.10) Network concepts and causes is oriented to encourage self-sufficiency and important of relationship among members more than economic purpose.

1.1.11) To enhance network leader in good sake and creating more leaders and they have to act as good model such as learning, public-oriented, systemize traditional and modern knowledge, understand the connection of community life and environment, enable to communicating concepts and experiences and also have interpersonal skills.

1.1.12) Application of new members, have fundamental knowledge of self-sufficiency agriculture in diversification plantation, for training and studying concepts of network.

1.1.13) Emphasis on traditional knowledge and local wisdom that believe in community scholars synthesize with external knowledge in order to apply to the appropriate situation and problems.

1.1.14) The expansion of 2 network centers: Palang Chaowang Center and Phoom Panya Center, these two more network could take care more members.

1.1.15) Some projects initiated by government such as New Theory project, Restructuring of agriculture area in territory of Agriculture Land Reform Office are congruity with fundamental structure of Inpang.

1.1.16) There are: social funds such as potential of people, knowledge and culture; and natural resources to conduct learning process and virtually practiced.

1.1.17) Knowledge transferring by training and conducting activities to new generation of Dek Hug Thin group with the collaboration with school.

1.2) Learning process of network for plant diversity conservation aspect.

1.2.1) Principles and concepts of network are aiming at study of life and to be University of life that creates linkage between life forms and environments.

1.2.2) There are varieties of site around Pupan Forest for collecting seeds of traditional plants and learning of natural diversity.

1.2.3) Lifestyle, culture and wisdom bound with forest is the source of knowledge about plant species and usage is essential for living while conserving the natural equilibrium.

1.2.4) Knowledge about plants was transferred from parents, elders and scholars in community.

1.2.5) Training that is the supplementary part of knowledge in plant diversity conservation through concept of Sustainable Agriculture and leadership skills supported by funds.

1.2.6) Forest hiking activity is conducted for studying plant species, and educational excursion to orchards of network members, which have plant diversity.

1.2.7) Group seminar emphasizing on learning from experiences and practice in breeding of traditional plants, multifunctional orchard and transformation of excessive production.

1.2.8) Scholars will act as network teachers who have knowledge and understanding of systematic relationship between man and nature and have communication skill in transferring knowledge among them and to new generation that is Dek Hug Thin group.

1.2.9) Educational excursion to other networks for instance Ajarn Preecha's orchard at Amphur Varichaphoom, Mr. Phai Soisraklang at Amphur Lamplaimas, Buriram province will enable members to gaining experiences.

2) Limiting Factors

2.1) Organization network development aspects.

2.1.1) Fewer than 20% of people in the community are network members, while some interested people were not invited to join the network. Therefore, opportunity should be granted impartially to interested people.

2.1.2) When network become bigger and has more and more members, then formal relationship is more pervasive. This reduces informal relationship between committees and members.

2.1.3) Documentation is not filing properly and information that should be published for instance news, progression of network, educational excursion activity and income statements is not distributed thoroughly. Therefore, newsletter should be published and distributed fortnightly.

2.1.4) Some groups are lacked of cooperation within group because the problem of debt repayment.

2.1.5) Some areas are on plateau, this cause the irrigation problem.

2.2) Learning process of network for plant diversity conservation aspect.

2.2.1) Data about plant breeding and plant usage is not systematically collected and propagated to members thoroughly.

2.2.2) There are a few connections between local organizations and learning conducted by network except some community such as Ban Kudhad in which Inpang Network leader, schools and village are interconnected perpetually.

4.1.1.4 Data Analyzed from Pattern of Plant Diversity Conservation

1) Conservation and restoration pattern of plant diversity in Inpang Network could be illustrated as follows:

1.1) Seedling from breeding traditional plants will be cultivated around house area, orchard, plot or lawn and the rest will grant to relatives and neighbors or sale to the visitors, company or other communities. Trees donation is conducted annually with community network level. Network plant shop at Amphur

Pupan, border of Kampeom-Sakolnakorn Road was established by the collection of shares from network members. Inpang Network becomes source of traditional Pupan plant seedling.

1.1.1) Rattan breeding is the starting point of other 150 species of traditional plants breeding.

1.1.2) Original source of plant seeds is Pupan Forest. After study of the nature of certain plant in forest, plant seeds for example rattan, Mak Mao, Mak Khor and Mak Fai are brought to cultivate in the orchard. This will not injure the equilibrium of forest ecological system conversely, this will Conserve Pupan Forest in long run because the earlier seeds brought back to cultivate in orchard will produce offspring which enable villagers to breeding the next generation of plant. After, transformation of Mak Mao seeds to juice, seeds left will offer to members for further cultivation.

1.1.3) Plant breeding method is simplicity and naturally, most of materials and instruments are available in the community for example soil, water, hays and chaff. Method of plant breeding are described as follows: first mixing soil with chaff 1:1 and put on the plot; second cover plot with hays until 2-3 leaf is emerged (upon the type of seed); third transfer seedling into black bag. Fertilizer used in breeding is manure will mix with soil after put seedling into black bag and lay down under tree.

Plant breeding method emphasis on diversity of plants and maximizing usage area in the plot for instance breeding perennial trees thereafter sow vegetable seeds or shrub seeds cultivate potato, sweet basil or chili at the border of plot. The prominent examples are the 200 m² breeding pods of Mrs. Vilai Kongveha and Mrs. Chalee Songsiri which have more than 50 type of plants with more than 1,000 trees.

1.2) Breeding based on Ecological Agriculture and Sustainable Agriculture system in orchard and farm is diversification plantation by cultivating various height levels of trees and animal farming together like the state of being in natural setting which also congruence with traditional agricultural culture of community that cultivate all usable plants. Almost of plants cultivated are local plants but mostly of foreign plants were supported by Agriculture Promotion Officers

and the few portions were purchased from new members just entering the network. The core plant in the orchard is rattan and the popular pilot plant is banana.

Cultivating method based on Ecological Agriculture system orchard, farm and plot is illustrate as follows:

1.2.1) Cultivate most of traditional plants from breeding, purchasing or exchanging with other members or network, emphasize multi-usage cultivation.

1.2.2) Starting from cultivating at the border and expand into cultivate plot by diversify the plant cultivation by the level of height and type of plants.

1.2.3) Based on self-sufficiency which aiming to consumption primarily and sales the excess amounts. The self-dependency concept was synthesized with new methods for instance New Theory Agriculture, Integrated Agriculture, Agro-Forestry Agriculture and animal farming for instance chicken will dig up soil, cattle will eat grass in orchard and dung from animal are natural fertilizer.

1.2.4) The application of traditional technology is priority follow by modern technology as necessary for instance use tractor in the case of massive farming and use organic fertilizer prior chemical fertilizer. For example Mr. Nun Thopangjanat Ban Kudnamsai, Tambon Namong, Amphur Kudbak, Sakolnakorn province was supported 22,000 Baht by New Theory Project, while he is using the traditional pump handle well so called Communist pump handle.

1.2.5) The important components in cultivate plot are reservoir, cattle shed, hut and farm. Some members stay in the orchard permanently to take care orchard for example Mr. Polwat Toedasa, Ban Namong, Tambon Namong, Amphur Kudbak, Sakolnakorn province.

1.2.6) The excessive production could sales throughout the year for revenue for instance rattan shooting, galingale shooting and some type of vegetables and some vegetables could be seasonal harvested.

1.2.7) Land area usage will allocate according to appropriateness of size and landscape for example the area of less than 20 rais is used to cultivate diversity of plants such as vegetable, fruit, herb and perennial tree.

1.3) In the conservation area including Pupan Forest which is national protected forest and national park, Inpang Network was participated in conservation by lightly disturbing forest, let forest grow freely (Succession) and learning site in plant diversity and natural ecological system.

1.4) Analysis of plant species richness: The results of diversification plantation in agricultural plot of network members according to Menhinick index founded that species richness (R_2) of plant in network members' orchards is higher than orchard of non network members particularly value of plant species richness of Mr. Polawat Toedasa the network members at Ban Namong is $R_2 = 1.869$ as there are 124 type of plants, amount 4,400 trees compare to orchard of Mrs. Pha Sormka at Ban Namong who is non network members has plant species richness value of $R_2 = 0.693$ as there are 28 type of plants, amount 1,630 trees and orchard of Mr. Khian Srimukda network member at Ban Kudhad has plant species richness of $R_2 = 1.614$ as there are 167 type of plants, amount 10,693 trees compare to orchard of Mr. Kluanvai Dapimsri who is non network member at Ban Kudhad has value of plant species richness equal to $R_2 = 0.603$ as there are 22 type of plants, amount 1,320 trees. The evidence shown that Inpang Network members have more plants diversity in their orchards than non network members.

1.5) The result of diversification plantation is the knowledge about interdependence in ecological system, which occurred in the orchard that has plant diversity according to Ecological Agriculture. This also bring moisture in to soil, encourage growth of animal in soil, insects came to live, pigs and chickens dig up soil, rotted tree branches enable mushrooms to exits, all of these contributed to natural equilibrium. Orchards and breeding plots of members are the gallery that collect genetic diversity of traditional plants which are the learning sites for network members, Dek Hug Thin and other interested people (Phor Khian Srimukda, Interview).

1.6) Consequences from restoration and conservation of plant diversity both breeding and cultivating plants in orchard, farm and plot are

1.6.1) Mental and physical condition of family members were enhanced because family work together, participating in mutual activities, magnifying kindness and compassion among family members, consume variety of

productions from orchard, living in comfortable and organic environment, exercise frequently, talking about plants is the mean of communication in creating warmth relationship with other network members. (Polawat Toedasa, Interview)

1.6.2) Economic condition of family was improved from plants diversity cultivation which is the source of food supply, assisting in cut off expenses and long term income from selling.

1.6.3) Persuading the equilibrium of ecological system in Pupan Forest and orchards; fertility restoration of nature, soil, water, forest and biological resources. This ensures the invaluable natural properties to community and society in the mean time and in the future.

1.6.4) Various activities were developed as a consequence of diversification agriculture for instance industrial business, group management and learning activities of network. Plant diversity is also a tool in developing man, group and network of Inpang and became a role model in sustainable agriculture. (Wanchai Pilaokhajan, Interview)

2) Pattern and method of usage of plant diversity in Inpang network are as follows:

2.1) Plant diversity as food supply while granting medical properties according to the health principle of consumption for protection rather than solving.

2.2) Plants are used as herb medicine both traditional formula and formula obtained from external for instance Northeastern Traditional Healer Network Club and Ministry of Health. Most of formulas cure common disease such as anti-inflammation, gas expelling, urine expelling, blood enrichment, cure diarrhea, cure itching, laxative, antidote and etc.

2.3) Bring excess plant production to transform for preservation and sales for instance fruit transformation and wine production shortly in the future. This could bring additional revenue to network members and also improving economic of the community.

2.4) Activities for instance establishment of cooperative or educational visiting were conducted for learning development of network members and group process in collaboration and supporting each other.

2.5) The further experiment on merits of plant both in medicine formulas and food recipes by asking from local scholars and from external knowledge sources which, enable the exchanging of knowledge in utilizing plant diversity and new method development. This in turn effects the better relationship between individual and group, better family economic development, practicing of group management, profit allocation, establishment of welfare and practicing of bureaucracy system. Environment in the community is better and forest is healthier because cultivating area is identical to forest and allowed indirect expansion of forest.

4.1.2 Thepnimit Ecological Agriculture Club Network.

4.1.2.1 The Characteristics of Network Establishment and Development.

1) Network Development

1.1) The origin of Thepnimit Ecological Agriculture network was Ban Numlad, Na-yang-klug Tambon, Amphur Thepsatit, Chaiyaphum Province. It locates on the Coke-hin-lad hill at the foot of the Pung-hei mountain, which is the barrier between Chaiyaphum Province and Lopburi Province, and is also one part of Phetchabun Ranges. The Tambon locates in the boundary of Na-yang-klug National Protected Forest. There is a large stream pass through; the Tambon is surrounded by mountains. The climate is terrestrial grassland, which is similar to northeastern climate, because it locates 1,000 median altitude.

Natural resources in the previous time, it was enrich with mixed deciduous forest, and different numerous wildlife. Soil contained high humus. The fresh water would be shortage in dry season. After the irrigation had built and well had dug by government, the water was not shortage further. The enrichment was decreased after the forest was destroyed by cutting wood for factory, and charcoal burning during 1971-1972. In 1983, the government announced to close this area, it became the Na-yang-klug National Protected Forest. The villager had destroyed forest in order to cultivate the economic crops (Monoculture) such as cassava, hemp, corn, and Job's tears or tear grass during 1983-1987.

There is a primary school was established in 1973, Ajarn Suthud Sirisalung has been the principle and the important leader of Thepnimit Ecological Agriculture Club, and has been the developer, he had implement the teacher network for children, and for community with other 7 schools. He got award as "Kondeesrisungkom Award" in 1998. Here, there is one monastery was built in 1983.

Population and Settlement, the first group was Chaobon or Chaodong or Yukee or Niakul or Patongleang, which was the minor group. They had preferred to live at hill foot of Nakornrachasima Province, Chaiyaphum Province, and Phetchabun Province for more than 200 years ago. They had their own verbal language, but no written language. This race had distributed in 11 villages of Amphur Thepsatit (Auitrakul, p., & Tosurat, K., 1987:1-2). They started to have first wood house in 1963 that it has become the prototype of present house. Many people had moved in this area so there had been a lot of forest deterioration in order to build house and charcoal burning, including cutting forest for economic purpose that had caused the more forest deterioration since 1971. In addition with the large amount of immigrants from Khonkaen Province, Nakornrachasima Province, Chaiyaphum Province, Chainat Province, Phetchabun Province, and Buriram Province, it was the reason why there were diverse culture in this area. At present, Ban Numlad composes of three main races that are Kondong (Dong people), Lao people, and Thai people united together. The total population are 1,416 persons, which 726 males, and 690 females, it is 305 households. Mr. Chan Suksamran is the Pu-yai-ban (leader of Village) (Chan Suksamran, Interview).

Social Situation, Previously, the relationship was relative system because there was only Kondong, after 1977 Thai and Lao migrated, and married with them, later they had become relatives. They have had the same problem that was poverty, which caused them to cooperate and harmonize in order to fight together, in addition with interchanging of learning jointly, especially teacher, Preecha Uitrakul from Teacher College, "Nakornrachasima Rajabhat Institute" (Nakornrachasima Teacher College, previously) entered to do action research, in order to develop Chaobon's life and community that it caused the more integration among three races.

The main belief and culture of Bannumlad are Buddhism, spirits, and ancestors' spirit so there is feeding rite of ancestors' spirit in the fifth month, and for

Dongs' spirit, Laos' spirit and Thais' spirit in the sixth month, including, their beliefs on amulets, magic, auspices, and dream. There are also have Songkarn festival (a festival of pouring water in 13 rd April) and games in different styles, however these beliefs caused the good relationship.

Their livings are depended on natural resources among soil, water, forest, and wildlife that caused them join together, therefore when they have hunted, they will share each other with equality so they must care each other in order to prevent natural danger because they have to depend on nature, which provides basic needs for them. The person who understands more nature, the higher chance he will be a leader. Economic situation, the original occupation of people in Bannumlad are the integrated agriculture in 3-5 rais, they have cultivated different type of plants for feeding such as rice, other cereals, fruits, and vegetables, including cotton for clothing. Preceding, they invaded into protected forest for farming without the authority, because of their poverty. Afterward in 1977 the land was used to be guarantee with lender, finally, the land had been owned by the lender, therefore they must rent the land from the lender or they began to invade the forest again.

During 1987-1989, Surasuk Uwicchan, from Local Information Center at Nakornrachasima Rajabhat Institute, was the bachelor volunteer had entered to be the researcher for Banlad community, the people pf three races joined with him in order to search their potential to find out the debt problem. About 80% of people are debtors of intermediaries who brought the crops and charcoal from villagers, simultaneously, drugs were dissimilated, especially, Yaba was used in order to make them more diligent in working, but the villager who have no debt is one who do the integrated agriculture, which is in each plot composed of diverse plants such as glutinous rice, rice, banana, chilly, corn, gourd, squash, taro, and potato, including to searching forest products in order to change for cloths and stuffs with the people from outside. The forest products are rubber oils, rattan, and hemp. Because of learning together, they discovered the mean to solve the problem through integrated agriculture for living and conserving the forest concurrently (Peng Plodkratok, Interview). The government had enforced the villagers to leave out off upper stream area in 1992. They had to adapt themselves to change the method of cultivation from forest invasion to ecological agriculture in order to conserve the plant diversity

through cultivation of herb, perennial, seeding, and forest growing. There are separate 500 raiss of protected forest to be community forest or buffer zone, and prohibit forest woodcutting, wildlife hunting, in addition with punishment. Moreover, there was afforest and separating area 60 rais for waterfall area for being tourism site, and recreation. It was obviously that the villagers assist to protect forest so they are not enforced to move from this area. At the present, villagers of Bannumlad are all the members of Thepnimit Ecological-Agriculture Club, it was divide into four groups are Numlad Group, Subhong Group, Subchareon Group, and Subgrad Group, 305 households totally. After they have participated to network, they are going to free from debt, and they can have saving.

The infrastructure of the village composed of laterite road, electrical supply, telephone, wireless radio, traditional irrigation, and dug-well for agriculture, including drug fund. However, the urban value and culture have entered into the villages. They have gone for learning in the city, and for labor force in the big cities and Metropolitan of Bangkok.

Amphur Thepsatit, Chaiyaphum Province was established in 1993. The Agricultural Land Reform Office (ALRO) have issued the land authority for the area that Royal Forest Department allowed the villagers to live in some section of protected forest with 547,250 rais. There is the origin of various streams such as Chee River, Kunchu Creek, Krajuen Creek, Chiangtha Creek, Pong-khun-Peth Brook, and it floods in rainy season, and water shortage in dry season. In addition, Pa-hin-ngam National Park, Dok-krajaew Field, Pa-nom-dom Mountain, Thep-prathan Waterfall, Thepana Waterfall, Bansapanhin Waterfall, Bansunmongkol Paradise, Khao-yai-hom Lord Buddha footprint, Khao-Pratu-Chumpol Temple are recreation sites. Average rainfall is 40 millimeters per year. Average temperature is 38 Celsius.

Total population is 63,583 persons, 32,374 males, and 31,209 females, 14,624 households in 31st Mark 1999. There is one municipal, five Tambons, and 63 villages. Buddhist is 98% of total population, and Islamic is 2%. There are 78 temples and monasteries. The local traditions are Rumkrajae (One kind of classical dance), and Paobaimai (Blowing the leaf). The main occupation is agriculture; there

are 10,100 rais for rice farming, 10,200 rais for orchard, and 212,000 rais for cropping. The average income is 12,000 Baht /person/ year.

Basic Problem of Amphur is road to villages; most of them are laterite road, which impact for traveling in the rainy season.

1.2) Network organization development, Thepnimit Ecological Agriculture Club was established in 1995 due to the social and cultural research results of Ajarn Preecha Uitrakul and Ajarn Kanok Tosurat by using action research technique for education process and development of Chaobons' life in 1986.

While they had researched, they had learnt between research team and villagers both youths and adults, they got experiences from outside through educational excursion and learning from Viboon Khemchalerm (village leader at Chachaengchao Province), and Mr. Chit Thato at Na-yang-klug Tambon that 10 kilometers far away. After they have gained self-confidence, they turned back to cultivate with the old traditional agriculture that is integrated agriculture. There were key persons that were Mr. Naen Yokchaturat (leader of village), Mr. Dokmai Yokchaturat, Mr. Sumrit Sirisakha, and Mr. Peng Plodkratoke for instance. These pioneering persons set the "Ecological Agricultural Supporting Project of Bannumlad with 30 people at the starting time. At the end of project Mr. Surasak Uwicheckan had left the village, later year he came back at a coordinator of the Village Fund in order to coordinate for development at Bannumlad, and the secretary of Thep-ni-mit Ecological Agriculture Club.

In 1992 the government had policy to move the communities, which located in the upper stream forest, the villager here had known that the people in the Banponpet, Bansubsomboon, Ban-nong-yai, and Bannonsawan that got only 2,000 Baht per family for moving. So they have tried to find the mean to solve this problem by breeding, cultivating seeding, simultaneously, they held campaign to grow the perennial plants among the forest, public land, and their own land, including to, conserving 500 rais of community forest. Besides they had excluded the waterfall area 60 rais for tourism, and recreation through the cooperation of multisector such as community, school, and external organization. Resulting, they got allowance from the government to live further.

The success of cooperation, the members of ecological agriculture have expanded in growing the perennial plants instead of crops, including cultivate the vegetables for family consumption, simultaneously, bringing seeds and seeding from forest to cultivate in their farms, and their backyard around their houses, such as Krajaew (*Curcuma sparganifolia*), Irog, and Pugwan (*Melientha suavis*). Moreover, they grow the various fruits for supplement in order to decrease buying, and the rest was sold. In the rice farm, they grow corn, chilly, Numtao, Makhua (tomato) pumpkin, and also feeding the duck, and chicken. They have gathered product as least as needs in order to adjust about constructing biodiversity of ecosystem.

In 1993 the ecological agriculture promoting project of Bannumlad has expanded to other villages of Amphur Thepsatit, 20 villages, and in 1998 the Thepnimit Ecological Agriculture Club was established, then the members increase to 22 groups in 19 villages of 5 Tambons in Amphur Thepsatit. It illustrated in table 6.

Table 6 Network Members of Thepnimit Ecological Agriculture Club, Amphur Thepsatit, Chaiyapum Province.

Tambon	Mu	Group	Number	
			Household	Population
1. Pongnok	Mu2	1. Sapanhin	158	1,011
		2. Sukprasert	49	281
2. Na-yang-klug	Mu4	3. Numlad	85	435
		4. Subhong	70	352
		5. Suncharaen	69	292
		6. Subgrad	78	399
		7. Hausapan	219	1,159
	Mu6	8. Coke-sa-ard	175	846
	Mu1	9. Na-yang-klug	710	4,742
	Mu5	10. Saliangthong	110	650
	Mu4	11. Wang-ei-po	192	897
		12. Banrai	231	1,165
3. Banrai	Mu1	13. Bannoi	91	371
	Mu3	14. Coke-kra-bueng	130	640
	Mu8	15. Wangmaipattana	196	948
	Mu6	16. Wang-ei-dong	243	1,273
	Mu5	17. Coke-rung	329	2,071
		18. Khaokee	118	374
	Mu4	19. Muangthong	61	309
	Mu9	20. Sunsomboon	154	711
4. Hauy-yai-jaew	Mu5	21. Yang-kiak-fag	334	1,199
		22. Submee	327	1,185
5. Watabag	Mu3			
	Mu6			
5	19	22	4,228	21,303

In 2000, six groups in six villages will prepare to be the members of network. Currently, they are constructing the center of for community to mange the learning process, it locates in 5 rais in buffer zone of Bannumlad, and budget was supported by Social Investment Fund (SIF).

There are 3 centers at present as follows:

1.2.1) Bannumlad Center, Na-yang-klug Tambon, Amphur Thepsatit emphasizes on ecological agriculture.

1.2.2) Kogrung Center, Haew-yai-jew Tambon, Amphur Thepsatit emphasizes on herbs, and local strain plants

1.2.3) Na-yang-klug Center, Na-yang-klug Tambon, Amphur Thepsatit emphasizes on integrated agriculture. There were presented in figure 13.

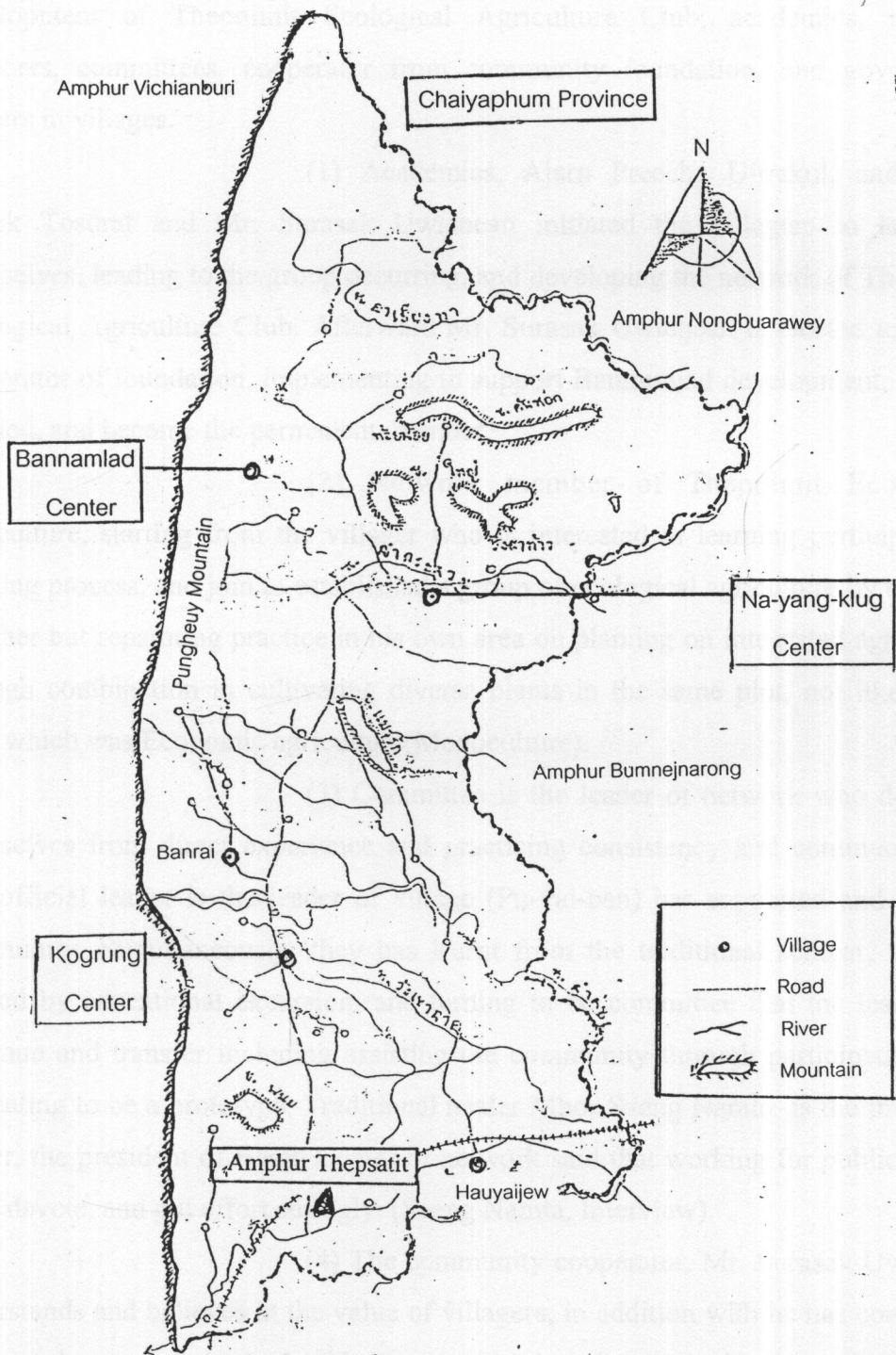


Figure 13. Map of Amphur Thepsatit Chaiyaphum Province

2) Characteristics of network organization implementation are as follows:

2.1) Components of Implementation of Thepnimit Ecological Agriculture Club.

2.1.1) Man : Man who takes part in construction and development of Thepnimit Ecological Agriculture Club, academics, network members, committees, cooperator from community foundation, and government officers in villages.

(1) Academics, Ajarn Preecha Uitrakul, and Ajarn Kanok Tosurat and Mr. Surasak Uwichean initiated the villagers to learn by themselves, leading to the group occurring, and developing the network of Thepnimit Ecological Agriculture Club. Afterward Mr. Surasak Uwichean is elected to be the cooperator of foundation, implementing to support Bannumlad development, then he married, and become the permanent member.

(2) Network member of Thepnimit Ecological Agriculture, starting from the villager who is interested in learning participates to learning process, and join to established a group of ecological agriculture by thinking together but separating practice in his own area on planting on integrated agriculture through combination in cultivating diverse plants in the same plot, not like in the past, which was Economic agriculture(Monoculture).

(3) Committee is the leader of network who develops themselves from direct experience and practicing consistency and continuousness. The official leader is the leader of village (Pu-yai-ban) has supported and has led community. Simultaneously, they has learnt from the traditional scholar, and has studied by educational excursion, and turning to be committee that the leader can continue and transfer including assisting the community through participating, and presenting to be a prototype. Traditional healer Mhor Saeng Namta is the important leader, the president of Heath Center of network said that working for public, and it must devote, and put effort strongly. (Saeng Namta, Interview).

(4) The community cooperator, Mr. Surasak Uwichean understands and believes in the value of villagers, in addition with he has committed to assist the community had said that when he was the researcher he realizes about

the community problem, and he thought that he should have a chance to help villagers, community, and society in order to encourage the local people to have knowledge and finally they gain self-confidence to help themselves (Mr. Surasak Uwicchan, Interview). Therefore, he acts as consultant to give the suggestion, help hold activity for adding up knowledge such as invite the instructor, and search the place for educational excursion to gain new knowledge and experience, cooperating to the different projects were also included constantly.

(5) Government officers and local leaders are village leader, principle (Ajarn Suthud Sirisalung) and teachers cooperate by joining activities with the community through the cooperation of students and network on build the breeding house together, and connecting to network of Thepnimit Ecological Agriculture Club, and 7 networks of Teacher for Children and Community Network. The meeting has held monthly. They act as treasurer, steering committee of network, consultant of saving group of network. Ajarn Suthud Sirisalung is a network member, and lives in Bannumlad, his work as accepted in general and he got award “Kondeesrisungkom” in 1998, now he still works for Thepnimit Ecological Agriculture Club.

2.1.2) Knowledge: Thepnimit Ecological Agriculture Club transfers the knowledge in the aspects of ecological and environmental agriculture, community administrative fund, product transformation, and health to members on the important issues as follows:

(1) Providing awareness raising for members, it emphasizes on realizing the value of cooperation, for children to love their home country, in addition with have knowledge in all aspects of maintaining the network sustainingly.

(2) Sustainable agriculture accords the self-sufficiency agriculture guideline by breeding plants, restoring the resources with microorganism.

(3) Guarding community and public forest, and preventing forest fire.

(4) Saving for welfare, production, and being free from debt.

(5) There are products transformations for value added, and business benefit.

(6) There are cultural knowledge, and earn for living in community.

(7) There are herbs knowledge, forest conservation, and life style.

(8) To take care their health in the holistic pattern harmonized with local guideline.

(9) There are fund, group, network management.

(10) There is career, social, economic, and environmental development in self-sufficiency style.

(11) There is knowledge on organization management.

(12) All these knowledge are integrated between internal and external community through inviting instructor, and educational excursion outside for studying at least two times annually, in accordant with the member interest. The knowledge in community is such as ecological agriculture, breeding of local plants, herbs, herb drug formulas, and self-sufficient concept. For external knowledge are for instance; funding, economic plant growing, good fruit strains, health care as Deungled form of Sabai Sabai Japanese style (Japanese massage), some herbs, herb drug formulas, group and network management, and product transformation.

2.1.3) The Important Resources of Thep-ni-mit Ecological Agriculture Club There are as follows:

(1) Natural resources are soil, water, forest, biological resources, even through some area the enrichment was decreased due to the monoculture, it has remained natural resources in community forest (Buffer zone), which can facilitate for breeding, and there are some natural products rest for them to gather, such as mushroom, Krajaew (*Curcuma sparganifolia*), and bamboo shooting. The important natural resources for network are 500 rais of forest in buffer zone, in addition 60 rais of forest surrounding waterfall area at Bannumlad Tambon.

(2) Money factor, due to the debt problem, it has threaten them to search the mean to solve the problem by establishing of Village

Saving Fund to pay it back external community capitalist that charge high interest rate. The members devoted their workforce to plant on the devoted land by the village leader, the village leader, Nean Yokchaturat for 3 years since 1989, as primary fund was starting with 33 people, they paid 50 Baht for each shareholder for ploughing. The fund has grown until present. The other groups have started in the same manner.

2.1.4) Technology: At primary phase of network implementation, the technology was used is local wisdom, later external community technology were introduced to apply harmonizing as needs, such as chemical fertilizers used planting were changed to organic agriculture by natural fertilizer as fermented fertilizer, and manure. Presently, they start training on using microorganism to ferment food remainders such as crops, vegetables, fruits and others in order to enrich the soil, instructing by Ajarn Porn Pumipunna. Even though, there is utilization of chemical fertilizer, insecticides, and plough machine, it is used lesser when compares with the economic agriculture (monoculture) pattern. Moreover, they introduce the techniques of bud grafting, approach grafting, cutting, and top grafting, simultaneously, breeding of local plant strain. The fund management is obviously in accounting system, and informs to member every month.

2.2) Frame of Network Management

Thepnimit Ecological Agriculture Club, there are four central administrative committees, which composed of one people from every group, total amount are 22 persons, they are committee for 2 years period, and have met one time monthly. The frame and committees are present as follows: It presented in figure 14.

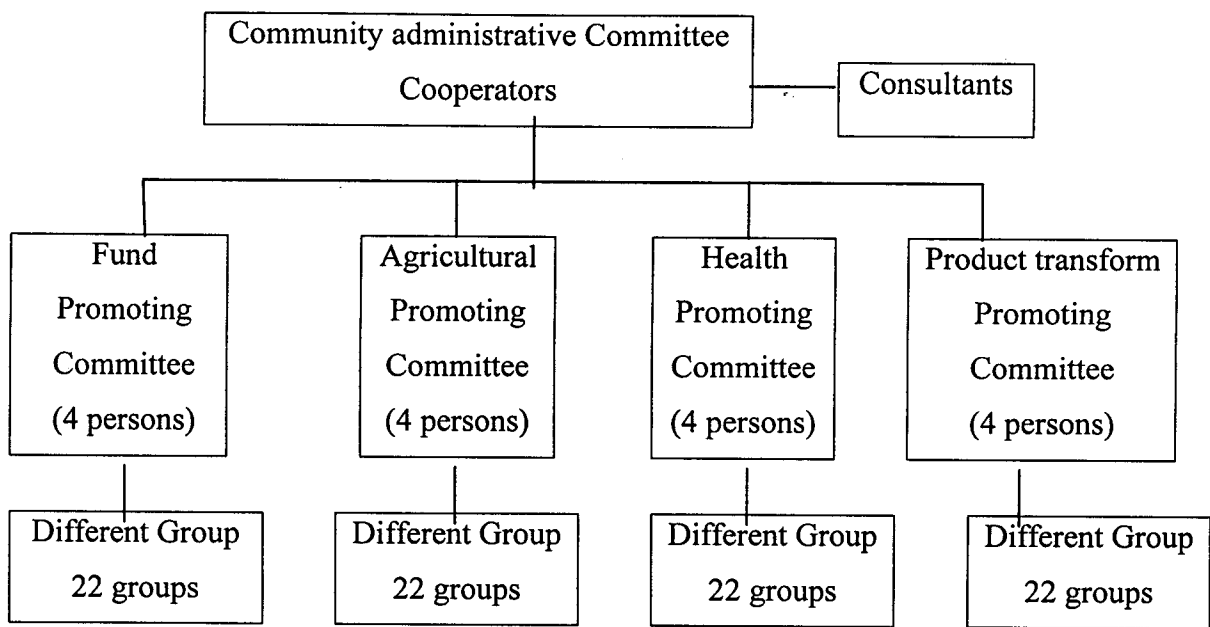


Figure 14 Frame of Network Administration of Thepnimit Ecological Agriculture Club, Amphur Thepsatit, Chaiyaphum Province.

Implementation and interaction within networks, they employ the group process to be the main mean for problem solving through meeting to share their thinking, discussing, analyzing, and planning openly. The members have meeting on the ninth of every month, at schools of the member villages by rotating, afterward they changed to hold meeting at temple hall (hall for sermon in temple) of network villages by rotating. The important issues were as follows:

- 2.2.1) Conclusion on implementing results of groups monthly.
- 2.2.2) Proposing problem was presented to solve together.
- 2.2.3) Saving, and loaning had been done entirely.
- 2.2.4) There have exchanged about knowledge and experiences.
- 2.2.5) There were robes offering.
- 2.2.6) They had meal together by using the club welfare fund. For group meeting, they held a meeting as their convenience privately, for instance educational excursion member home, or religious rites.

The capacity development of committee and members, they have visited outside for education twice a month, emphasizing on agriculture, fund, and product transform, For training would be held in accordance with their preparedness, and needs. There were committees who were responsible for fund management to monitor every three months. However, group welfare providing, there were nursing fund, educational fund, and vocation developmental fund for instance.

2.3) Objectives, Goals, and Rules

Thepnimit Ecological Agriculture Club defines the objectives, goals, and rules of network as follows:

2.3.1) Main objectives were cooperative in problem solving in living of local people in order to be better through starting at agricultural area development for economic, social, environmental development.

2.3.2) Sub-objectives are as follows:

(1) The agricultural development was sufficient for feeding and earning.

(2) The living and community development were better.

(3) There was environmental development.

(4) There were health and hygiene development.

2.3.3) Goals raised the ideas on living development of network member in order to be self-sufficiency to have enough food, free from debt, cooperation, having rotating fund investment for earning, excess products transformed for selling, having good health, and environment in order to strengthen the community to transfer to next generations.

2.3.4) Activities were implemented by club were as follows:

(1) Sustainable agricultural development, they used the ecological agriculture guideline that is to breed, and cultivate, feeding domestic animals in being congruent to the environment in order to conserve the balancing of ecosystem. There was emphasizing on traditional agricultural style through plant different types of trees in the same field by having plants with different story such as emergent or super canopy, top canopy or upper story, secondary canopy or canopy or

story or layer, lower canopy or story or layer, lower shrub layer, group surface cover, and subterranean layer. Local plants have been conserved and restored, especially, bamboo, which is local bamboo for transformation, and breeding the seeding for sale. There was cooperation between network and school about center establishment at school to let student bring back home for cultivation.

(2) Environmental aspect, there are promoting in conservation and restored community forest and waterfall forest through the establishing rules, consecutively, promoting to grow the wood tree such as Maipradu (*Pterocarpus macrocarpus*), Maiyang (*Rubber tree*), Maidang (*Xylia xylocarpa var. kerrii*), and Makamong (*Azelia xylocarpa*) in their orchard for long range utilization. Let the poor and children have changes to participate following after the network trend about training the concept transferring to next generation.

(3) Health aspect, there were promoting to have the health care center, to be the learning center for community health, massage teaching, herb streaming, and holding stage for health knowledge exchange at traditional healer, Mhor Saeng Manta at Ban Coke-rung.

(4) Funding aspect, solving debt problem of members through having fund for vocational working, and group members must have saving monthly, all saving must be loaned for member having the most serious problem, and member having less assets by rotating. Ajarn Suthud Sirisalung, principle Bannumlad School was the first president of saving group. Fund establishment promotes both group level, and community level to provide the welfare for community level.

(5) Product transformation and community business forming, there are product exchanging among networks on food preservation, handicraft, and bamboo shooting package.

2.3.5) Network rules of Thepnimit Ecological Agriculture Club. Thepnimit Ecological Agriculture Club has rules for club implementation broadly as follows:

(1) To be the members they must live in Amphur Thepsatit, and they want to solve the community problems under main aims on five aspects by gathering of people, therefore, each group has its aims, activities and rules.

(2) Every group has saving activity, and every member must saving monthly. They are willing allow the group to give loan for member to invest or pay the debt.

(3) To be member or to quit membership, they must follow under group agreement, but at group level, the member can be get in or out freely because they are no obligation with network.

(4) Group has the administrative committee that comes from election, and the president must participate as committees of other groups in the network level.

(5) Network members has no limited on sex, age, and occupation but must be people in the community of network.

2.4) Body of Knowledge and Learning Activity

2.4.1) Knowledge contents are exchanged and transferred, within the network, and it must be applied for problem solving in real situation, and composes of main aims on five aspects as mentioned above.

2.4.2) Activity and learning method

(1) The traditional scholars tell the community history, and they analyze together about good point and weak point, finally, they select the appropriate subjects for actual performance further.

(2) They identify the occurring problems in community, then let the traditional scholars, adults, and youths exchange knowledge, and search the mean to solve problem. Then they practice in the actual circumstance such as having not enough rice to eat, debt issue, problem occurrence in cassava growing, plant cultivating on mountain for conservation, local strain plants, and community fund.

(3) Transferring knowledge through the daily actual practice, it happen from generation to generation. Such as Saeng Namta who transfers knowledge to his children to learn on herb through traditional healer, and integrated agriculture, even though they study in the school system to any further extent.

(4) They are learning through group system with the small one first, if it succeeds, they will expand to bigger one.

(5) The local skilled persons become teachers to transfer their experiences to members such as Mr. Chit Thato at Ban Na-yang-klug to be teacher of integrated agricultural aspect. Mr. Peng Plodkratok is a teacher in self-sufficiency agriculture aspect, and trains the members to grow diverse plants in gardens.

(6) Learning from folk tales, and folk song, they contain contents to preserve traditional wisdom.

(7) The seminar will be held among the scholar person in community network and academics, developers, they would hear, and share ideas together.

(8) There is meeting monthly for committees and members.

(9) There is educational excursion program such as educational excursion to learn the performance of agriculture of village leader Viboon Khemchalerm, Chachaengchao Province; Mr. Kiang Kongkaew, Pattalung Province; Kiriwong Cub; Inpang Network.

(10) There are activities connecting between network and school through teacher network and network of Thepnimit Ecological Agriculture Club. The teacher and selected network members are committee, simultaneously, the schools hold the activity to support network as plant breeding.

(11) There is training on modern knowledge such as knowledge about Japanese traditional medicine, and cultivation natural microorganism.

(12) They use activity as tool for learning by using saving activity for social development learning, building harmonization, and holding group through saving and loaning activity. At present, There is more than 700,000 Baht saving that can provide loan for member at 1.5% interest rate monthly. The interest is divided as follows: 60% for dividend money, 20% for mid money, 10% for committee responsibility, 10% for member award.

There is a rule that every members must be saving group member, in monthly meeting, they must pay money for saving fund, then the club will give loan for group and group will give loan for member. The group will pay back at 1.0%

interest rate, but the member will pay back at 1.5% interest rate monthly. The member will receive the dividend money annually. The mid money saving of each group must be deposit with club at least one shareholding (equal to 100 Baht) monthly, so saving activity is actual learning process by practicing.

(13) They provide direct experience for children to love their home country, and nature concurrently by transferring knowledge about environment ecosystem. The local scholar will act as a teacher to teach them on the topics of forest, plant growth, food sources, plant breeding, traditions, cultures, and earning.

(14) There are learning centers that provide all time such as Health Center at Chanthepituk Orchard of Mhor Saeng Namta, president of Coke-rung Group, and the first president of Health Center, in addition with inviting external instructor to share knowledge, and experience with the group members. Besides they have constructed the Numlad Center for product transformation learning sponsored by Social Investment Fund (SIF), and Na-Yang-Klug as a integrated agricultural learning center at group president home as a center for implementation.

3) Implementation results of Thepnimit Ecological Agriculture Club were presented as follows:

3.1) Social aspect

3.1.1) It was able to build harmonization between people surrounded Pangheuy mountain, and there are more than 4,000 households of 19 villages, it is going to expand to others, growing to be 25 villages, in addition, it expands to other Amphurs. It constructed the relative relationship like.

3.1.2) It was able to build the community leaders through the elected to be a leader by rotating biannually.

3.1.3) It was able to build the cooperation of multisector groups among different networks, government officers in topic of agriculture promoting, included monks from a variety of monasteries.

3.1.4) It caused cooperation of individuals, organizations, and external sectors in diverse facets as concepts, funds, materials, and knowledge

and experience exchange frequently, that motivate them to develop themselves constantly. The important groups and organizations were as follows:

(1) Nakornrachasima Rajabhat Institute has local information center, it is unique about initiating development, and research continuously.

(2) Village Foundation provides research fund, including supporting development in village permanently at the moment.

(3) Northeast Rural Development Institute (NERDA) cooperates to traditional healer club, in addition external organizations have supported clubs.

(4) Agricultural Land Reform Office (ALRO) has held training knowledge about health and microorganism cultivation.

(5) Office of Accelerated Rural Development or Department of Accelerated Rural Development at the moment has supported for water supply.

(6) Social Investment Fund (SIF) has supported Menu 4 for learning support, Menu 5 for promoting vocation and welfare for the poor.

(7) Department of Environmental Quality Promotion has supported to Saving Fund.

(8) Sawaddee Foundation and T.V Channels 3,5,9,and11 have presented the work results.

(9) Office of National Educational Board support fund for traditional wisdom teacher to hold the Learning Management on Traditional Medicine Project through Mr. Yongyuth Trinuchakorn.

3.2) Economic Aspect, there has elevated member living as follows:

3.2.1) Debt problem of member was mostly from the high interest rate because previously, they must pay at least 5% interest rate monthly. Afterward there was having at least saving Fund that they pay only 1.5% interest rate monthly, moreover they would get dividend return back at the end of year, they would change their attitude to grow diverse plants for consumption in order to

minimize living cost, resulting, they could free from external debt entirely and were able to have saving too.

3.2.2) There was welfare fund for group members accordance with groups activity such as product transformation group, health group, child loving home country Group, and Environment Group. There were 22 groups, it was obvious that each group must to have Saving Fund, and Welfare Fund by following after group agreement.

3.2.3) In Business and Industry aspect, network members got training to sell the products, product transformed for value added, Business Administration at group level as Submee Housewife Group, having different fruits transformation activity. They were Cooperative Shop for selling products, in addition, the community factory for Bamboo shooting packing would be supported by SIF.

3.2.4) Occupation, there were occurring different career forms more than previously such as bamboo handicraft, dessert transformation, drug transformation, traditional massage, plants marketing.

3.3) Health Aspect, members had learn the method of health care and disease prevention primarily through traditional medicine such as massage, herb steaming, herb medicine, and natural living, restoring herb breeding, and drug capsule transformation, 108 sedge drug in ball form, boiling drug. The center for learning that had 250 types of herbs. In future, members will cultivate herb, and transform for business purpose in order to gain skill, they could devote themselves for Dogkrajaw Blooming Festival. Health center open the service center for tourist with free of charge in the fair. They could donate as their wish.

3.4) Learning aspect, among seminar, studying, training, and meeting caused the following effects.

3.4.1) Member had changed their old concept of agriculture aspect, from economic agriculture, monoculture to ecological agriculture, regarding to life quality, simultaneously, making products in order to decrease expense and increase income.

3.4.2) Member would be trained to manage, his life, family, and group in order to be self-sufficiency by assembling their learning powers

through the real performance for social fund in order to develop in other facets as well.

3.4.3) Member had learnt how to analyze the problem, and had searched the mean for living properly through the main concept of traditional wisdom, external knowledge introducing, and technology as needs.

3.5) Agriculture and environmental aspects

3.5.1) Agriculture aspect, member had changed from the monoculture such as corn, cassava, and hemp to cultivate diverse plants according to the concept of ecological agriculture, integrated agriculture, traditional agriculture to be sustainable agriculture including, they had grown numerous fruits, bamboo, perennial trees, diverse type of vegetable, seed breeding for distribution. Decreasing chemical fertilizer used, they emphasize on restoration and conservation of natural resources as soil, water, forest, and biological resources, and life quality.

3.5.2) Environmental aspect, they were able to conserve the community forest and waterfall surrounding forest, totally 560 rai to be conserving for the balance of ecosystem, in addition, local plants, herb restoration, combination of animal feeding, and microorganism cultivation for soil fertility to share each other.

4.1.2.2. Learning Process of Network for Plant Diversity Conservation.

Thepnimit Ecological Agriculture Club implemented 5 main aspects are sustainable agriculture aspect, health aspect, and environmental aspect. Every activity are involving and supporting for life and community development as holistic view. The constant learning process management is fundamental tool in numerous development facets. The plants have been used plant as the main elementary factor for living as food for every meal of people in community. Network has been held the learning process for plant diversity conservation, implantation was done as follows.

1) Learning Components.

1.1) People involved in learning for plant diversity conservation in the Thepnimit Ecological Agriculture network were as follows.

1.1.1) The traditional scholar in network were both internal and external community, starting by Ajarn Preecha Uitrakul researcher and Mr.

Surasak Uvichean, research assistant stimulated the people in community to revise the history of community, searching their local wisdom in various facets such as traditional agriculture, herbs, simultaneously, introduce the concept of learning process, and shared the knowledge and experience, including connection the inside and outside knowledge and experiences, and finally, they were realize the value of natural recourses, and knowledge gaining and awareness raising, then they had changed their altitudes from agriculture as monoculture aspect to tradition agriculture, ecological agriculture, integrated agriculture or as whole called sustainable agriculture.

The activities were participated by multisector as community, network and government sector, in addition, educational excursion outside where they had succeeded of sustainable agriculture as village leader Viboon Knewmehalerm, at Chachaengchao Province is expert in agricultural aspect. For herbs, Mr. Yongyuth Trinuchakorn, teacher Kumpun Kudwongkaew suggest about different herbs.

Ajarn Porn Pumipanna advised for micro-organism cultivation. Government officers, Land Reform office and from Agriculture Promotion of Amphur Thepsatit. In family, parents, grandfather, and other are able to transfer knowledge to their children through practice leading.

The scholar in community are Mr. Naun Yokchaturat, Mr. Peng Plodkvatog, Mrs. Ujan Noisalao, Mr. Chit Thato, Mr. Saeng Namta for instance.

1.1.2) Learners are the members of networks both ad nets and youths. The others in community begin to realize the usefulness of diverse plant cultivation, so they start educational excursion succeeded member and participating in meeting, seminar, and training, in addition educational excursion the outside where those plant with sustainable agriculture manners. They practice in their own orchard for real environment.

1.2) Knowledge body on plant diversity conservation of Thepnimit Ecological Agriculture Network

1.2.1) Content knowledge on conservation, restoration, and breeding fruit, crop, vegetables, and herb, cultivating method, growing pattern, and usefulness of plants, product transformed for sale, including environment

improvement such as enrich the soil with microorganism fertilizer, the knowledge contents for transferring are as follows.

(1) Using the rice strain, which is appropriate environment. The traditional rice strain are 10 strains are glutinous rice 8 strains, rice 2 strains. They are improved and are used at moment as E-nong rice, which glutinous rice.

(2) Local plant conservation and restoration, there are 6 strains of potato, 3 strains of taro, 5 strains tomato and others.

(3) Ecological agriculture, they have grown the fruits and perennial tree such as rubber tree, Maipradu (*Pterocarpus macrocarpus*), Maimaka (*Fzelia xylocarpa*), and chilly, cucumber, pumpkin, sugar cane, and gourd together. Therefore, the field has become orchard, which composed of diverse plant that caused the birds, and other animals to enter the orchard to stay mutually. However, they fed the fish, chicken and duck for instance.

To growth the in targeted agriculture, they grow the fruits and introduce the Elog, Dok-krajaew (*Melientha suavis*), peppermint, lemongrass, galingale, vegetable under the perennial tree, because they don't like much light (Peng Plodkratok, Interview). They must arrange the area for cultivation accordance with own area.

The importance of integrated agriculture, there are water, plants, and animal, the plants are grown composed of diverse story such as perennial tree, vegetable, and herbs (Sang Namta, Interview). The ecological agriculture is no exact pattern for land use, strain of plants to cultivate depend on soil, but its must be diverse, and for multi purpose, especially, for basic needs as foods, drugs, shelters, and clothes. The important point that is water supply for whole hears, in order to decrease the expense, increase income.

(4) Herbs, and Usefulness of biological diversity. Thep-ni-mit Ecological Agriculture Club had aims to use traditional medicine to take care themselves. It uses for prevention more than cure.

1.2.2) Source of knowledge, there were from both external and internal community, especially in their families, by generation to generation.

1.2.3) Knowledge transfer on plant diversity, it has done within networks both formal and informal, such as training, service, meeting, and educational excursion outside through direct experience and practice.

1.2.4) Knowledge development on plant diversity conversation, it is learnt from problem solving, learning together selecting integrated agriculture and preparing from improvement the soil quality by microorganism edification as natural fertilizer, product trans for meeting using herbs as drug, and understanding, value realization, awareness raising in order to conserve the forest by following after academics systematic thinking.

1.3) Learning resource about plant diversity conversation was man, scholar, and members, real environment of farm and natural forest. To visit both internal and external network they will get the different knowledge tools, and technology both local technology and internal technology as plough machine, water spray bottle, distilled machine, herb steam instrument.

The most important resource was grass root of community, which was culture of living interdependent with nature. Chaodong has transferred their knowledge from generation to generation. In addition; the assistance of external academics had supported the concepts and had instructed the learning process management. The variety of organization sponsored fund for training, educational excursion, building construction and instructions such as SIF had supported money for factory building of bamboo shooting packing at Ban Numlad. Besides, they had held the Saving Fund for loan on vocation, so the members could loan money with lower interest rate (1.0 % per monthly). Network had centers for member to learn biodiversity, was Numlad Center located in buffer zone, community forest, Coke-rung Center emphasize on herbs diversity, and was the example of integrated agriculture, and Na-yang-klug Center is education center for integrated agriculture, and Submee Center was sourced of product Transformation.

1.4) Network had goals and objectives of learning for plant diversity conservation under 5 main activities. There were goals for members to have diverse plant for consumption, medicine, transformation and the excess will be sold in order to the members have better life, and learning to so live the problem together. The community provided benefit to natural resources by constructing the forest at

their home gardens in order to decrease irritating the forest. They were able to self-dependent and the environment would be sustainable (Peng Plodkratog, Interview)

Objectives of network, they would like the member to perceives value of local plant strain, the usefulness of creating biodiversity in their homes, including changing to plant with ecological agriculture in order to meet their basic needs, decreasing their debts, and maximize the value of agriculture. It was able to conserve forest among houses garden, orchards, and forest.

2) Phases and Methods of learning on plant diversity conservation

2.1) Phases of learning, it starts action research that cooperate by academics and local people through salting the issue, then people will reach together as rice enlivening, local plant strains, cassava planting, debt problem, local life stock, agriculture on hill and mountain, enervation, village fund. They realize the problem, and analyze to find the mean to sustain themselves due to the delft occurred from monoculture in the past. They barn continuously, therefore they are able to develop themselves intensively. More over, government has policy to support people organization by allowing to register ate with Office of Farmer Rehabilitation and Development Fund and Agriculturist Development Fund, and Social Investment Fund (SIF). They provided budget to support network to develop work at both member quality and quantity in expanding the activity of product transformation, and holding learning activity for member increasingly.

2.2) Methods of learning were used through traditional wisdom transferring among people in same generation, and among people different generations. The patterns of method of learning process management were as follows:

2.2.1) They had studied together about the community history in order to understand the economic, social, culture, and environment of community. Therefore, they had comprehended the change of community through past compassing and present condition.

2.2.2) Group learning on the interested issue, the scholars had taught their children such as bamboo handicraft by telling a folk in order to motivate them to practice. Moreover, they held group to discuss about rice, local plant strains, setting fund for loan, and setting child group to love their hometown.

2.2.3) There was learning from family and neighbors by transferring plant diversity through telling teaching, and more practicing daily.

2.2.4) They had learnt from the instructor or successful person by instructing, observing, asking, plant strains exchanging, and applying.

2.3) Phases development of learning method for plant diversity conservation, it may be occurred by intention or non-intention, development may be led by members, or leaders in the network, or from outside by recommendation of academics, instructors, non-government organization (NGO) or through the government sector as Office of Farmer Rehabilitation and Development Fund, Social investment Fund (SIF). Phases of learning method started intently by action research of researchers from Nakornrachasima Rajabhat Institute, and supported by Village Foundation continuously. There was goal to develop community, and environment by connecting every life issues together concerning plant diversity conservation, which is the fundamental method. It was a learning method from direct contact, and daily practice that were planting, natural forest learning, and developed on management their own farm in order to change to sustainable agriculture. Moreover, they were able to administrative their farm, and trained about product transformation and could run business by themselves within the network. Meanwhile, They developed their learning through practice in order to produce product subjectively, Entering learning, and practicing in the implicated and delicate issue, it needed more complicated thinking, in addition with understanding, and analyzing systemically such as learning and understanding the herb values, herb drug preparing from numerous types. There was syrup preparation for microorganism cultivation as fertilizer. Learning on forest preservation and natural restoration for sustainability of community, life and nature. (Surasak Uvichean, Interview)

3) Learning activity for plant diversity conservation

3.1) Activity pattern were various forms as follows.

3.1.1) Activity in daily life style, living in the community by the folk lifestyle, there were having conversation at morning and evening daily, and meeting at different tradition festival, and religious rite, they had a change to exchange their idea in earning, including visiting each other and studying their work.

In addition with exchanging plant strain, ideas, planting methods, usefulness, they could be counted as learning activity from way of life.

3.1.2) Network held the training activity to provide knowledge for members about integrated agriculture, ecological agriculture, and sustainable agriculture were all supporting to grow diverse plants, at monthly meeting. Network would hold up to the preparedness, change, and appropriate situation.

3.1.3) Activity supported from external sector such as educational excursion to various groups, holding seminars concerning organizations as Northeastern Traditional Healer Network, National Health Community Network. There was Village Foundation, which sponsored 100,000 Baht for activity supporting in 1993, that caused the network enhancement to 15 villages. It was important factor to facilitate the network to work efficiency simultaneously, learning development for plant diversity conservation instead of monoculture.

3.2) Method of learning activity was held for plant diversity conservation, both formal seminar and informal seminar, training, meeting for ideas, and experiences exchanging, nature forest observation, including to, experimenting, and practicing through breeding, and participating in growing, and plant product transforming for using in different forms. There were searching community history, and cultural center establishment in order to create the proud of their community for new generation. Therefore, there were a great number of methods to proceed their activities to create knowledge and concept, and practical guidelines for members, such as an activity of Health Center at Thep-ni-mit Community Ban Coke-rung Hauryai-jew Tambon, Amphur Thep-sa-tit, Chaiyapum Province.

The principles of health group were to share experiences about health care as a holistic view, including, massage, steaming, Prakob (massage with hot compress containing medicinal herbs). Moreover, member had learnt herb strains, and they searched the seeds, and seeding from forest for breeding, and adjusting ecosystem in their orchard in order to be similar to forest, There are 57 members currently.

Methods, they thought together, but separated to practice, then share their knowledge, experiences, and herb strains. There was supporting fund from various sources, such as Village Foundation Department of Land Reform and Agriculture,

Office of National Education Commission, Japanese Post Office, NERDA, and SIF. Each member could borrow 5,000 Baht per year from the Saving Fund..

4) Assessment and Monitoring

4.1) Assessment of member knowledge achievement on plant diversity conservation.

4.1.1) Assessment Principle. There were assessments of actual practice, anticipation with network, adjusting cultivate method from monoculture to diverse plant cultivation, decreasing chemical used, increasing natural fertilizer used, opening orchard for educational excursion, breeding plant for exchanging, increasing number of plant stains.

4.1.2) Assessment Method, observation, examination of real objectives, talking and asking question, telling their expertise of problem solving, and the changed attitude.

4.1.3) Assessment tool were, committees, members and external education visitors.

4.2) Monitoring

The committee at group level, community, and network level would visit and monitor the members every three months in or order to observe the results of learning from conceptualization to actual practice in orchard plants such as breeding the plant strain in the plot, including to, the activities participated in cultivating forest in the public areas, rice, fruits and vegetable for consumption, and product transformation for sale in group level, and there were monitoring the results of practice simultaneously, it was concluded the results in monthly meeting.

4.1.2.3. Factors Involved in Development of Network Organization, and Network Learning for Plant Diversity Conservation.

1) Supporting Factor.

1.1) Network organization development aspect.

1.1.1) Thepnimit Ecological Agriculture club network locates at Panghei foot mountain, which is in Na-yang-klug National Protected forest boundary, and some part is in the area of Agricultural Land Reform Office. Prior way of life in community depended on forest, people realized the value of plant diversity.

They had experience with the flourished forest comparing the changed circumstance at the moment, they got understanding, loving nature, and awareness.

1.1.2) Frame of network emphasized on people management in the community, including to, creating the numerous network leaders and, spread in very group, its management was implemented by group system in community.

1.1.3) There were cooperation from both individual and organization of internal and external community on the concept, group management, and learning incessantly, in addition having complementing fund for holding various activities.

1.1.4) There was learning through practicing, talking, meeting and saving monthly at network constantly and continuously to create the understanding, cooperating between members and leader to hold training, and educational excursion both internal and external network, that would increase knowledge, and experiences to develop the right direction.

1.1.5) There were culture, belief, and respect to forest and nature previously, which had effected to the concept of comprehension on soil, water, and forest. Even though, prior community mostly, which were composed of different races of people jointly, such as Chondong, or Chaobon, and Thais, Laos, Cambodian had migrated from, northeastern, middle; in addition the indigenous, however, they faced the same problem due to monoculture. It caused them to be debtor. Therefore, they were also having the culture of cultivating the diverse plants, breeding the local plant strains, using the natural fertilizer, and herbs. It was the mean that was concurrent with concept and community culture.

1.1.6) There were leaders and successful prototype, both internal and external community, when linked all organization network that had both integrated agriculture, agro-forestry, including, the management process, herb plantation, and saving fund that encourage the members to keep confidence to the right direction of development.

1.1.7) The action research was used to stimulate the members' thinking, the academics from education institute in local, joined to search the mean to solve problem and supported continuously, in addition there were

supporting from the other organization, especially, Village Foundation required develop to be volunteers in the community in order to be consultant of network, and to be the collaborator to assist reaching the sources of knowledge, and external fund, which was the important supporting power of network.

1.1.8) Concept and method of development of governmental sector had patterns that the network was able to apply for success, such as before they implemented network, Numlad village got Earthen Jar Fund from Amphur, the people participated with Earthen Jar Fund. The network brought it to be applied to hold Saving Fund currently. The implementation of network succeed promptly, and tangibly, because it had started from uncomplicated, performance to complicated performance, and from small group to bigger one, through linking to be network. It was the developed pattern, which has changed gradually as organizational natural growth.

1.1.9) To gather the human resources in local at organization level, and local leader level, they participated to be the members to support who supported the concepts, and complicated management, The important people were school principle, village leaders, monk, teachers, and government officer from Department of Agriculture Extension. Moreover, they held the complementary activities to collaborate and connect among different generations in order ascend the development concept of 5 main aspects, especially, teacher network for child and community 7 schools leading by Ajarn Suthud Sirisalung. It reduced the gap between and community, including between children and adults, and it became the cooperation and supporting among members from different sectors.

1.1.10) There were the main activities, which had the clear target, and let the members choose to participate activities, according to preparedness, and desire, exceptionally, the saving group, that everyone must be the member in order that they could train to create group harmonization, devotion, and collaboration.

1.1.11) There were some management obviously, at monthly meeting, they had explained the accounting data about saving, and loaning, that every group made decision together.

1.2) There were learning process management for plant diversity conservation

1.2.1) Using group process, they were learning together on wisdom, and wish of life, including revising on the past and present in order to compare the conventional guideline, which was diverse plant cultivation to meet their basic needs, but they wanted more comfortable, then they changed to do monoculture, even though the more money they gain the more the more debt they got, because when they had got more money, they had paid money for unnecessary. After they had been learning, they found that they should use the conventional agriculture, they plant diversity cultivation through sustainable pattern that they must cultivate diverse plants in order to meet the basic needs. Moreover, they had no need to borrow money from outside with the high interest rate, because there was fund to support them at less interest rate. From the group participation, for instance meeting, training, educational excursion, sharing knowledge and experiences, in addition with external assisting, they discovered the mean to solve their problem through the plant diversity conservation by various mean of sustainable agriculture such as traditional agriculture, ecological agriculture, natural agriculture, agro-forestry, integrated agriculture, simultaneously, they got direct experiences from practice. Therefore, they were interdependent, Their relationship like relatives.

1.2.2) There was knowledge transferring from experiment people, successful person, parents, their ancestors, including scholars from inside and outside community, they grew with agro-forestry technique, integrated agriculture, from direct experience by doing themselves, and indirectly from training, educational excursion, because they were member of network the gain knowledge, understanding, and awareness raised, attitude changed, it caused them to incomes to try further, in addition with group and network support in different facets, They were more self-confidence to do all sustainable agriculture forms.

1.2.3) They learnt from external academics who had assisted in different form for instance, doing action research, discussion, instructing, suggesting in the complicated issues, challenging them to have systemically thinking about the relationship among human being, soil, water, forest, plant resources, and other living creatures that they are interdependent. It accelerated their understanding,

and they could link with their direct experiences, and more ensured to select the appropriate technology to exchange the activity of plant diversity conservation, natural fertilizer preparation, product transformation, and operation on business at community level.

1.2.4) They learnt from actual practice, resulting of comprehensive learning about plant strains, they are able to select plant strain, to store strain, and to disperse breeding strain instead of buying, simultaneously, bringing seeds from forest to grow in their backyards, farms, and orchards for consumption, decreasing irritating forest because they realized to the forest value. Besides, they prevented and conserved the forest, and keeping buffer zone for community.

1.2.5) They were linking of the economic, health, cultivation, saving, the plant diversity conservation, was used as pioneer factor causing the other activities, so plant growing and breeding learning lead to the other learning continuously, and the plants were used as center of learning together.

1.2.6) The cooperation of members in network assisted them to have their own land because they could borrow from saving fund, and external fund, which facilitated them to success in plant diversity conservation, and other activities supporting, for instance decreasing their expense through cultivate for basic needs first, and the excess would be sold.

1.2.7) There were developers, student staying permanently, it supported to hold the learning process that were the informal education, and non-formal education. It caused the network learn with durability and having linkage of the different generations. The people who play important roles were Mr. Somasak Uvichean, and Ajarn Suthud Sirisalung.

1.2.8) There are supporting policy of concerning organization of non-government organization, and government organization that it exchanged the network learning on plant diversity conservation was able to implement succeeding, for example policy of ecological agriculture, and integrated agriculture, which were supported by office of Land Reform for Agriculture, Village foundation. In addition, NERDA, Nation Health Network on herb had policy on herb supporting project.

2) Limiting factors.

2.1) Network organization development.

2.1.1) Transportation between community, was difficult due to rainy season, because the laterite road were rough, and they had traveled far distance to visit other villages that located in the steep and high mountain, causing difficulty to join activity.

2.1.2) Leaders had limited potential, because they were responsible overloading, in addition, most of member graduated at elementary school level, so they were good at practice, but poor business administration and management, they were too complicated for them. It caused some leaders were confuse and got headache, and sick from the high tension.

2.1.3) Lack of permanent collaborative center, it caused the lack of database collection system. There were no officers to response permanently at the moment, they start constructing by getting the sponsored from SIF. The problems would be disappearing when they will complete the building of center, and there will be have the database system for network and members.

2.1.4) Lack of communication through documentary information, it would increase knowledge transferring, information exchanging, transfer news and present the work to member both individual members and group level or community level. It would communicate the network with member.

2.1.5) Some Committees were the committee in other group, it caused conflict interest, such as they wanted to use the money of fund to buy the seeds chemical fertilizer, and insecticide. Moreover, some members used the loan money to pay the dept, instead of investment, for instance.

2.1.6) Most of the external sectors were government sectors that supported with the defining objectives, targets, activities for network in order to reach their policy, and the network had no change to make decision with them, so that the external sectors should join with network to set consulting, planning, and making decision together about objectives, goals, and practical activities. It should be congruent with network desire and potential.

2.1.7) Gathering concepts and the supporting of different aspect, they could have self-sufficiency guideline follow his majesty concept on the new theory of agriculture.

2.2) Holding learning process for plant diversity conservation aspect.

2.2.1) The information of knowledge was not distributed widely because of lacking collected knowledge articles enough for member, even though the leaders had attempted to distribute, but they had different level of capacity so that it should have monthly booklet, or every three months in order to conclude and spread knowledge to members, in addition stimulating the members to learn more and join educational excursion.

2.2.2) It should have register for plant strains, plant properties, and product transformation method, but they were not collected. There was only Mhor Saeng Namta had done to register them. Therefore, it should be had register at every center. The members should register both at their orchard and at Center, which would be used at the place for new member to learn and practice concurrently, so that the knowledge may distribute extensively.

2.2.3) Plant strains were limited for exchanging because it lacked of register system for local plants strains, and endanger strains to record. The members should register both at their orchard and at Center about plants strains, breeding, moreover, selecting good location for selling and public relation at the tourism sites. It would spread plant strains to other part of country that brought the broad usefulness of plant strains at national level.

2.2.4) There were lack of learning linkage for plant diversity conservation, among academic institutes, and other government sector, at Amphur, and province levels, including, other governmental sector, for example school, sanitary office, pharmaceutical office, forest office, agricultural promoting office, non-formal education system. If there are learning center for new members by introducing, learning and practicing about knowledge on plant diversity conservation will distribute over all country.

4.1.2.4. Results of Plant Diversity Conservation Patterns

1) Plant diversity conservation patterns of Thep-ni-mit Ecological Agriculture network, there are patterns and methods as the follows.

1.1) Plant strain collection, they have collected numerous plant strains for instance, rice 10 strains, taro 3 strains, potato 6 strains, afterward they cultivated with the combination of all collected strain in the same plot, and expand to the member plots because different strains are suitable with different areas.

1.2) Crops, fruits, herbs were bred for cultivating in member backyard, house surrounded area, orchard, and farm.

1.2.1) Plant breeding procedure, some group as Dek Hug Thin Group has gathered the plant strains for sale on the main road sides. They had both internal and external strains for breeding simultaneously, planting in their orchards. They have introduced breeding technique into the complementary activity of curriculum in the school of the teacher network for children and community. School has provided plot for student training in order that they can grow at their houses gardens, public area, and forest.

1.2.2) Even though, there are various strains breeding, the most popular strain is local bamboo because it is the originated strain from forest. Moreover, its shooting is food, trunks are able to make handicraft or fence, and other purposes due to its property of easy growing, in addition, they had strong root system, which is able be cultivated by seed, trunk, and bud, therefore, they are going to have factory for bamboo shooting packaging. For the herb strains had been collected 320 strains at Health Center, and the utilized plants, and consumed plant are collected more than 150 strains. Some member preferred to flower planting for decoration, however some are herbs property too.

1.2.3) Source of plant strains, they have originated from forests, at Pung-hei mountain, and hill surrounded Na-yang-klug National Protected Park mostly, especially, those are numerous of local plants, for example, different bamboo strains, herbs, utilized wood, local fruits as banana, Mhag-ngael, Mhang-ko, tamarind, guava, star fruit (carambola), mango, and external good strain fruit, for example rose apple, longan, cantus, pepper, zalacca, ruby-red fruit, and Sato. The

selecting method, they selected the biggest body, aggregated group, and trunks and sheath. Modern technique of breeding were also introduced.

1.3) Planting in the plot was imitated the nature mainly, which is ecological agriculture with diverse plants. There are multistory of plants in the same plot. Some members grow integrated agriculture, they will divide area separately for each main strain in each small plot, and supplementary with few other strains, moreover some part is divided for keeping forest like characteristics. Most of member who has big land, will do mixture of ecological agriculture and integrated agriculture for example, Mr. Saeng Namta had 70 rais area. For member who has small plot such as 5 rais, Mr. Peng Plod-kra-toke, he cultivates around his house with diverse plants, and he feed fishes, duck, chicken and frog for consumption in the family first. The excess plant will be sold, here it contains more than 130 strains totally; which introduced from internal and external network. Unitization Methods for plant diversity conservation were done as follows.

1.3.1) There is adapting the farm of monoculture to orchard, and rice farm with digging well to keep water for cultivation and feeding the domestic animal. It would assist to fertilize the soil both directly by digging, rummaging, and indirectly through producing manures.

1.3.2) The perennial tree, fruit tree, crops and vegetables. Banana was used as pilot fruit because its multipurpose and grows fast.

1.3.3) There are managing the planting plot in accordance with size and characteristics of land.

1.3.4) The work forces are the family members, friend from group, and budget were supported by Saving Fund of network.

1.3.5) Ecological agriculture is not take much time to grow daily, especially, when plants grow enough. Most of them move to stay in orchard so they live in comfortable environment with clean and fresh air, they will come back home when they will work something in the village (Mrs. Gee Namta, Interview).

In protected forest, community forest, and waterfall forest, they will let them to restore by natural succession, through minimizing their activities; which disturbed forest. Even though, it has been some problem remaining due to the whole villages are not network members. They still enter forest to harvest some plants with

regardless to nature, so they must do some activity to assist the natural condition of forest for instance burning grass to let young seeding to grow in order to use it feed cow, and cattle.

1.4) Analysis of plant diversity in the network member of Thepnimit Ecological Agriculture club was calculated by Richness index formula according to Manhinick's index (1964). It was found that the plant diversity (R_2) of member's orchard were higher those who were not network member, for instance at Bannumlad, plant diversity value (R_2) of Mr. Peng Plod-kra-toke's was 3.203, when compared with plant diversity value (R_2) of Mr. Koon Noisena's orchard, which was 1.866, and at Ban coke-rung Mr. Saeng Namta's (network member) the plant diversity value (R_2) was 3.848, when compared with plant diversity value of Mrs. Chalie Ngamsrisuk's was 1.856. It was obviously seen that the plant diversity value of member orchards were higher than plant diversity value of non-member orchards.

1.5) Result of plant diversity cultivation, they have enough food for consumption. There are herbs enhancing the physical and mental health, in addition the excess products can be sold. Moreover, they appreciated the nature and had good quality of life. They had time to live with their family and participated activity together. Therefore, the plant diversity conservation can facilitate the environment restore because the accumulated leaves will cover the ground and become fertilizer, the soil gain more humidity, when it rains, soil will absorb the water, and retain, then soil will be enrich again. Consequently, the water flow slowly, the soil will not erode, and become the trees are more density. Finally, non-network member become interested to imitate, and get share plant strains from member to cultivate.

2) Usefulness of plant diversity of Thepnimit Ecological Agriculture network, the patterns and methods are as follows.

2.1) The plant products are used as food, drug, family wares, shelters, and clothes.

2.2) They get the nature of forest back because they have their own forest products in their garden and orchard, no need to disturb the forest further.

2.3) They use plant products to be food and drug directly, the excess was transformed for sale e.g. salted mango, salted bamboo shooting, and dried mango.

2.4) The excess can be sold as business and as the present for relatives, friends, and neighbors.

2.5) They use integrated agriculture to manage the ecosystem in house garden, orchard, and farm, moreover, sources of learning, educational excursion orchard, recreation for family and friends.

4.1.3 Wungnumkheaw Organic Farming Promotional Group Network.

4.1.3.1 The Characteristics of Network Establishment and Development.

1) The network development.

1.1) Community ground data the origin of network. Collaboration and operation center of Wung-num-kheaw Organic Farming Promotional Group Network is located at 14, Moo 11, Ban Numsub, Tambon Wangnum-kheaw, Amphur Wangnumkheaw, Nakornrachasima province, far from Amphur Office for 3 kilometers. Its goal is to establish village network in Amphur Wangnumkheaw and national organic farming group network.

Amphur Wangnumkheaw is located at southern part of Nakornrachasima province, far from provincial urban about 74 kilometers on the road Nakornrachasima-Kabinburi, the whole area of 1,129.99 km² or 706,243 rais, and has territory connect to the followings Amphurs and provinces as follows: North next to Amphur Pakthongchai, Nakornrachasima province; East next to Amphur Kornburi, Nakornrachasima province; South next to Amphur Nadi, Prachinburi province; West next to Amphur Pakchong, Nakornrachasima province.

Topography characteristics: most of area is mountain and waving plateau throughout the area, 400 altitude from medium sea level, the important mountiains are: Khao Hin Pleong, Khao Kheaw, Khao Subtao, Khao Soong, Khao Noi, Khao Tublek, Khao Suanlom, Khao Kampaeng, Khao Plaiklongkum, Khao Pangma, Khao Vong, Khao Takudrang, Khao Krapok, Khao Fai where all of these are the part of Panomdongrak Range and are the origin of many important streams such as

Lumphrepleong, Lummoonbon, Bangpakong, Lamtakong and Lamchiangsa for instance.

Climate characteristics: there are 3 seasons in a year, average temperature is 23 Celsius degree, average rain fall is 1,200-1,300 millimeters per year. Winter Start from November to January, average temperature is 9 Celsius degree; Summer Start from February to May, average temperature is 35 Celsius degree; Rainy season Start from June to October

Natural resources: Amphur Wang-num-kheaw forest has area of 245,000 rais or about 38% of the whole province forest area. The important forests are: National Protected Forest named Khao Phooluang Forest, area 396,687 rais. National Park Thublan, area 220,625 rais. Khao Yai National Park, area 33,250 rais.

Soil: Soil condition is fertile together with cold and humidity climate and high rainfall in each year. All of these contribute to proper condition for plants to grow favorably and also enable the cultivation of plants, vegetables and florists from Temperate Zone.

Land occupation: About 320,000 rais is in Agricultural Land Reform Area according to Agricultural Land Reform Act in 1975, thus the land is able to use for agricultural purpose only. From the whole land, there are only 14,000 rais owned by landowners according to Land Corrective Law.

Natural tourism sites are: Moollong and Moolsamngam natural tourism sites are the range in National Park Thublan; Pha Hom Fall in Tambon Wangnumkheaw; Klong Krating Fall in Tambon Thaisamakkee ; Eco-tourism Center at Khao Phooluang Forest in Tambon Rareong ; Khao Pangma where is the fertility forest and sightseeing area next to Khao Yai National Park ; Sakaerach Environmental Research Center and Forest Orchard ; Cultivating and Training Center ; The first Lamprapleong Reservoir in Tambon Wangmee.

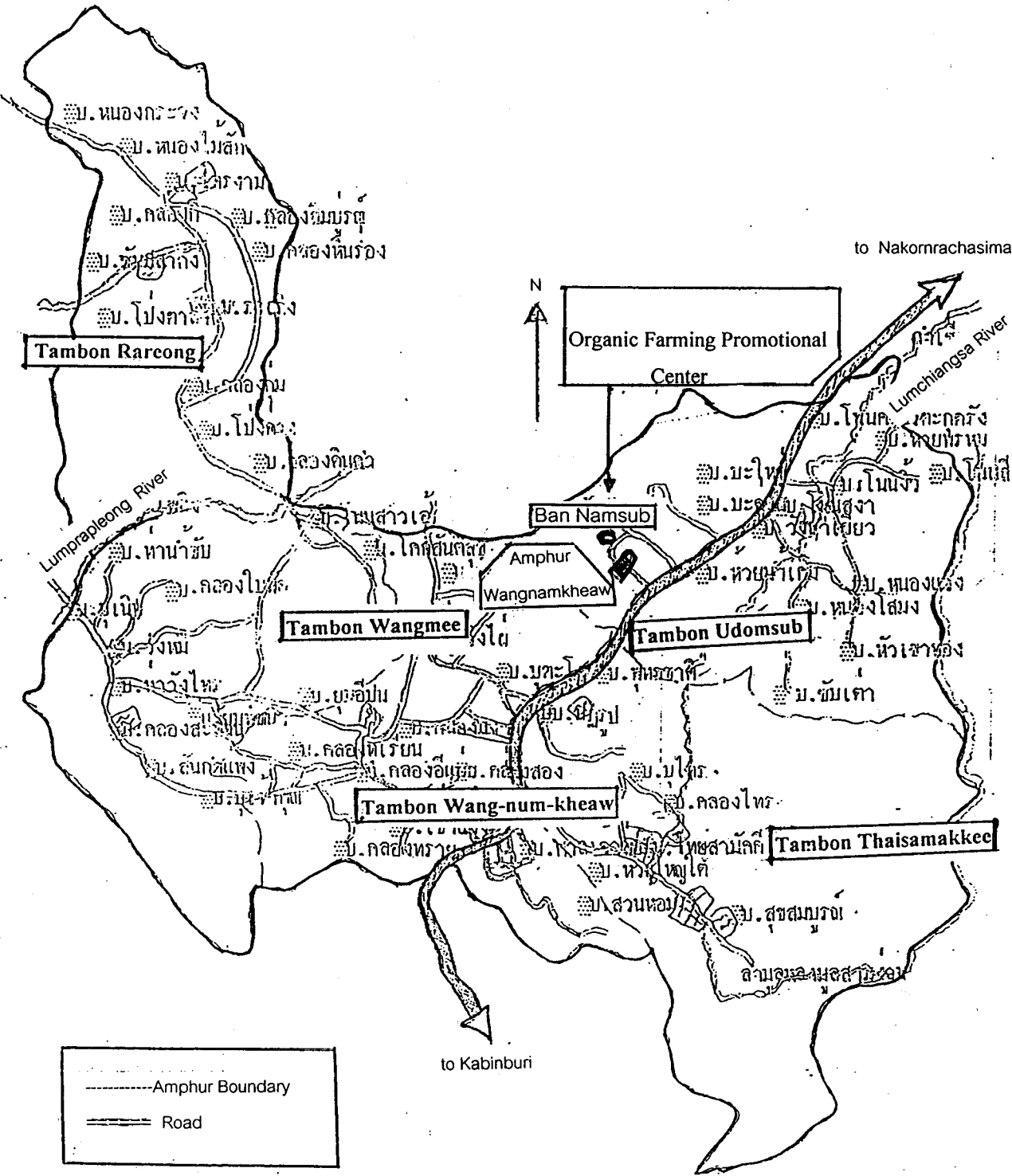


Figure 15 Map of Amphur Wangnumkheaw , Nakornrachasima Province

Economical and Societal: Amphur Wangnumkheaw separated from Amphur Pakthongchai to be Sub-Amphur since 1 May 1989 and promoted to be Amphur in 5 December 1996, currently has 5 Tambons 70 villages

- (1) Tambon Wang-num-kheaw 15 villages
- (2) Tambon Wangmee 16 villages
- (3) Tambon Thaisamakkee 10 villages
- (4) Tambon Udomsub 16 villages
- (5) Tambon Rareong 13 villages

Total populations of 40,614 are 20,526 males and 20,088 females. Most of people are immigrated from various provinces in Central and North-Eastern Region for 10-30 years. Population in Amphur Wangnumkheaw could be classified according to gender and Tambon as follows: (31 January 2000)

Number	Tambon	Male	Female	Total
1.	Wangnumkheaw	5,407	5,115	10,522
2.	Udomsub	5,324	5,287	10,611
3.	Wangmee	4,249	4,093	8,342
4.	Rareong	2,636	2,709	5,345
5.	Thaisamakkee	2,910	2,884	5,794

Population career: 95% of population is agriculturists, 1.5% is traders and 3.5% is employees and others. The average income per year is 18,000 Baht with agricultural area of 458.16 km² or about 286,350 rais could be classified as follows:

Number	Type	Area (in rai)	% of the whole area
1.	Rice farm	21,735	7.84
2.	Orchard Plants		
	Animal fed maize	153,345	55.29
	Cassava	55,216	19.91
	Sugar cane	5,000	1.81
	Sweet corn	2,650	0.96
	Green bean	1,550	0.56
	Soy bean	2,700	0.97
	Ground nut	1,500	0.41
3.	Perennial tree		
	Fruit tree	26,000	9.37
	Rubber	1,000	0.36
4.	Crops		
	Vegetables	1,945	0.70
	Florist	65	0.02

Infrastructures of Amphur Wangnumkheaw are: highway no. 304 (Nakorn rachasima-Kabinburi) as a core root, road from Ban Saljao to Amphur Pakchong and 33 routes connecting between Tambons and villages, 2 High schools under Department of General Education, 37 elementary schools, 1 Hospital capacity 10 beds, 11 health centers, 2 police stations: Amphur Wangnumkheaw police station and Tambon Udomsub police station, 1 regional irrigation, 17 village irrigation, 3 banks, 6 gas stations, 3 cooperatives.

The extensive problems are: debt of agriculturist, reduction of production, price depression and instability, soil erosion, lack of reservoir, chemical fertilizer and insecticide. The severe problem is chemical fertilizer both absorbable and non-absorbable, which are applied in farm for 2 phrases that are soil preparation phrase and growth expedition phrase with average usage rate of 25-30 kilograms per rais. While, Amphur Wangnumkheaw is the origin of many important streams and sub-

streams, thus the following effects from chemical substances used were pervasive to soil, water, plants, animals and agriculturist and were articulated as follows:

- (1) Accumulation of chemical substances in streams and soil.
- (2) Accumulation of chemical substances in agricultural products, which in term harm customers.
- (3) Jeopardize agriculturists themselves.
- (4) Soil fertility was deteriorating at fast rate.
- (5) High expenses.
- (6) Natural and environmental ecological system was devastating.
- (7) High soil erosion rate.

1.2) Organization network development

1.2.1) Wungnumkheaw Organic Farming Promotional Group Network Nakornrachasima province was founded at 27 January 1998 from the cooperation of agriculturists Ban Numsub, Tambon Wang-num-kheaw, Amphur Wangnumkheaw, Nakornrachasima province leading by Mr. Amnaj Maiyodklang and his family. He recognizes the problems and the effects of using chemical substance in agriculture that cause negative effects to health of people and environment. Thus, he started to cultivating organic vegetables and fruits, altogether with conducting a career supporting activities for members and neighbors including environmental activities. All activities conducted is the completed-cycle for instance production, transformation, marketing, training and etc, which all of the activities conducted were aiming to the process of self-sufficiency in the near future

Mr. Amnaj Maiyodklang was born in Nakornrachasima, he is the biggest brother of 6 children. He engaged in religion rehearsal at Santi Asoka Monastery. In 1992, Mr. Amnaj's father acquired 40 rai land where is the land in Agricultural Land Reform Area from local villagers located behind Ban Numsub Temple. Thereafter, they start cultivating organic vegetable and sales at Jatujak Market for 10,000 Bahts a week. While, they cultivating additional perennial trees such as teak, margosa, Pterocarpus, Ormosia, mango, longan, lichee, banana and etc by cultivating integrated diversity plants.

While, Mr. Amnaj Maiyodklang was 42 years, he established Ruam Palang Lamprapleong Group with his friends from Santi Asoka network, which most of them are societal revolution in natural agriculture by cultivating organic vegetable for salad making and other organic vegetables. Altogether with the concept of vegetarianism and simplicity and interdependency lifestyle, which is not intruding the nature derived from Santi Asoka guideline. He also solicited other Numsub villagers to join the organic vegetable cultivating group that collaboration with government in the time of Chavalit Yongyaiyut was a *prime minister*. The travel meeting of cabinet at Amphur Wangnumkheaw resulting in change of National Protected Forest Area to Agricultural Land Reform Area in Amphur Wang-numkheaw. This permitted people migrated from other provinces to founding their home and agricultural. Thus, the operation of Ruam Palng Lamprapleong Group led to the conservation of water sources, solving the problem of insolvency and poverty in Amphur Wangnumkheaw area. Training and knowledge about living principles of Buddhism emphasis on present action primarily was conferred to villagers. Form broadcasting, monthly meeting of Amphur and villagers and village leader meeting, all of these is intended to invite and initiate collaboration from villagers to participate in organic vegetable cultivating group as pilot project. In addition with, conducting of seminar in organic vegetable at Amphur Wangnumkheaw. The group was formally founded with the supporting of sheriff and the group was named “Wangnumkheaw Organic Farming Promotional Group” at 27 January 1998, and the first group meeting was conducted at Raifahaboon Bhufahphakheaw, Ban Numsub, Tambon Wangnumkheaw, Amphur Wangnumkheaw, Nakornrachasima province which is the orchard own by Mr. Amnaj Maiyodklang and family at 14 February 1998. The meeting results were concluded group has 2 type of members, they are:

(1) Permanent members are members who practices and obey to group disciplines, total 33 members.

(2) Auxiliary members are listeners, observers and participate in group activities, total 4 members.

Both types of membership have to pay application fee of 100 Baht for permanent membership and 50 Baht for auxiliary membership according to

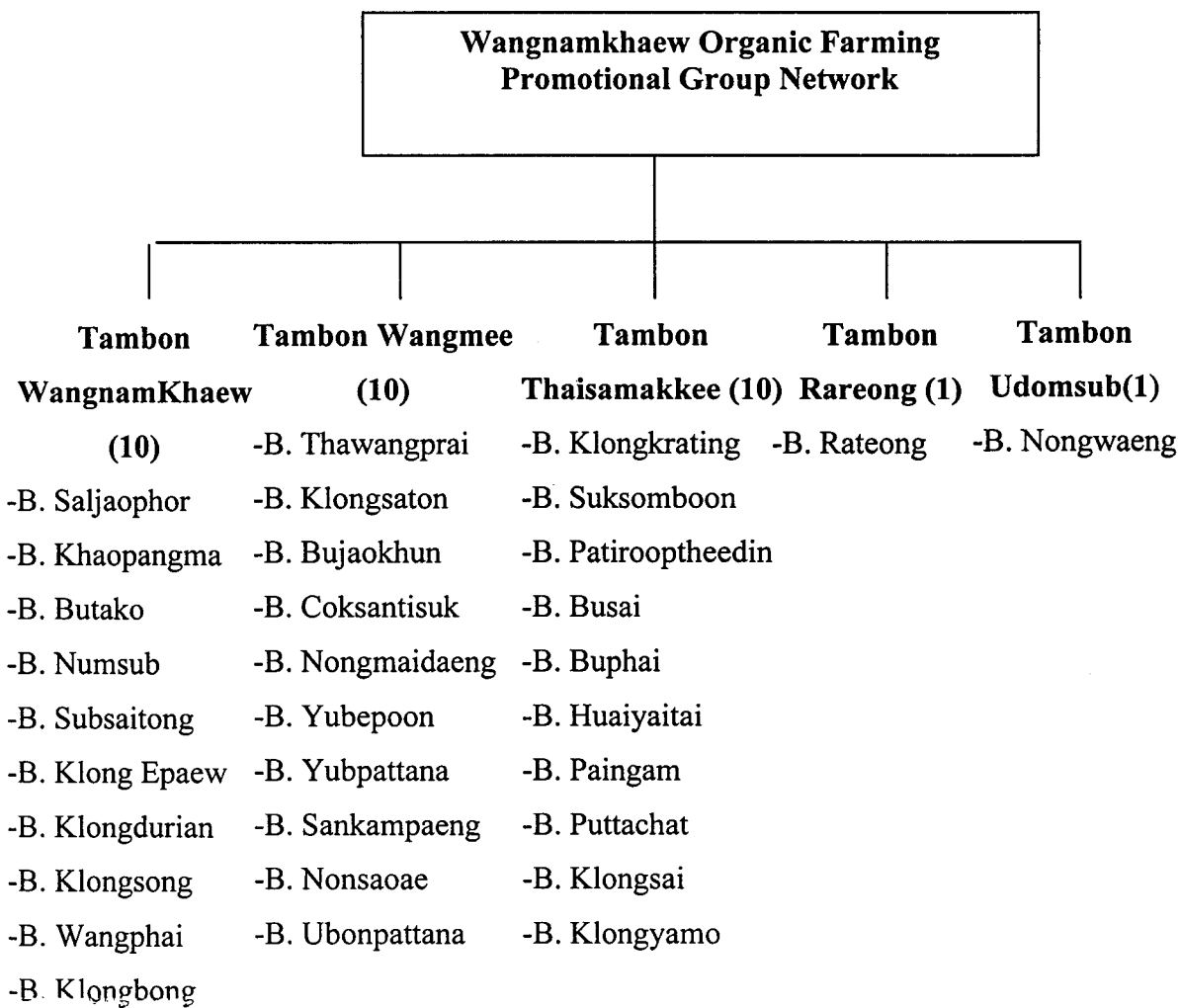
meeting agreement. The group office was located at 14, Moo 11, Ban Numsub, Tambon Wang-num-kheaw, Amphur Wang-num-kheaw, Nakornrachasima province.

1.2.2) The function of network linkage creation after foundation of organic farming promotional group was performed by conducting twice meetings a month for scheduling activities, making agreements, rules and regulation, and collaboration with province in requesting for a support from Chaipattana foundation and Special Project Office for Project Collaboration as His Royal Initiative. (Kor Por Raw Office). Subsequently, project was patronized from His Majesty the King at 9 October 1998 as the His Majesty's Principal Private Secretariat Record no. 0005/13581. This solicited various government organizations for example Department of Provincial Administration, the army area 2, Tambon Administrative Organization of Wang-num-kheaw, Department of Agricultural Promotion, Department of Land Development, Ministry of Health, Agricultural Land Reform Office, Department of Livestock Development, Royal Forest Department to support the operation of the group.

Supports from government stabilized the group and assisting group in expanding activities. At the end of year 1998, group has operating 4 core tasks: Plant and vegetable, herb, fruit and saving, and group expanded tasks after funds received from Social Investment Fund for instance Forest Cultivation, Poverty Welfare Promotion Project, Agriculturist Aiding Project, establish of Marketing Transformational Demonstration Center, Village Bank, Righteousness Bank. As a consequence, group expanding the network by grouping at least 4 members in various villages to form a subgroup in performing activities, particularly saving. These subgroups will directly depend on original group and enlarge Wangnumkheaw Organic Farming Promotional Group to become a network, which has network center at Ban Numsub in connecting network members and collaborating with other organizations.

1.2.3) In October 1999, network was expanded the number of member to 222 members in 32 villages, 5 Tambons in Amphur Wangnumkheaw. The expansion of network and activities are resulting from kindly patronage from His Majesty the King. After that, the government policy in supporting community organization network by granted Social Investment Fund group, them group

proposed the project in assisting and welfare promoting to unemployed altogether with expanding Organic Farming Group Network in 2000, which resulting in increasing of members to 7,111 families in 32 villages, 5 Tambons in Amphur Wangnumkheaw area. The followings are the group structure of Wangnumkheaw Organic Farming Promotional Group Network:



Moreover, network also expanding network through collaboration with Healthy Water City Reversal to Nature Project for 72 years Birthday Celebration of His Majesty the King's since 5 December 1999 until 2004 derived from 9 Provinces Policy in North Eastern region such as the followings Nakornrachasima, Surin, Srisakate, Yasotorn, Ubonrachathani, Roi-ed, Amnaujareon, Mukdahan and Khonkaen.

1.2.4) The network existent is a consequence of tangible performances accepted by the involvers, which can be indicated by frequent educational visitors group. Later, the network became source of knowledge about organic farming for example educational excursion and training of Sub-Amphur Panomdongrak sheriff with agriculturist leaders of Surin the City of Organic Agriculture without Chemical Toxic Project during 10-12 May 2000. At 14 May 2000, about 40 Graduate students majoring in Technology Management, Faculty of Technology Management, Thammasat University came for educational excursion in learning for production technology.

2) The operation characteristics of network organization.

2.1) Important components of Wangnumkheaw Organic Farming Promotion Group Network are illustrated as follows:

2.1.1) Human resources involved in establishing and developing Wangnumkheaw Organic Farming Promotion Group Network are:

(1) Group of founders was consisted of Mr. Amnaj Maiyodklang and family, particularly Mr. Amnaj's daughter, Miss Fakfon Maiyodhlang officer of group office. The group of founders has variety of experience and knowledge and has a good connection with government agencies, academics and politicians, all of these contributed to cooperation and support from various divisions.

(2) Committees and staff are young blood, who have age range 25-30 year, they are energetic in challenging works and acknowledge the importance of establishing and expanding group. They also have experiences and potential in development and became a group of leaders, they are: Mr. Krai Chomnoi, Mr. Suppachai Kanaenok, Mr. Boonmee Srivilai, Mr. Chokchai Samantararat and Mr. Somjit Lakam.

(3) Group members, most of them were initially flopped from chemical agriculture both monocultures cropping and chemical used for vegetable plantation. Most of them enter the group as they experiencing successful in production and marketing and were educating in natural cultivation method, microorganism water making, manure making and livestock farming for example.

(4) Advisors and supporters, most of them are doctrinal practitioners from Santi Asoka group and people that emphasize on development by

Thai wisdom accentuate on living with nature for instance Mr. Chaiwat Sinsuvong, Mr. Pamorn Navarattakorn, Mr. Nattapat Bamrungrit, Mr. Wiwat Salyakamtorn, Dr, Rossukon Pumpuangpan, and internal support in the area such as sheriff of Amphur Wangnumkheaw, government agencies and etc.

(5) Young bloods ,who will proceed group duty, are member heirs and receiving scholarship fund from group. They will work during holidays in order to pay back scholarship fund and also practicing group activities.

There were the Administrative structure of Wangnumkheaw Organic Farming Promotion Group Network, it illustrated in figure 16.

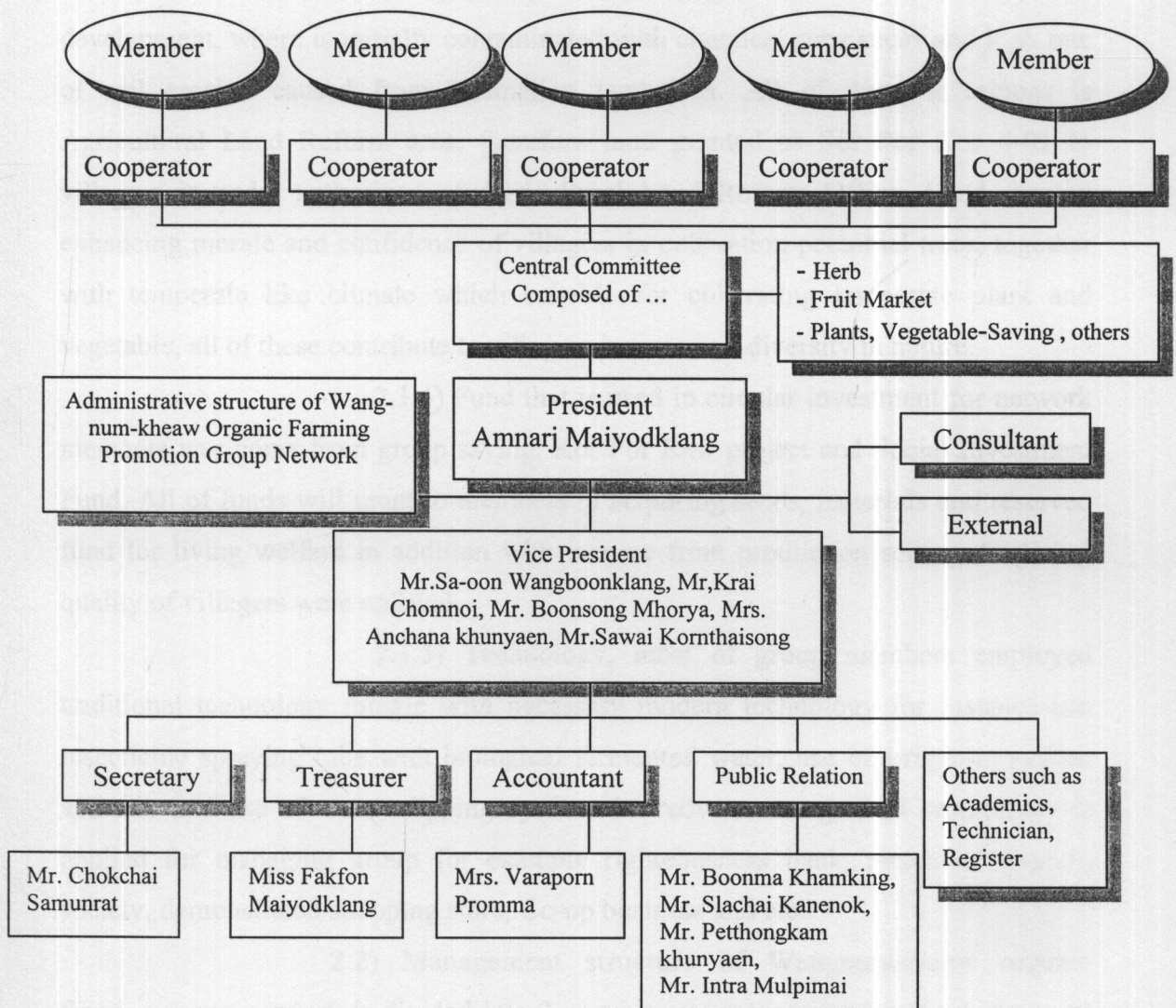


Figure 16 Administrative structure of Wangnumkheaw Organic Farming Promotion Group Network

2.1.2) Knowledge used in operating group are: Organic Natural Agriculture, agricultural products transformation, organic fertilizer, land improvement by natural method, temperate plant and vegetable cultivation, sales management, banking, cooperative, marketing demonstration center, group network development management and resources and environment conservation development.

Knowledge used is the traditional wisdom of some members for instance plant cultivation applied with external knowledge for instance making of microorganism water, organic agriculture and business management.

2.1.3) Land is the major resource necessary for development, where is initially contaminated with chemical substances and high rate of soil erosion caused from inclination land area. All of Amphur regions is Agricultural Land Reform area, therefore land granted as Sor Por Kor 4-01 to villagers is under authorized of Agricultural Land Reform Office. Land granted enhancing morale and confidence of villagers in cultivation perennial trees, together with temperate like climate which suitable for cultivating temperate plant and vegetable, all of these contribute to villagers income and diversity in nature.

2.1.4) Fund that is used in circular investment for network members was come from group saving, Kor Por Raw project and Social Investment Fund. All of funds will grant to members in acquiring seeds, materials and reserved fund for living welfare in addition with income from production selling the living quality of villagers were uplifted.

2.1.5) Technology, most of group members employed traditional technology mingle with necessary modern technology for instance use insecticide spraying tube with biological fermented water, use of irrigation system sprinkle and use of water dipping system. Moreover, management technology is applied for managing group for example righteousness bank, return of fund to society, demonstrated shopping store, Co-op business and etc.

2.2) Management structure of Wangnumkheaw organic farming group network is divided into 2 parts: group management and management of Organic Farming Promotional Project from His Majesty's Initiative. As group management will concern on directing group members to accomplish objectives and

goals settled and Organic Farming Promotional Project from His Majesty’s Initiative is the supportive organization. Illustrate as follows:

2.2.1) Management structure of Wangnumkheaw Organic Farming Promotion Group Network is governed by Board of committees has a task in managing, policy identification and collaboration with other member groups in villages. In board of committees, there is a president, a vice president, a secretary, a treasurer, an accountant and an informant. The president and board of committees will collaborate with other networks illustrate as following management structure. It presented in figure 17.

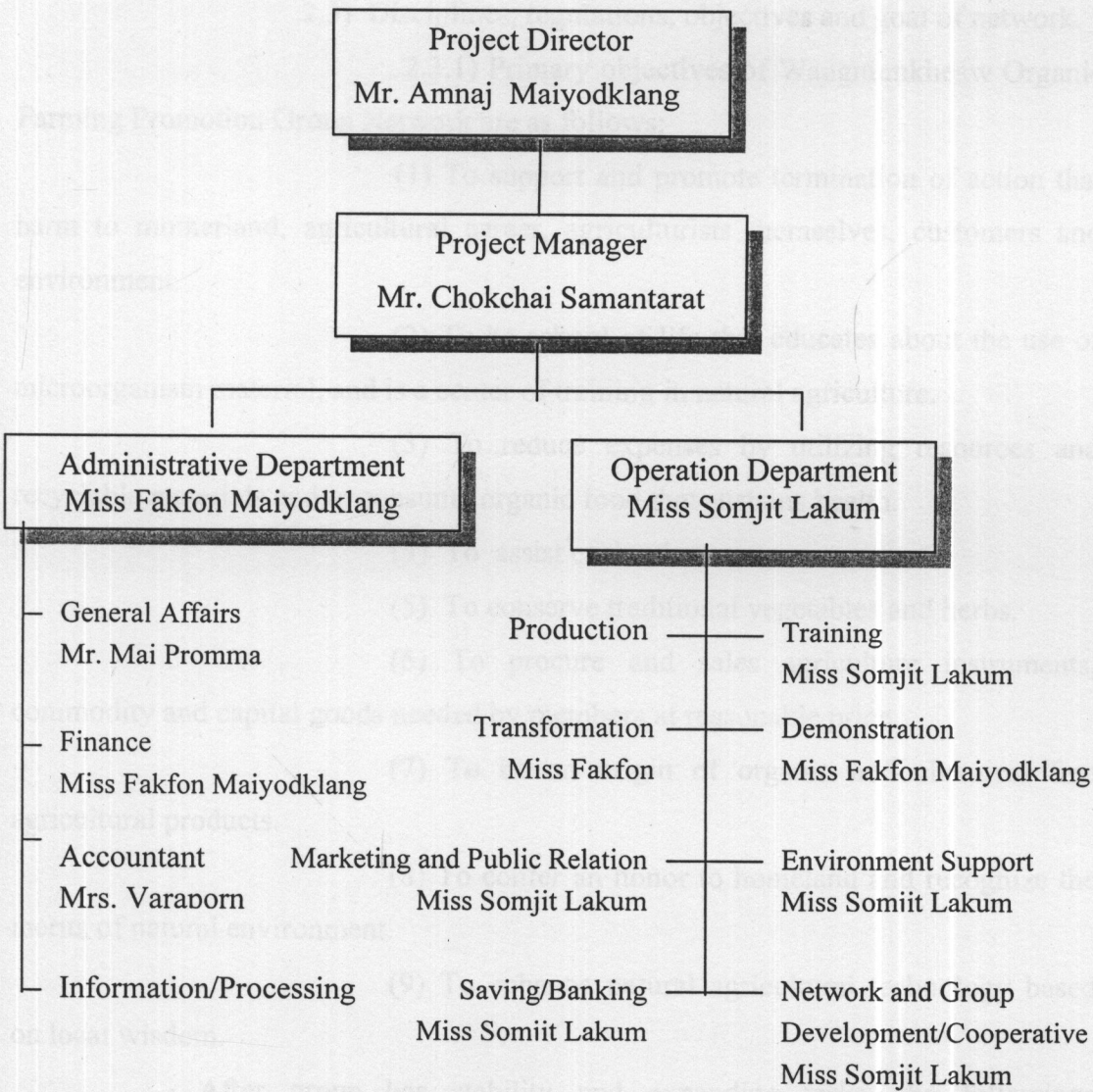


Figure 17 Management structure of Wangnumkheaw Organic Farming Promotional Project from His Majesty’s Initiative

2.2.2) Management structure of Organic Farming Cooperative in agricultural land reform area in Amphur Wangnumkheaw is responsible for managing cooperative.

2.2.3) Interrelationship in network: Network members will meet each other twice a month on second Sunday of the month and 20 of the month. Meeting will conduct rotate at members' house and contents of meetings mostly concerning about experience exchanging, training, activities and educational excursion, all of these contribute in creating endure and warm relationship among network members.

2.3) Disciplines, regulations, objectives and goal of network.

2.3.1) Primary objectives of Wangnumkheaw Organic Farming Promotion Group Network are as follows:

(1) To support and promote termination of action that harm to motherland, agricultural career, agriculturists themselves, customers and environment.

(2) To be school of life that educates about the use of microorganism material, and is a center of training in natural agriculture.

(3) To reduce expenses by utilizing resources and recyclable materials and to consume organic food that sustains health.

(4) To assist each other.

(5) To conserve traditional vegetables and herbs.

(6) To procure and sales agriculture instruments, commodity and capital goods needed by members at reasonable price.

(7) To be an origin of organic and chemical free agricultural products.

(8) To confer an honor to homeland and recognize the merits of natural environment.

(9) To enhance natural agricultural technology based on local wisdom.

After group has stability and expanding tasks, the followings objectives were added:

(1) To enhance and promote organic agriculture activities altogether with aware members in disastrous caused from using chemical substances.

(2) To enhance and promote career, income and saving to members.

(3) To enhance and promote members in assemble the group and establishment of community organization altogether with conducting complete-circle activities that enable self-dependency.

(4) To enhance and promote members in bringing appropriate technology from local wisdom integrate in conducting such an activity.

(5) To enhance and promote members in preserving, conserving and developing traditional culture and natural resources in environment.

(6) To find other networks for collaboration and participation in conduction activities.

(7) To be an educational site in transferring knowledge and experiences to people and other organizations.

2.3.2) Goals of Wangnumkheaw Organic Farming Promotion Group Network are:

(1) To develop members in self-dependency and be a model for other agriculturists in surrounding area.

(2) To promote members to use hygienic fertilizer in order to restoring soil and to conserve environment.

(3) To increase agricultural productions by not using chemical substances and transformation, managing marketing with cooperative system.

(4) The targeted area is villages in Amphur Wangnumkheaw and expand to nearby Amphurs, provinces and organic farming networks nation wide.

(5) To build learning center for learning of life, society, economic and environment development based on ethical principles.

2.3.3) Disciplines and regulations of Wangnumkheaw Organic Farming Promotion Group Network are:

(1) Regulations of organic farming promotion group could be classified into 9 categories, 39 rules. Wangnumkheaw Organic Farming Promotion Group abbreviation is Kor Sor Vor.

There are 3 type of memberships: ordinary members, application fee 100 Baht for lifetime membership, have rights to participate in activities and could be elected to be a group committee; extraordinary members, application fee 50 Baht for lifetime membership, have rights to participate in meetings and could request for aid on case by case basis; honorary members are members that used to patron the group and affirmed by committees to join group without application fee.

Characteristics of members are: interested in group activities, politeness, are not infected social aversion diseases, confer importance to organic farming, energetically participate in group activities, and lawfully mature.

Member has a right in choosing and deselecting committee, if he/she is ordinary member for at least 1 year, participated in at least 5 activities and completed training at least one course.

Membership will terminate as death, resign, absent of characteristics required and exile by board of committees. Members have tasks in practicing according to rules, order and group consensus; they also have to cooperate and participate group activities, preserve and disseminate the good reputation of group.

Group board of committees has 9 – 45 people came from election in ordinary meeting. The elected people or the consensus chooses president and vice president, then president choose the rest committees.

Committees have 4 years lifetime, except the case of death, resign, membership expired or dismissed by two third votes of members.

There were 2 ordinary meetings have to conducted in a year and extraordinary meetings as agreement of board of committees or requested by one third of members 7 days notify heretofore. In the 2nd ordinary meeting, declaration of income statement and balance sheet has to be done.

Financial and properties under responsibility of committee, cash must be deposit in the bank as to group committees agreement. During every financial year from 1 January to 31 December, withdrawal could be made only by signature of

treasurer and president with a stamp in a withdrawal document. Board of committees has to eagerly assist when an audit requested.

Rules could be revocable if there is an agreement of at least two third of votes from ordinary members. Liquidation could be taken into action only at least three fourth agreement of committees and at least three fourth of agreements from all of members except the liquidation forced by law. After liquidation, all group properties belonging to charity foundation by group committee's agreement

(2) Group bank rules: As group established group bank derived from His Majesty's Initiative of "Wang-num-kheaw" Organic Farming Promotion Group, there are 16 rules that could be conclude as follows:

Organic Farming Promotion Group Bank as His Majesty's Initiative located at 14, Moo11, Ban Numsub, Tambon Wang-num-kheaw, Amphur Wang-num-kheaw, Nakornrachasima province has objectives to encourage members to save for business purpose and strengthening the financial condition of group.

Members have to be social accepted person regardless of the age, gender and career. But youth age between 0-18 years not have a right to adopt a loan, vote, and be a committee or guarantor.

Deposit and withdrawal could be done on any operating day, except withdrawal in an emergency case could be done 24 hours everyday. At least 100 Baht of deposit, could be done, and at least 500 for 3 or 6 months periodically deposit could be done.

Each member could make a short term loan of not more than 3,000 Baht each person, repayment including principal and interest within 3 months except the case of illness and accident. Interest free in case of repayment of full amount within 30 days. A medium term loan of not more than 12,000 Baht each person, repayment including principal and interest within 6 months and long term loan of not more than 36,000 Baht each person, repayment including principal and interest within 12 months. Borrower could use shares as collateral for loan or others stated in the rules.

Bank executive committees group consists of 11-15 interesting people there are: a president, a vice president, a treasurer, an assistant treasurer, a secretary, an assistant secretary, a manager, an assistant manager, an accountant, an assistant

accountant, an educational public relation, an auditor, a debt tracer and etc. Committees have 2 years lifetime and half of them will be randomly picked out, except president, treasurer, secretary, manager and accountant has 3 years lifetime, committee could be reelect for at most 2 times consecutively.

Monthly members meeting are conducted to report the progression, answer the questions and provide member knowledge for an hour.

When there is an excessive amount of saving, it should be invested in community business such as demonstrate shop and gas station, this is a part of development to agricultural industrial system.

Dividends from group bank and demonstrate shop should be divided to: Reserve fund not more than 20% of profit ; Shares value not less than 20% of share value per year and operating fee to staff and committees not more than 30% of profit ; Social welfare not more than 10% of profit ; Educational excursion fund, trainings, seminars for members and committees for 10% of profit ; Group foundation 1% of profit but not more than 1,500 a year ; Other purposes according to management executives agreement.

Treasurer cannot hold more than 5,000 Baht of cash, the excessive amount must bring to deposit in commercial bank of saving bank within 3 days. Withdrawal could be made only the present of at least 2 signatures from president, vice president, or secretary and manager.

2.4) Wisdom and learning activities conducted by group.

2.4.1) The important wisdom and knowledge that organic farming promotion group network confer to members and people is organic farming along with standardizing plot, use indigenous microorganism fertilizer, organic fertilizer and diversification plantation. Organic vegetable of the group was certified by Yamo Standard Organization at Nakornrachasima province. Production of Organic Farming Promotion Group will distribute directly stores that sell to customers directly for instance Lemon Farm Cooperative stores, organic vegetable and plant stores in Bangkok and in various exhibitions. Organic production also sells directly to final customers at Nakornrachasima Market and Bangkapi Market every Saturday. Another remarkable wisdom is Indigenous Microorganism (IMO) fertilizer, this fertilizer helping in supplementing and restoring soil, which in turn

conserving environment. The production method of IMO fertilizer was transferred Korean Agricultural Association, which is massive portion of IMO fertilizer produced by the group but some network members still purchased EM Concentrate Microorganism from Kusei Group, Japan. Some members had developed new formulas of Indigenous Microorganism fertilizer also called Enzyme. Moreover, the group also produces variety of wines for instance Passion fruit wine, Lichee Wine and Mak Vang wine. The group also publishes leaflet about natural agriculture and enzyme application knowledge that helps in conserving environment. At the beginning, group emphasis on natural agriculture in order to conserving soil, water, air with economic development and in long term members will restore, conservation of plants species and cultivate Ago-Forestry which emphasis on planting perennial trees. For group management development in teamwork, individual and group potential development and to be self-dependency in consumption, transformation, and sales.

2.4.2) The complete circle activities that group conducts for members are:

(1) Production: Group will support members in producing various agricultural products such as vegetable, fruit, plant, herb, seedling, charcoal, organic fertilizer, water fertilizer, indigenous microorganism fertilizer, rice, drinking water, coffee bean, flower and etc.

(2) Transformation: Some agricultural production will bring in transformation process and transforming into fruit juice, salted vegetable, herbal water for example. In addition with transformed herbal product for instance herbal creaming, herbal shampoo, herbal conditioning, passion fruit juice, beet root juice, and sweeten fruit and vegetable.

(3) Marketing: Group will purchase agricultural production from members, then resell in the form of fresh products and transform the rest. Moreover, group also marketing the environmental related products such as health foods, coffee beans and eco-tourism.

(4) Training: Group will conduct training to propagate experiential knowledge for instance group management, organic farming cultivation, production method, transformation method, energy and environmental management,

management in organization and network development, marketing, making indigenous microorganism fertilizer and eco-tourism.

(5) Demonstration: Demonstration activities; making indigenous microorganism fertilizer, water fertilizer, organic fertilizer, cultivating organic vegetable, agricultural product transformation, establishing natural library, waste classification, cultivating herbal forest orchard, energy and environmental management, waste utilization will present to members and educational visitors.

(6) Group development: Agriculturists in certain who interested in cultivating organic farming will be supported knowledge and collaboration in establishing community organization from group. The interconnection in organic farming network among villages in variety of Tambon, Amphur, and province.

(7) Energy and environmental conservation: Group will protect, conserve and develop the natural resources by establishing community environmental development plan altogether with management in forest, water, soil, energy and human resources.

There are variety of activities conducted by group such as monthly meeting, educational meeting, work together to develop and promote organic farming, establishment of righteousness bank where members could deposit goodness in the bank, learning activities conducted to educate members by Dr. Rossukon Pumpunvong. Moreover, educational excursion to study Integrated Agriculture System and Land Development Project applying with New Theory derived from His Majesty's Initiative conceived by Ajarn Boonma Banpradit of Kasetsart University, Kampangsaen Campus.

When group expanded to network, it received funds from Social Investment Fund amount 5.3 million Baht and supporting money from community amount 2.1 million Baht for operating the network in year 1999-2000. From funds granted, Wang-num-kheaw Organic Farming Promotion Group Network magnifying the scope of work by conducting activities such as Welfare Promotion for Poverty Project, aggregation and selling of agricultural production and Career Development and Assisting Problematic Agriculturists as follows:

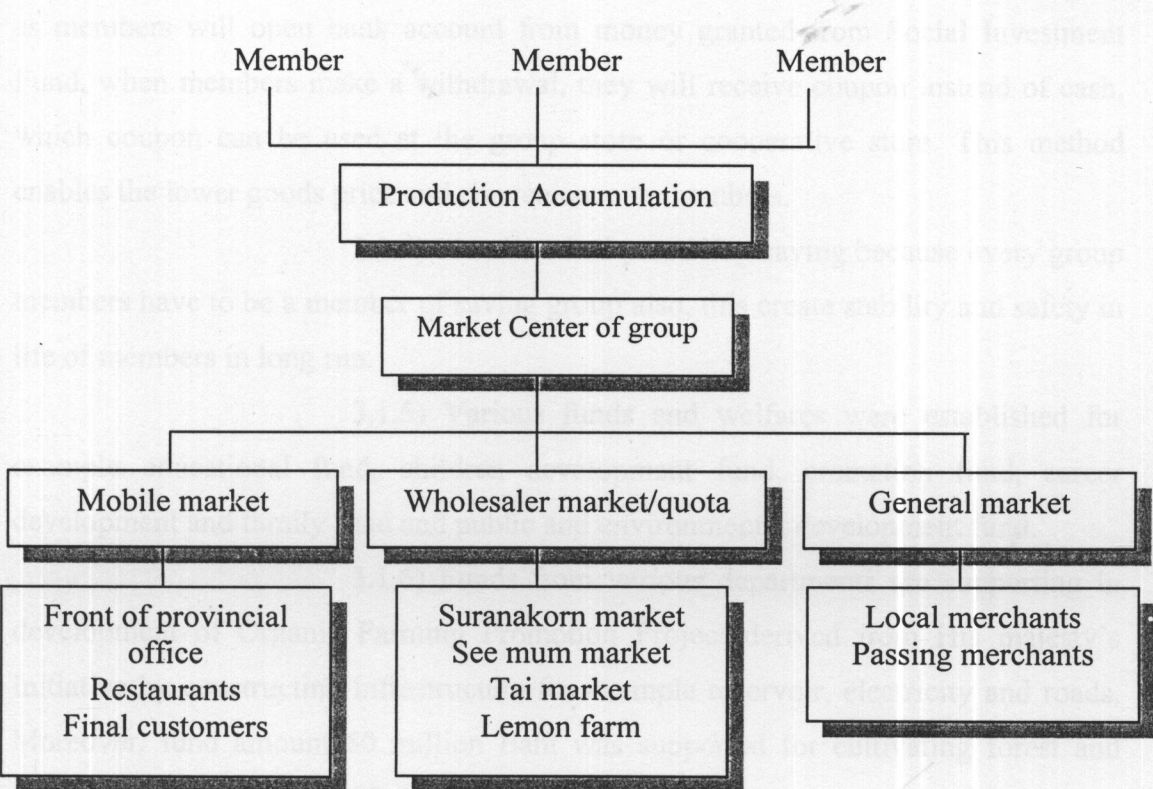


Figure 18 Production accumulation and sales project

3) Operating results of Wangnumkheaw Organic Farming Promotion Group Network are congruence with the initial objectives, which can be illustrated as follows:

3.1) Economical aspect: the results are as follows:

3.1.1) Members changed the cultivation method from monoculture cropping to cultivating organic vegetable. Moreover, they produce Indigenous Microorganism fertilizer, which stimulate vegetable and plant to growth faster and healthier and could be sold for higher price because of demand side from the market. Some members, whom cultivating only 2 rai of organic vegetable, have monthly income range from 7,000 – 10,000 Bahts.

3.1.2) Members are collectively practiced in business management by delivering agricultural production to group and help the group by rotating go to sales agricultural products directly at Bangkapi Market or fairs.

3.1.3) Establishing of group bank and group store for servicing commodity and capital goods to members and managing members' finance

as members will open bank account from money granted from Social Investment Fund, when members make a withdrawal, they will receive coupon instead of cash, which coupon can be used at the group store or cooperative store. This method enables the lower goods price and convenience to members.

3.1.4) Members had practicing saving because every group members have to be a member of saving group also, this create stability and safety in life of members in long run.

3.1.5) Various funds and welfares were established for example educational fund, children development fund, cremation fund, career development and family fund and public and environmental development fund.

3.1.6) Funds from various departments are supporting in development of Organic Farming Promotion Project derived from His majesty's Initiative by constructing infrastructure for example reservoir, electricity and roads. Moreover, fund amount 50 million Baht was supported for cultivating forest and promoting agriculture. (1999-2000)

3.1.7) Trading, and bartering of agriculture products among various organic farming networks creates interconnection of activities.

3.2) Societal aspect: results are as follows:

3.2.1) Group members help each other in solving insolvency and poverty problems, they also practicing leadership skills through participate in educational excursion, training and meeting. All of activities nourishing members' vision and practicing members to live peacefully based on Buddhism principles

3.2.2) Members practicing in contribute to public activities by developing land in the project area on every Buddhist holy day, group will deposit goodness equal to 100 Baht a day for the contributor into righteousness bank and pay back in form of gift of seedling. For students who received scholarship fund, they have to pay back fund by participate in public activities according to the appointment.

3.2.3) The collection of the group enhancing thought, harmony and capital, all of these lead to traditional culture.

3.2.4) Members practicing in leadership skills and management at all level including family, group and network, which in turn create interconnection and interrelation like kin network.

3.2.5) Various groups of educational visitors including organization group, community group, academic group, developer group and student group. came to visit network, this shown that group is the source of learning and has an objectively development.

3.3) Natural resources and environment: results are as follows:

3.3.1) Organic farming cultivation is the one of the leading group activities. In organic farming cultivation, natural microorganism water is the key performer in restoring soil, water and air in to the pollutant free condition, this in turn enhancing members' health from the chemical effect.

3.3.2) Members applied natural agricultural method in restoring biodiversity of traditional plants, vegetables, herb and perennial trees, this in turn benefit to environment and socio-economic.

3.4) Management and technological knowledge.

3.4.1) Technological knowledge is applied in making Indigenous Microorganism Fertilizer and fermentation to plants and vegetables. Members also applied technological knowledge in water system management for agriculture. Knowledge gained from group management also helps in developing contributed mind in form of righteousness bank, this implant good cause in both children and adults.

3.4.2) Management, group system management and cooperation with others departments entail group unity. Various supports in form of fund were granted from Kor Por Raw Office, Social Investment Fund and etc. These funds were spending in network development including human resources, capital, business and interconnection between networks.

4.1.3.2. Learning process for plant diversity conservation of Wangnumkheaw Organic Farming Promotion Group Network

1) Learning components for plant diversity conservation.

1.1) People involved in learning of network are:

1.1.1) Scholars have 2 groups as follows:

(1) Scholars inside the community are agriculturists that cultivate vegetable by rational method derived from predecessors integrated with knowledge exchanged among network members, committees, and network advisors including Mr. Amnaj Maiyodklang, Miss Fakfon Maiyodklang and Mr. Krai Chomnoi for example.

(2) Scholars outside the community are academics, politicians invited by network to provide knowledge and advising for instance Dr. Rossukon Pumpunvong and Mr. Sompong Kongjan.

As Mr. Krai Chomnoi, one of the most important network leaders said that I am Bangkokian that came to planting vegetable for 4-5 years, I applied knowledge obtained from agriculturists whom practicing from academics with experience from vegetable plantation and acquire more than 100 rais by income from selling agricultural products. (Krai Chomnoi, Interview)

1.1.2) Knowledge successors are Wangnamkhaew Organic Farming Promotion Group members and their children whose learning from working with parents in orchard for example cultivating, fostering, harvesting, making Indigenous Microorganism fertilizer and organic fertilizer. Children who received scholarship fund from Social Investment Fund also learning from public work contribution for example packaging, recording merchandises list and making Indigenous Microorganism Fertilizer.

For group members, who succeed knowledge from predecessors in plant and vegetable cultivation, also learning conceptual and technical knowledge about cultivating diversity of organic plants in the same plot with the use of Indigenous Microorganism Fertilizer instead of chemical fertilizer. They also participate in lecturing class, educational excursion, and exchanging knowledge among members. This enables the propagation of knowledge to family members and

neighbors through network members who obtain knowledge from visiting, meeting and participating in network activities.

1.2) Knowledge about plant diversity conservation of Wangnum-kheaw organic farming group network.

1.2.1) Contents of knowledge consist of 2 parts: first, plant cultivation for conservation and restoration; second plant cultivation for usage. The second part emphasis on cultivating organic vegetable and fruit for consumption and sales, it is preferable to cultivate vegetable because of rapid and high production but for perennial trees will cultivate crossing with vegetable plot in order to get benefit in long run. Some of members also conserve the traditional forest plants for example orchard of Mrs. Thongsai Leongkuntod, Ban Khaopangma where has both traditional forest plants and cultivated plants including mango, leak, banana, tamarind together with chili, pumpkin, tomato, lemongrass, morning glory, sweet corn, lichee, longan and bamboo for example.

Other than plant diversity conservation by Organic Intergrated Agriculture, another thing that help in restoring and conserving plant species is natural Indigenous Microorganism Fertilizer and organic fertilizer in order to nourishing soil altogether with preparing reservoir and irrigating water to plot by sprinkle system and dipping system. Group also arranged marketing and business management in the form of cooperative as a mean to add economic value to plants cultivated.

Group also has a policy in encouraging members to cultivating various types of plants and vegetables in order to serve market demand. According to the policy, group encourage members in each subgroup to cultivate at least 6 kind of vegetables assisting by committees in analyzing and zoning the land for subgroup to cultivate different kind of vegetables, this practice will proportionate the market demand and supply of vegetables produced by group members.

Wangnumkheaw organic farming group network utilizing plant diversity by using spoiled plants, vegetables, fruit, fruit peel and wet garbage fermenting with brown sugar or refuse sugar in making Indigenous Microorganism Fertilizer. Moreover, the refuse left from fermenting Indigenous Microorganism Fertilizer can be used in fermenting leaves, rind etc. to get organic fertilizer.

Indigenous Microorganism Fertilizer, which it is pollutant free and safety, can be used instead of chemical fertilizer in watering and spraying plants.

There are more than 20 formulas of biological water, which can be classified by place of origin or fermentation time for instance Japanese formula called EM, Korean formula called IMO, Network formula called SUMO, fermentation time less than 3 months called Microorganism, fermentation time between 3-12 months called Enzyme and fermentation time more than 1 year called Ozone. The followings are example of formulas:

(1) Enzyme fermentation method from garbage and refuse food.

Fermentation process: Put garbage or refuse food, brown sugar and fresh water proportion 3:1:10 orderly in the plastic bucket or an earthen jar and commingle them. Then cover and lay the container in the shadowy area for 1 week, then check the fermentation reaction, the correct reaction happened if the mixture smell like spoiled orange juice with white fungi covered, and if the smell is like spoiled food then add more brown sugar and check for correct reaction lately.

When fermentation time reached 3 months, the fermented water also called enzyme will smell like spoiled orange juice with dark brown color. Enzyme reproduction can be done by mixing enzyme obtained with refuse sugar and fresh water in proportion 1:1:10 orderly, then stirring the mixture and cover the container for 7 days. The refuse left from fermentation process can be used as fertilizer also.

(2) Insects propellant mixture ingredients are 1 liter of enzyme, 1 liter of refuse sugar or brown sugar, white liquor, 0.1 liter of 5% distilled vinegar and 10 liters of fresh water.

Fermentation process : Combine refuse sugar or brown sugar with fresh water stir the mixtures , then pure white liquor and 5% distilled vinegar ;Pure enzyme in the mixture, stir and cover container, during fermentation process the container should be shook every day and open the cover twice a day to release gas ; Enzyme can be used after 15 days, and the enzyme left could be kept for as long as 3 months with gas releasing sometimes.

Usage : Mix 10-15 milliliters of enzyme with 10-15 milliliters of refuse sugar and 10 liters of fresh water ; Stir the mixture, then spraying to plants every day or at least 1-2 times a week.

(3) Organic soil fertilizer ingredients are 5 portions of grinded dry soil, 2 portions rice powder, 2 portions of burned chaff, 2 portions of manure, 10-20 milliliters of enzyme, 10-20 milliliters of refuse sugar and 10 liters of fresh water.

Fermentation process : Mix grinded dry soil, burned chaff, rice powder and manure, then pure enzyme, refuse sugar and fresh water on the previous mixture, after that cover the mixture with hemp sack for 5-6 days before use.

(4) Plants hormone production with enzyme, the ingredients are 2 kilograms of ripe banana, 2 kilograms of overripe pumpkin, 2 kilograms of ripe papaya, 20 milliliters of enzyme, 10-15 milliliters of refuse sugar and 10 liters of fresh water.

Fermentation process : Grind banana, pumpkin and papaya together, then pure enzyme, refuse sugar and fresh water and pulverize them ; Fill the mixture in fertilizer sack and put in plastic bucket, cover the bucket for 7-8 days.

Usage : Bring 20 milliliters of fermented water mix with 5 liters of fresh water, then spraying to plants, it stimulate plants fertility and increase plant production ; Water microorganism can be used for treat waste water, pure enzyme in waste water well. Enzyme also uses to get rid of flies by terminating its life cycle and veto bad smelling by mix 1 portion of enzyme with 100 portions of fresh water vaporizing on garbage.

Other merit formulas such as health enriching nectar, fruit wines and microorganism for anti-freckle (Fagfon Maiyodklang, Interview).

1.2.2) Source of knowledge about plant diversity is local wisdom that succeed from predecessors of network members. Even though, some of agriculturists cultivate monoculture crop but some also maintain diversification plantation for the consumption purpose, thus some knowledge of plant diversity still maintain in the community. The diversification plantation is reformed once again after group encouraging agriculturists to cultivate at least 6 kind of vegetables.

But knowledge of transformation of plant diversity came from outside the community by collaboration of Wang-num-kheaw Organic Farming Promotion Group with other departments for instance Department of Agriculture Promotion, Agricultural Land Reform Office and Kor Por Raw Office. The scholars and academics are invited to network for lecturing, seminar, training and meeting, from the previous activities, knowledge was transferred to network members.

For knowledge about producing biological fertilizer was transferred from abroad such as Japan, Korea through people interested in natural agriculture. The prominent scholars in producing biological fertilizer are Dr. Rossukon Pumpunvong and Mr. Sompong Kongjan, the ex-agriculturist in Amphur Promburi.

1.2.3) Knowledge was transferred by network scholars through training, lecturing, meeting, speaking, demonstrating, practicing and exchanging experience both formal and informal setting.

1.2.4) Knowledge development through practicing and experimenting of network members who learnt from network scholars, thereafter network members exchanging experience with one another. Some members could develop their own biological formulas from observing and practicing. The example of excellent project is the developing of Tree for life project purposed to the Natural Resources and Local Culture Conservation and Restoration Project under supervision of Social Investment Fund, which it conceived by Mr. Chokchai Samantararat and Mr. Somjit Lakum, committees of Wang-num-kheaw Organic Farming Promotion Group in the meeting of village collaborators at Ban Thaisamakkee on 15 May 2000. The roughly contents of the project conceived could be articulated as follows:

- (1) Members have to mutually cultivating plants.
- (2) Diversifying type of plants, particularly local plants.
- (3) Compensation of each of cultivation activities will be rewarded to members and community.
- (4) Award in form of fund will grant to plants survival in each year. (first 4 years)
- (5) Community will benefit from plants production and arrange to members as necessary.

(6) Cultivation area in public places will be use for cultivation for example temples and schools.

(7) Cultivated plants could be applied for social fund.

(8) Members have to take care plants proportionately.

1.3) The important learning resources of Wangnumkheaw Organic Farming Promotion Group Network for plant diversity conservation are:

1.3.1) Human: They are network members and group committees cooperate in learning development: network members who interested in organic cultivation using Indigenous Microorganism Fertilizer; group committees who attempt to strengthening the group and achieving the goal settled but all of them are parts in developing learning sources of the network.

1.3.2) Land and fundamental structures of members in Wangnumkheaw organic farming promotion particularly land of Mr. Amnaj Maiyodklang is the exemplary land for network members to study and learn about plant cultivation and biological fertilizer production. There is also shared land own by network that allowed members to conduct activities and study together.

1.3.3) Fund available for learning about plant diversity conservation came from individual, borrowing and fund requested from relevant organizations, most of fund will be used in conducting seminar, meeting, educational excursion and acquiring materials.

1.3.4) Learning period for plant diversity conservation, members can studying by themselves all the time but group learning period is monthly meeting and public contribution in Buddhist holy day, members also learning through exchanging experience at group office almost of the time.

1.4) Network's goals and objectives of plant diversity conservation.

1.4.1) The most important goal is to supporting network members in cultivating natural agriculture to increase agricultural production, diversification, consumption and sales. This also indirectly contributed to conservation and restoration of soil, water and environment. The natural agriculture cultivation is also aiming to group learning center development for biodiversity restoration and to be a prototype in organic vegetable cultivation.

1.4.2) Network's objectives were emphasis on conserving natural resources by applying integrated agricultural process particularly organic vegetable cultivation and encouraging members to organizing group for learning through practicing activities such as temperate plants restoration, producing Indigenous Microorganism Fertilizer for using in day to day life and learning through practicing in plant diversity conservation supported by management and development knowledge.

2) Methodology and procedures of learning about plant diversity conservation.

2.1) Learning procedures debut from group leader, Mr. Amnaj Maiyodklang and his family as they start to cultivate Ago-Forestry plant diversity and initiate in using Indigenous Microorganism Fertilizer.

After successfully practice, he established group and brought the concept of diversification plantation for economic purpose. Group process is also applied to create organic farming society altogether with enhancing environment and traditional plant restoration. Learning activities also conducted regularly for example meeting, seminar, training, educational excursion, demonstration method and field practicing with encouraging community members to form a sub-group in cultivating organic vegetable and fruit. Group process emphasizes network members on learning by doing for instance production, sell, transformation and restoration the environment. This leads to innovation of cultivating forest in community project for sustainable development thereof.

2.2) Learning methodology of group members are: formal learning conducted by group for instance meeting, seminar or training; informal learning for example members accidentally met each other, meeting of members in subgroup or meeting at group center.

2.3) Learning development process for biodiversity conservation is partly depended on the readiness of members and supportive force from for instance fund from Social Investment Fund, seeds offered from Kor Por Raw organization. Another important part of learning development process is the knowledge transferring from outside scholars and academics to network members,

lately the educated members became scholars of the network and able to educating other network members (1998 – 2000).

3) Learning activities for plant diversity conservation.

3.1) The followings are pattern of learning activities:

3.1.1) Learning by practicing in agricultural plot enables members to understand nature of plants for instance quantity of water and fertilizer needed by certain plants and alternately cultivating insect propellant plants in orchard or plot.

3.1.2) Learning from exchanging experience with network members or neighborhood for instance Mr. Krai Chomnoi, who profoundly understand plant nature, then network members are frequently visiting him for exchanging experience.

3.1.3) Meeting, seminar and educational excursion are learning conducted by network to educating network members.

3.1.4) Learning conducted for outside interested people group who came for educational excursion, listening to lecturer and learning in making Indigenous Microorganism Fertilizer.

3.2) Method in conducting learning activities for plant diversity conservation, the learning method is conducted by group for network and educational visitors through lecturing, conferencing, demonstrating and practicing for example.

4) Assessment and tracking of learning results for plant diversity conservation.

4.1) Assessment of cultivating organic plant and vegetable could be indicated by certain level of successful in plant diversity conservation. The major indicators used in measuring the successful are variety of species, quantity of plants to area, quantity and frequency of using Indigenous Microorganism Fertilizer and organic fertilizer. At the beginning, the primary assessment indicator is type of vegetables cultivated in each subgroup, thereafter, assessors will look at type and quantity of fruit produced. Statistically observing and checking of quality and quantity of vegetable will be used in assessment methodology, group will notify

network members to improve the quality of vegetable, if certain vegetable is disqualified from assessment.

4.2) Informal tracking was done by group committee and village collaborator through asking for results and problems happened during vegetable cultivation at monthly meeting and visiting at network members' orchard.

4.1.3.3 Factors related to network organization development and learning for plant diversity conservation.

1) Supporting factors

1.1) Organization network development aspects.

1.1.1) Amphur Wangnumkheaw is transition area of Central Region and North Eastern Region and is newly open area that allowed people to settlement under the authority of Sor Por Kor 4-01. During last 30 years, people from various provinces both from Central Region and North Eastern Region were immigrated to settle new community. Thus, the establishing of Wangnumkheaw Organic Farming Promotion Group is the collection of people diversity, which enhances the variety of knowledge from various people. (1998 – 2000)

1.1.2) The natural resources, soil, water and weather are fertile, but the only problem is deforestation. After the pilot project of organic agriculture to solve economic and deforestation problem supported by other departments, this contributes to potential of success in operating Wangnumkheaw Organic Farming Promotion Group Network.

1.1.3) Group of founders has a cause to enhance social well-being and natural interdependent living. They are natural leaders adhering to Santi Asoka principles of living that emphasis on sacrifice, sufficiency and simplicity. They also have a connection with colleagues, politicians and academics, which in turn they could ask for collaboration and support.

1.1.4) Network structure is systematically arranged and clearly identified the role, rules and regulation for network members. There are central committees and subgroup committees responsible for community level, there is a collaborator as a representative for each community in the central committees. Network structure is also supported by group advisors, whom have capability and

development experience for example Mr. Chokchai Samantararat, the group secretary and project manager.

1.1.5) Group's objectives were clearly identified, then development strategies and tactics are aiming to motivate people to contribute back for the society.

1.1.6) Economic, the root cause of the members' problems, was solved through saving, establishing group bank in order to systematically manage money and establishing of cooperative store to sell cheap products for network members.

1.1.7) Appropriate technology and restored local wisdom were synthetically applied in various agricultural activities for instance organic plant cultivation with sprinkle system.

1.1.8) Organic Farming Project under His Majesty's Initiative was supported by various departments, this also brought collaboration and connection from those departments to group operation.

1.1.9) There are two meetings a month and social contribution on every Buddhist holy day.

1.1.10) Learning was conducted continually altogether with training, seminar, educational excursion, experience exchanging from both internal and external group network.

1.1.11) Interrelationship both formal and informal among members.

1.1.12) Organization management on various activities such as production, sales, transformation and quality development.

1.1.13) Group network is educational excursion center and organic agricultural learning center, which enable group members in meeting, practicing and learning.

1.1.14) Continually support from external organizations and department for instance fund offered from Social Investment Fund.

1.1.15) Members are eagerly developing their living quality, wealth and family because most of them are in working age.

1.1.16) New generation was inherited concepts and causes.

1.2) Learning process of network for plant diversity conservation aspect.

1.2.1) Amphur Wangnumkheaw has fertility of soil, climate and water. Thus, it is allowed cultivation of ordinary vegetables, temperate vegetables and perennial trees. The land fertility also enables the restoration of plant diversity and brings back natural equilibrium.

1.2.2) Goals, objectives and group activities are aiming to accomplish organic agriculture and plant diversity, which in turn contributed to sustainable economic, social, environment and living quality.

1.2.3) The establishment of cooperative makes availability of seeds diversity and agricultural tools and equipment.

1.2.4) Marketing management and group requirement for subgroup to cultivate at least 6 types of vegetables or fruits, leads to economic efficiency and plant diversity.

1.2.5) Continuous learning from various activities both inside and outside the network such as training, educational excursion, experimenting and practicing in plant utilization.

1.2.6) Traditional lifestyle of members and external technology were synthesized, which leads to using Indigenous Microorganism Fertilizer instead of chemical fertilizer and supporting in plant diversity cultivation.

1.2.7) Fundamental believes and ideal of group leaders influence group members in understanding the value of plant diversity, transformation of vegetables and fruits and connection between human and ecological system.

1.2.8) Group members have a chance in learning about complete circle management in production, sales and transformation.

1.2.9) The paper about Natural agriculture and making of Indigenous Microorganism Fertilizer was published and sales for members and interested people.

1.2.10) Fewer time is needed to cultivate vegetable, then this reduce risk and generate quicker income for group members, diversity of vegetables also enabling higher turnover rate of various vegetables.

2) Constraining factors

2.1) Organization network development aspects.

2.1.1) The transportation routes among villages are rugged, then it makes difficult for distribution, higher fuel cost and upset people in other communities traveling to the group.

2.1.2) Some organic plant production is not reached the standard, this could leads to revenue in long term.

2.1.3) There is insufficient number of staffs compares to workload effected from expansion of network. This required effort from members to assist in network operation.

2.1.4) There is no quality control department for inspecting and analyzing the transformed products. Then, there should be at least nutrients value label, place of origin and expiry date attached beside product package.

2.1.5) There is insufficient number of distribution channels and markets, thus the production and marketing has to be harmony cooperated.

2.1.6) There are few number of members compare to popultion in the community, some members still not participate in full circle activities.

2.1.7) Government agencies exerted some control over group operation, contrary to group members that need to managing group themselves.

2.2) Learning process of network for plant diversity conservation aspect.

2.2.1) Transportation routes among some villages also rugged, then it impedes other villagers in traveling to learn about plant diversity conservation.

2.2.2) There are few number of educators in vegetables and fruits transformation and making of Indigenous Microorganism Fertilizer, then group should educate members to become educators.

2.2.3) Communication and exchange of knowledge is done personally, then some information may be loss between connection. Thus, the publishing of documents should be done monthly or quarterly.

2.2.4) Group was newly established, then tangible restoration of traditional herbs and perennial tree is obscured because most of members were inclined to cultivate economic vegetable more than tradition herbs and perennial trees.

2.2.5) Group members requested group to conduct thinking system development in addition from physical and managerial support.

4.1.3.4. Data analyzed from pattern of plant diversity conservation.

1) Conservation and restoration pattern of plant diversity in Inpang Network could be illustrated as follows:

1.1) Plants are diversified cultivated such as vegetables needed by market, temperate vegetables and vegetable for self consumption purpose, in addition with livestock farming. Perennial trees, bamboos and traditional plants are cultivated at border of the plot, all of these contributed to plant diversity conservation by Agro-Forestry agriculture and integrated agricultural cultivation.

1.2) Appropriate technology is applied in cultivating organic vegetable and fruits, in environment conservation and restoration soil by using natural microorganism. It also mutually integrated with local wisdom derived in various cultivation techniques such as schedule control sprinkle, water dipping system and seeds coated before cultivation.

1.3) The primary concern is laid on vegetable diversity, follow by fruits, perennial trees and herbs. Group will survey the market demand and distribution channels before identifying members to cultivate certain vegetables.

1.4) Fund and marketing management in diversification plantation and plants transformation for example wines, organic fertilizer and Indigenous Microorganism Fertilizer.

1.5) Most of economic vegetable seeds in form of canned seeds were acquired by cooperative from various companies except some vegetable seeds such as peppermint, lemongrass and banana are collected from around forest. Some members cultivate traditional plants, then bud grafting and top grafting supported by skillful neighbors and Agricultural Promotion officers.

1.6) Analysis of plant species richness in members' plots calculated by producible perennial trees and crops and not including climbers according to Menhinick index founded that species richness (R_2) of plant in network members' plots is higher than plots of non network members particularly value of plant species richness of Menhinick index in Mr. Intr Moonpimai's plot has species richness value of $R_2 = 1.557$ with 23 types of 218 trees, Mr. Plian Lomsoongneon's plot has species richness value of $R_2 = 0.735$ with 10 types of 185 trees, Mrs. Rangsan Noradee's has species richness of $R_2 = 1.432$ with 18 types of 158 trees and Mr. Liang Punsamrong's plot has species richness of $R_2 = 0.973$ with 12 types of 152 trees. The above information indicated that network members could cultivate plants more diversity than non network members.

1.7) Diversification plantation enhances income of network members and alleviates certain level of economic problems. Network members also have better physical and mental condition because they consume organic vegetables, experience and knowledge exchange among members and collaboration for better cultivation method.

2) Pattern and method of usage of plant diversity in Wangnumkheaw Organic Farming Promotion Group Network are as follows:

2.1) Diversify organic agricultural production is demanded by market and is the source of income for network members.

2.2) Members also consume organic agricultural production daily, which is better for their health.

2.3) Use plants and vegetables refuse with garbage in making Indigenous Microorganism Fertilizer, organic fertilizer and biological fermented water which all of these can be use instead of chemical fertilizer and helping in environmental restoration, sustainable ecological system and safety for health.

2.4) Use of diversification plantation as a pilot activity to achieve completed circle development consists of production, sales, transformation, marketing management, cooperative and banking. These assist in learning of network members, group development, and organization development from group to network, from network to learning center which in turn contribute to safety society through natural agriculture.

4.2 Analyzed Results of Behavior of Network Learning for Plant Diversity Conservation.

Analyzed results of behavior of network learning for plant diversity conservation, 3 networks members were Inpang Center, Thepnimit Ecological Agriculture Club, and Wungnumkheaw Organic Farming Promoting Group. The analyzed learning results of three aspects as knowledge, awareness, and practice for plant diversity conservation were as follows:

4.2.1 Individual Status of Network Member.

4.2.1.1 Inpang Center.

The network member respondents were 65.0 % male and 35.0 % female; average the age group of 41-60 years old, were mostly (40.0%), upper 60 years old were the least (10.0%), and the age group of 0-20, and 21-40 years were equal. Most of them married 70.0%, and the least were divorce (3.3%), the rest were single. Most of them, education level were elementary level (71.7%), and the least were bachelor degree (1.7%), the rest were secondary school. The majority of network members' occupation were agriculturists (85.0%), the least were workers and merchants. Most of them had membership length more than 1-3 years (40.0%), and more than 5-7 years were the least (11.7%). For the number of learning according to the network management process, most of them participated not more than 3 times were 41.7%, and the least were 7-9 times (11.7%), the least were 4-6 times, and more than 10 times were orderly, (30.0%, and 16.7%). The training topics were fruit plant breeding, ecological agriculture, sustainable agriculture, integrated agriculture, economic sufficiency, leadership, breeding local plant strains and traditional vegetable strains, saving, pig feeding, traditional cattle strains feeding, plant conservation, herbs planting, traditional massage and healer, woven, soil structure, E.M. microorganism, and market leader.

For educational excursion, there would emphasize on members to visit internal and external community. The source of external educational excursion site

were in northeastern region, and others such as Pangpaoisraklang Orchard, Bansrakun, Amphur Lumpaimas, Burirum Province; Phor Prayoon Orchard, Bansuannod, Patulung Province; the third collected Agriculture Center, Amphur Pupan, Sakolnakorn Province, the Agricultural Research and Training Rajamangala Institute, Sakolnakorn Province; and Uraiwan Voravicheanwong Orchard, Amphur Maung, Nakornpanom Province; especially the member were appreciated Uraiwan Voravicheanwong Orchard, because there was an attempt to overcome the nature through planting on the laterite soil, moreover there was high production. At Ajarn Preecha Srisamsan, Amphur Varinchamrab, Sakolnakorn Province that it first orchard enlightened the members on hemp cultivation.

For internal visiting, most of members had visited Mr. Nao Buakaew, Banhuachang, Amphur Pupan, Sakolnakorn Province; Punya Cater, Bansrangkhae, Amphur Lammaung, Kalasin Province; Mr. Khean Kaewmukda Orchard, Bankudhad; Phor Lek Kudvongkaew, Banbua; and Mr. Polawat Todasa Orchard, Bannamong, Amphur Kudbak, Sakolnakorn Province for instance.

4.2.1.2 Thepnimit Ecological Agriculture Network

It was found that the network member respondents were 70.0 % male and 30.0 % female; average the age group of 41-60 years old, were mostly (40.0%), upper 60 years old were the least (10.0%), and the age group of 0-20, and 21-40 years were equal (25%). Most of them, education level were elementary level (75.0%), the rest were secondary school (25%). The majority of network members' occupation were agriculturists (80.0%), the rest were students, having supplementary occupation were workers and others such as mushroom cultivation, herb planting, merchant. Most of them had membership length 5 years (35.0%), and the rest had 7 membership length year, 1-3 years, and 4 years were equally. For the number of learning according to the network management process, most of them participated 10 times were 40.0 %, and the rest were 12 times and 1 time was equally. The training topics were plant breeding, ecological agriculture, sustainable agriculture, integrated agriculture, mushroom cultivation, natural fertilizer preparation, integrated farm, health care, traditional massage, herbs planting, traditional vegetable strains, market management, fish farm, domestic feeding, saving, and E.M. microorganism.

For internal, and external visiting, the external visiting sites were Phor Suk Chaichana, Orchard, Roi-ed Province, natural Mill, Amphur Kudchum, Yasothorn Province; Puyai Viboon Khemchalerm Orchard, Chachaengchao Province; Phor Prakong Montkratoke Orchard, Patulung Province; Samorn Kirivong Orchard, Nakornsrihammarach Province for instance. The network member orchards were Mr. Naen Yokjaturat Orchard, Mr. Peng Plodkratoke Orchard, Bannumlad, Mr. Saeng Namta Orchard, Mr. Chit Thato, Ban Na-yang-klug, Amphur Thepsatit, and Chaiyapum Province for example.

4.2.1.3 Wungnumkheaw Organic Farming Promoting Group

It illustrated that network member respondents were 65.0 % male and 35.0 % female; average the age group of 41-60 years old, were mostly (40.0%), lower 20 years old were the least (25.0%), and the rest were at age group 21-40 years. Most of them married 75.0%, the rest were single. Most of them, education level were elementary level (70.0%), and the rest were secondary school, and bachelor degree orderly (10.0%, and 5.0%). The majority of network members' occupation were agriculturists (90.0%), the rest were workers. and supplementary occupation were pet farm such as poultry feeding, dress maker, mechanic moulders, and constructors for instance. Most of them had membership length 1 years (40.0%), the rest were 2 year, but not 1 year yet, were equally (30.0%). For the number of learning according to the network management process, most of them participated 2 times were 50.0 %, and the rest were 10 times, 5 times, 4 times, 3 times, and 1 time equally, (10.0%). The training topics were organic agriculture, product transformation, food preservation, natural fertilizer preparation, organic insecticide, natural technology, leader potential development, integrated farming, ecosystem knowledge, installation of water system, plant growing, such as fertilizer utilization, soil preparation.

For educational excursion, the member had ever visited only one site that was Royal Development Study Center, Khao-hin-sonn, Chachaengchao Province; but The network member orchards were Learning Center at Mr. Amnard Maiyodklang house, Bannamsub: Mr. Ducharin Tradklang, Banklongthai; Mr. In Mulpimai, Banbusai; Mr. Krai Chomnoi, Banthaisamukkey for instance.

4.2.2 Knowledge, Awareness, and Practice for Plant Diversity Conservation

4.2.2.1 Knowledge for Plant Diversity Conservation

It was found that knowledge of members about half (58.3%) were at the highest level, the second were at moderate level (8.3%), and the least were at low level (1.7%). It showed in table 7.

Table 7 Number and Percentage of Network Members' knowledge for Plant Diversity Conservation

Group of Score	Number	Percentage
1. Highest Knowledge	35	58.3
2. High Knowledge	9	13.3
3. Moderate Knowledge	11	18.3
4. Low Knowledge	5	8.3
5. Lowest Knowledge	1	1.7

When considering on knowledge for plant diversity conservation of network member for each question, it was found that they had knowledge about the contents of patterns and method of plant diversity conservation, because was obviously seen from 20 questions that the members answered correctly 11 questions, more than 80.0%, there were item 1,2,6,8,10,12,13,14,15,16, and 20. They answered correctly at moderate level (between 70-79%) were 3 items 5,11, and 18; for other items, they answered correctly at low level (between 60-69%), as showed in table 8.

Table 8 Number and Percentage of Network Members' knowledge for Plant Diversity Conservation Classified as Each Question.

Statement	Corrected Answer		Wrong Answer	
	No.	%	No.	%
1. The most effective method to solve the problem when the community faced with poverty, dryness, and product price decrement.	51	85.0	9	15.0
2. Effect toward environment occurred after monoculture.	50	83.3	10	16.7
3. Which answer provided the highest benefit when cultivated divers plants?	37	61.7	23	38.3
4. Which answer provides the least benefit when cultivated divers strains of the same plant?	41	68.3	19	31.7
5. What attributes of plant strains should be kept for cultivation?	44	73.3	16	26.7
6. The Local plants should be preserved or not, why?	56	93.3	4	6.7
7. What is the best method to conserve the plant diversity, and what should be done?	40	66.7	20	33.3
8. To breed the plant strains provided sustainable ecosystem, and what should be done?	52	86.7	8	13.3
9. Which answer is not the important of plant toward environment?	41	68.8	19	31.7
10. What type of pattern that should be used for plant diversity conservation?	51	85.0	9	15.0
15. What is the method should be used for breeding strong and resistant plants ?	42	70.0	18	30.0
12. What is the method that destroys plants in forest least?	56	93.0	4	6.7
13. What is the method used to consume the forest plants for sustainability?	51	85.0	9	15.0
14. What is the method that destroys plants in forest least?	51	85.0	9	15.0
15. Who is the best to transfer knowledge for plant train selection at the local?	50	83.3	10	16.7
16. How is the plant seeds be used for sustainability and community is able to have self-dependency?	53	88.3	7	11.7
17. What pattern is used to transform food and other, but it destroys the plant diversity and community state?	40	66.7	20	33.3
18. Which answer is the meaning of plant usefulness and conservation for sustainability?	44	73.3	16	26.7
19. What is the most important usefulness of plant product transformation and other plant products?	37	61.7	23	38.3
20. What kind of plant is no need to be protected, conserved, and restored hurry?	48	80.8	12	20.0

4.2.2.2 Awareness for Plant Diversity Conservation

It was found that the holistic view of network about awareness for plant diversity conservation, most of them were at the highest level (81.7%), the rest were at high level (18.3%). It showed in table 9.

Table 9 Number and Percentage of Network Member had Awareness for Plant Diversity Conservation.

Group of Score	Number	Percentage
1. Most awareness	49	81.7
2. More awareness	11	18.3
3. Moderate awareness	-	-
4. Less awareness	-	-
5. Least awareness	-	-

When considering on awareness for plant diversity conservation of network member for each question, it was found that they had awareness at moderate level, 1 item, which was question number; they had awareness at high level, 2 item, which were question number5, and 8; they had awareness at highest level, 7 item. It showed in table 10.

Table 10 Awareness of Network Member for Plant Diversity Conservation
Classified as Each Question.

Statement	\bar{x}	S.D.	Awareness Level
1. Humans have food, drug, and various forms of utilized wares because of plant diversity conservation.	4.77	0.46	Most
2. Teak orchard, eucalyptus orchard, and mango orchard provide the benefit for environmental quality among soil, water, and air to be liked as natural setting.	3.18	1.18	Moderate
3. Planting in orchard or house garden facilitate people to harvest products all the year, and utilize plant in multifacet.	4.47	0.48	Most
4. To consume more diverse plants are worth than less diverse plants because they have attributes as drug.	4.47	0.60	Most
5. To learn for breeding and to utilize plant are no need to learn from anyone, because they are able to learn by themselves.	3.57	1.05	More
6. Providing learning about plant strain values, breeding methods, and plant usefulness will facilitate to ascend for next generations.	4.63	0.52	Most
7. It is essential that people in the community have to cooperate in conservation of local endanger plants.	4.63	0.55	Most
8. To teach youths and adults in the community to realize the values and usefulness of plant, the teachers should be academics and connoisseurs from city more than the traditional scholar in the community.	3.67	1.10	More
9. If they want to have soil, water, forest, animal flourish as the past, it will need preserve the forest to fertile, and cultivate the diverse plants in orchards with all stories.	4.70	0.46	Most
10. To exchange multifacet of learning and experiences among communities, networks, and external organization supporting that facilitate the learning implementation management to achieve efficiency	4.45	0.62	Most
Total	4.27	0.32	Most

4.2.2.3 Practice for Plant Diversity Conservation

Practice for plant diversity conservation, it was found that more than half of network members (61.7%) practiced at the most level; the succeeding practiced at the more level (26.7%), the rest practiced at moderate level (6.37%)' and practiced at less level (3.3%), and practiced at the least level (1.7%). Orderly, it presented in table 11.

Table 11 Number and Percentage of Network Member had Practice for Plant Diversity Conservation

Group of Score	Number	Percentage
1. Most practice	37	61.7
2. More practice	16	26.7
3. Moderate practice	4	6.7
4. Less practice	2	3.3
5. Least practice	1	1.7

Considering on practice for plant diversity conservation of network member for each question, it was found that they practiced more than 80% were 12 items, it were 1,2,4,5,6,8,10,12,16,17,19, and 20 at the most practice; bout they practiced at more level were (70-79%), 4 items, 7,11,13, and 18; the subsequence practiced at moderate level (60-69%) were items, 3, 9,and 14; and less practice (lowest than 60%), was 1 item, item 15; it showed in table 14. The most 2 items that were answered by members (98.3%) were items 9, and 20. The contents of 2 items were they used plants for food and drug in daily life; and you had used your learnt and conserved productions in order to have better health in table 12.

Table 12 Number and Percentage of Network Member had Practice for Plant Diversity Conservation Classified as Each Question.

Statement	Practice		Not Practice	
	No.	%	No.	%
1. There was entering learning with network for conservation and utilization on plant diversity.	58	96.7	2	3.3
2. There was transferring, exchanging knowledge and experience with people in community and other networks.	57	85.0	9	15.0
3. They participated, chose, and made decision in curricular management, process, learning method, media, and instruments for learning management of organization and network	39	65.0	21	35.0
4. There was participation in conservation and restoration of community forest nearby your community.	55	91.7	5	8.3
5. Planting was regarded on natural principle through diverse plant conservation in the same plot.	54	90.0	6	10.0
6. There was knowledge brought from network organization to practice.	58	96.7	2	3.3
7. There were selecting the breeding strains from the farm production to be used for next year.	42	70.0	18	30.0
8 There were breeding as seeding, cutting, grafting, bud grafting, and approach grafting for planting by themselves.	49	81.7	11	18.3
9. They had brought the endanger plant species to cultivate.	38	63.3	22	36.7
10. They used plants for food and drug in daily life.	59	98.3	1	1.7
11. They used plants for house ware.	42	70.0	18	30.0
12. After you had planted diverse species, soil in your agricultural area would be more fertile.	56	93.3	4	6.7
13. There were selling and distributing plant strains to neighbors and friends.	45	75.0	15	25.0
14. You transformed your products for value added and preservation.	38	63.3	22	36.7
15. There were plants products transformation for sale	28	46.7	32	53.3
16. There was use organic fertilizer for planting.	48	80.0	12	20.0
17. There were using rinds leaves to prepare organic fertilizer and cover the ground to flourish the soil.	52	86.7	8	13.3
18. The cultivated plants were not used chemical expediters and insecticides.	47	78.3	13	21.7
19. They participated in meeting, exchanging, learning, and activities of organization or group.	50	83.3	10	16.7
20. You had used your learnt and conserved productions in order to have better health.	59	98.3	1	1.7

4.2.2.4 A Comparison among Knowledge, Awareness, and Practice on Plant Diversity Conservation

There were classified in accordant with sex, age, marital status, educational level, occupation, membership length, number of times to participate learning management process of network, there were results as follows:

1) The network members between male and female had different awareness with statistically at 0.05; but knowledge and practice aspect were not different awareness with statistically significant at 0.05. It showed in table 13.

Table 13 A Comparison the Learning Results All Three Knowledge, Awareness, and Practice on Plant Diversity Conservation were Classified in Accordant with Sex.

Results of Learning After to be Network Member	Full Score	Male		Female		t
		\bar{x}	S.D.	\bar{x}	S.D.	
1. Knowledge Aspect	20	16.00	2.87	14.80	2.76	1.55
2. Awareness Aspect	50	43.41	2.97	41.47	3.51	2.25 *
3. Practice Aspect	20	16.15	2.60	16.09	2.30	0.086

*Statistically Significant at 0.05

2) The network members had different age, marital status, occupation, and educational level, on knowledge, awareness, and practice on plant conservation, they were not different at statistically significant at 0.05.

3) The network members had different membership length, they would have different practice on plant conservation at statistically significant at 0.01level. It showed in table 14.

Table 14 Analysis of Variance of learning on Plant Diversity Conservation of three Aspects Scores were Classified as Membership Length.

Sources of Variance	df	SS	MS	F
Knowledge Aspect				
Between Group	4	71.970	17.992	2.387
Within Group	55	414.614	9.538	
Total	59	786.583		
Awareness Aspect				
Between Group	4	90.289	22.572	2.276
Within Group	55	545.445	9.917	
Total	59	635.733		
Practice Aspect				
Between Group	4	86.576	21.644	4.276 **
Within Group	55	280.357	5.097	
Total	59	366.933		

**Statistically Significant at 0.01

When test the difference between mean scores of each pair in accordance with Scheffe/ statistic test, it was found that the different membership length cause the different practice on plant different conservation with statistically significant at 0.05 level. The results illustrated that the member who had membership length longer than 3-5 years, and longer than 7 years, would practice more than one who had membership length longer than 1 year as it presented in table 15.

Table 15 Comparison of Practice Mean Scores of Each Pairs on Plant Diversity Conservation Classified as Membership length

Membership	Length (year)	0-1	>1-3	>3-5	5-7	>7
Practice Aspect	\bar{X}	14.00	16.25	17.25	17.14	17.25
0-1 years	14.00	-		*		*
More than 1-3	16.25		-			
More than 3-5	17.25			-		
More than 5-7	17.14				-	
More than 7	17.25					-

*Statistically Significant at 0.05

4) Network member had different time of participation of learning management process on plant diversity conservation were different among knowledge, awareness, and practice statistically significant at 0.01, 0.05, and 0.01 orderly, as showed in table 16.

Table 16 Analysis of Variance of Learning on Plant Diversity Conservation

Scores all three Aspects Classified as Number of Participation of Learning Management Process.

Sources of Variance	df	SS	MS	F
Knowledge Aspect				
Between Group	3	66.451	22.150	2.952**
Within Group	56	420.132	7.502	
Total	59	486.583		
Awareness Aspect				
Between Group	4	102.619	34.206	3.593**
Within Group	55	545.445	9.520	
Total	59	635.733		
Practice Aspect				
Between Group	3	53.981	17.994	3.220*
Within Group	56	321.952	5.588	
Total	59	366.933		

* Statistically Significant at 0.05

** Statistically Significant at 0.01

When test the difference between mean scores of each pair in accordance with Scheffe' statistic test, it was found the members participated 7-9 times, and 0-3 times, there were different knowledge, and awareness on plant different conservation statistically significant at 0.05 level. The results illustrated that the member who participated 7-9 times, would have knowledge, and awareness more than one who participated 0-3 times, also found that the members participated 10 times, and 0-3 times, there were different knowledge, and awareness on plant different conservation statistically significant at 0.05 level, that meant member who

participated 10 times, would have knowledge, and awareness more than one who participated 0-3 times, presented in table 17.

Table 17 A Comparison of Practice Mean Scores of Each Pairs on Plant Diversity Conservation Classified as times of Learning Participation.

Number of Time of Learning		0-3 Time	4-6 Time	7-9 Time	>10Time
Knowledge Aspect	\bar{X}	14.48	15.88	17.5 7	16.40
0-3	14.48			*	
4-6	15.88				
7-9	17.57				
>10	16.40				
Awareness Aspect	\bar{X}	41.60	42.50	45.42	44.10
0-3	41.60			*	
4-6	42.50				
7-9	45.42				
>10	44.10				
Practice Aspect	\bar{X}	15.16	16.38	16.57	17.80
0-3	15.16				*
4-6	16.38				
7-9	16.57				
>10	17.80				

* Statistically Significant at 0.05

5) Member of different networks practiced plant conservation statistically significant at 0.05 level, but for knowledge and awareness were not different statistically significant at 0.05 level, as presented in table 18.

Table 18 Analysis of Variance of Learning on Plant Diversity Conservation
Scores all three Aspects Classified as Network.

Sources of Variance	df	SS	MS	F
Knowledge Aspect				
Between Group	2	46.233	23.117	2.235
Within Group	57	589.500	10.342	
Total	59	635.733		
Awareness Aspect				
Between Group	2	29.033	14.517	2.449
Within Group	57	337.900	5.928	
Total	59	366.933		
Practice Aspect				
Between Group	2	67.233	33.617	4.569*
Within Group	57	419.350	7.357	
Total	59	486.583		

* Statistically Significant at 0.05

When test the difference of each pairs in accordant with Schaffe/ test, it was found that members of Inpang Center network and members of Wung-num-kheaw Organic Farming Promoting Group practiced for plant diversity conservation statistically significant 0.05 level, it illustrated that Inpang Center member practiced more than Wung-num-kheaw Organic Farming Promoting Group as presented in table 19.

Table 19 A Comparison of Practice Mean Scores of Each Pairs on Plant Diversity Conservation Classified as Network.

Network		Inpang	Thepnimit	Wangnumkheaw
	\bar{X}	16.5	16.5	14.10
Inpang	16.50	-	0.35	2.40*
Thepnimit	16.15		-	2.05
Wangnumkheaw	14.10			-

* Statistically Significant at 0.05

6) Correlation analysis of between knowledge and awareness; awareness and practice; practice and knowledge, after they had participated network learning process, it was found that there were positive correlation all three pairs. The results indicated that knowledge and awareness had correlation coefficient highest ($r=0.540$); subsequence, awareness and practice, and practice and knowledge ($r=0.216, 0.195$); orderly, it was found that knowledge and awareness correlated statistically significant 0.01. The rests did not have correlation statistically significant in table 20

Table 20 Correlation Coefficient between Knowledge, Awareness, and Practice on Plant Diversity Conservation.

Results of Learn Process Participation	Knowledge	Awareness	Practice
Knowledge	-	0.540**	0.216
Awareness	-	-	0.195
Practice	-	-	-

**Statistically Significant at 0.01

4.3 Analyzed Results, Evaluation of Proposal Model of Learning Network Development for plant diversity Conservation.

4.3.1 Analyzed Results

After analysis of case study, It was synthesized to be proposal model of learning network development for plant diversity conservation, the 9 connoisseurs examined the appropriateness and congruence of contents. The analyzed results of appropriateness, it was found that the various components had the appropriateness scores between 3.67-4.45, there was no item have the mean scores(\bar{X}), lower than 3.5; and the standard deviation not more than 1 were 17 items, and more than 1 was 1 item, which was objectives of model, it was improved by the connoisseurs' recommendation through merging some objectives. The results showed as table 21.

Table 21 Appropriateness Scores of Model of Learning Network Development
for plant diversity Conservation.

Evaluation Items	Appropriate Score		Appropriate Level
	\bar{X}	<i>S.D.</i>	
1. Problems and needs to have model	4.45	0.73	Suitable
2. Principle of model	4.00	0.50	Suitable
3. Goals of model	3.67	0.87	Suitable
4. Objectives of model	4.11	1.05	Improvement
5. Development of network	4.00	0.50	Suitable
6. Components of network	3.89	0.78	Suitable
7. Management structure of network	4.11	0.78	Suitable
8. Rules and regulations of network	4.22	0.67	Suitable
9. Objectives and Goals of network	3.89	0.78	Suitable
10. Body of knowledge and learning activity.	4.11	0.60	Suitable
11. Components of learning of plant diversity conservation.	4.11	0.78	Suitable
12. Phases of learning method for plant diversity conservation, evaluation, and monitoring.	4.00	0.71	Suitable
13. Constructed and restored patterns of for plant diversity conservation.	4.11	0.78	Suitable
14. Usefulness pattern for or for plant diversity.	4.00	0.86	Suitable
15. Involved factors of plant diversity conservation.	3.89	0.92	Suitable
15.1 Natural resources factors			
15.2 Human factor	4.11	0.78	Suitable
15.3 Structural factor	4.00	0.71	Suitable
15.4 External supporting factors	3.89	0.33	Suitable

For the results of considering the congruence of components in model of learning network development for plant diversity conservation , it was found that Index of Congruence (IOC), was between 0.67-1.00.

Table 22 Congruent Index of Component of Learning Knowledge Model.

Evaluation Items	Congruent Index	Evaluation Results
1. Problems and needs to have network development and principles.	0.89	Congruence
2. Problems and needs to have network development and goals.	0.78	Congruence
3. Problems and needs to have network development and objectives.	0.78	Congruence
4. Principles with goals.	0.67	Congruence
5. Principles with objectives.	0.67	Congruence
6. Goals with objectives.	0.89	Congruence
7. Objectives with development.	0.67	Congruence
8. Development with complementary.	0.89	Congruence
9. Complementary with management structures.	0.89	Congruence
10. Management structures with rules and regulations.	0.78	Congruence
11. Rules, regulations with objectives, goals.	0.78	Congruence
12. Objectives, goals with body of knowledge, learning activity.	1.00	Congruence
13. Body of knowledge, learning, with complementary for plant diversity conservation.	0.89	Congruence
14. Body of knowledge, learning, and complementary for plant diversity conservation, with phases of learning method, evaluation, and monitoring.	0.78	Congruence
15. Phases of learning method , evaluation, and monitoring with constructed and restored patterns of for plant diversity conservation.	0.78	Congruence
16. Constructed and restored patterns of for plant diversity conservation with usefulness pattern f or for plant diversity.	1.00	Congruence
17. Usefulness pattern f or for plant diversity with natural resources factors	0.89	Congruence
18. Natural resources factors with human factor.	0.89	Congruence
19. Human factor with structural factor.	0.78	Congruence
20. Structural factor with External supporting factors.	0.78	Congruence

4.3.2 Additional Recommendations of Connoisseurs.

- 1) It should be emphasized on environmental factors. For plant conservation.
- 2) It should be emphasized on changing of social and economic of members when they begin to enter as a network member at present.
- 3) It should be studied on each strain of plant in order to understand natural environment, and to utilize.
- 4) There are connecting the network the network with governmental policy and involved organization.
- 5) It should be proposal connecting of network as system, process, and implementation obviously.
- 6) Some objectives are able to merge together.
- 7) Increasing the importance of network organization management.
- 8) It should be emphasized on components of learning gathering systemically.
- 9) It should be emphasized on social, economic, and environment; connecting to economic and social development plan; and national education plan.
- 10) It should be added the reliable data in the topic of problem and need.
- 11) It should be emphasized on changing the way of thinking from monoculture to agricultures that create biodiversity.
- 12) It should be emphasized on educational institute and local administrative organization to supporting the network implementation.
- 13) It should be brought discovering from education to create model furthermore.

CHAPTER V

DISCUSSIONS

This chapter is the discussion of information and presentation of learning network development model for plant diversity conservation.

5.1 Discussions

5.1.1 It is essential and imperative to develop learning network for plant diversity conservation because it will leads to biodiversity conservation and other developments. Learning network was considered as strategy and development technology, which can be used to create relationship among individual, group and network. Network organization is also acted as cooperation center, which collaborates with both government departments and non-government departments. Members are learning about plant diversity cultivation through combination of local wisdom and new knowledge. Learning of plant diversity conservation leads to the following positive impacts including ecological system equilibrium, social development, economic development, quality of living, and improving of environmental quality.

As results from studying of Inpang Center Network, Thep-ni-mit Ecological Agriculture Club, and Wangnumkheaw Organic Farming Promotion Group Network, all of these networks are the collection of people who have insolvency problems caused from monoculture cultivation. Thereafter, they decided to cultivate plants, vegetables and fruits in which enhancing their quality of life. There are also contribution of ideas, efforts and knowledge, which all of these could be called “social synergy”, from members to restoring plant diversity in agricultural area through organic and natural system. This also enable forest to restoring itself (succession), therefore, learning network for plant diversity conservation is a navigation system to accomplish biodiversity conservation.

The results studied were congruence to the concept of Prawase Wasi (1993b:29), about learning network as it is the collection of ad hoc group that aiming

to solve the contingency problems, has interrelationship, and mutually managing in various stuff such as environmental management and forest resources and genetic management regardless of career, cultural or environmental network. It was the same as defining in the opening ceremony of the national meeting on learning network for community sustainable development (30rd March 1995). The learning network was the new dimension of education that was the collaborated learning exchange among people in the community. It was congruent the opinion of Anek Nakboot (1993:9) that network community organization manage the natural resources by community last few years such as the network of water basin for natural management through the linking with soil, water, and forest management in order to increase the efficiency in the same basin.

5.1.2 The implementation of learning network would be discussed in 3 sections. Those are network establishing, network development, and the compositions of network establishing

1) Network establishment, from the study it was found that the network could be established in 2 patterns.

Pattern I : Network Establishing, the finding illustrate that leaning network was established by the stimulating of academics from external community that they entered to do research and development through action research about community way of life in order to search about problems, needs, and better choice for better life, Therefore the people in community revising themselves, and search the answers and their potential together, simultaneously, searching traditional body of knowledge, learning process, education excursion the successful examples in order to be the complementary factor for choice discussion. Then, creation the group for learning, and holding activities, afterward connecting to be networks. There are establishment of network organization having group delegation to be the network committees. To collaboration of thinking and planning together, but separating to practice in their own field. The developers from private development organization who will stand by in the community to cooperate and creating the collaboration of both government sector and private sector. Most of the leaders were the network leaders who have good capability, and social person. (Natural leading is social excepted person who had learnt from

direct experience). Some leader was teachers, and members of Tambol administration, members had participation to be network member and the important function of leader construction all ages and a large amulet that will support the stability of network, and continuously implementation.

Network which implemented in accordance with pattern I was Inpang Center Network; Thep-ni-mit Ecological Agriculture Network, both networks was established from the research of Sakolnakorn Teacher College and Nakornrachshima Teacher College (present, Rajabhat Institute) orderly by the supporting of Village foundation. Therefore, after the research work had been finished, they was supported to be the developer of village in order to be the cooperator to collaborate in network development until the network had established. There was network organization management, holding learning for network members, including crating the various leaders; for example Inpang Network, there was prominent leader like as Lek Kudwongkeaw, and other leaders. It was obviously seen that the natural leaders contained capability to lead but they lack of opportunity to express their ability because there are no stage for them to present, so whenever they had chances to exchange their knowledge and experiences with external sectors. They can be a indigenous scholars, which values to community. For Thep-ni-mit Ecological Agriculture Network, the prominent leader was Ajarn Suthud Sirisalung was got award "Kondeesrisungkom Award" as well as Lek Kudwongkeaw. There were exchanging the network from groups members in the villages until become network at Amphur level, and Provincial level latterly.

Pattern II : learning network was occurred by the stimulation of natural leaders who had foreseen and far seen sight; who intended to create jobs for society, in addition having excellent relationship with external sectors. The work was started making public selection through radio, meeting with neighbors, and in the various festivals, including meeting with others village leader through the meeting held by government. So they had persuaded each other to hold meeting to revise their problems about their earning and search for alternatives to solve the problems through the group collaboration to do activities together, and to learn together, when there were a large number of member enough to hold seminar with the cooperation of government at Amphur Level, with the agreement and supporting of sheriffs to

establish the network in order to solve the problem of poverty, social problem, and environmental problem as integrating holistic view. The Amphur network level established, and composed of members from the different villages. There was organization to administrate network by the deglitches from community to be committee for cooperation both inside and outside network, in addition with the external consultants from all sectors such as politicians, cadencies person, and specialist.

The network which operating in accordance with the pattern II was Wung-num-kheaw Organic Farming Promoting Group. The initiator was Mr. Amnarj Maiyodhlang and his family who were the Buddhism practitioner from Santiasoka, had settlement in the community previously, and developed the network until stability, fiddly it had become the project under their muzziest initiative project. It was manned as “Organic Farming Promoting farm by his Majesty Initiative Project”. The learning center located on 110 rais, and this area learning belonged to Wat Bansubnum 70 rais, and 40 rais belonged to Mr. Amnaj Maiyodklang, the project implanted to support the group networks Wang-nun-kheaw Organic Farming Promoting Group. The findings illustrated that it was concurrent with Kriangsak Chareanwongsak (2000:53) referred to the roles of learning network as the place for harmonization of knowledge, data, information, and resource supplied, in addition the harmonized practice connecting each other in order to exchange, transfer propagate knowledge incessantly, by emphasizing on human resources development to think, analyze, solve the problem, simultaneously developing community in concert, complementary of increasing level capability of community. But the most important was people to realize to the importance of learning, then holding the people organization, managing learning network through network as mentioned Prawase Wasi (1993b:29), Senge (1990:2), and Pedler et al (1991:1-2) that learning network have to establish through the main organization which acts as cooperating, transfer facilitating, and concept transform, including stimulating members to learn by themselves.

2) Learning network development in the area, it meant the enhancing, and operating to sustain network. It was found that network development have the in important identical attribute was then network established, there were increasing of learning group in community beginning from one activity in community to various

activities and expanding to others with the network connecting among the same activity group and between different activity groups both inside and outside community in order to exchange the knowledge and experiences constantly, through the monthly meeting, training, and education excursion.

In the part of maintaining the network, there were the important cooperating factors as the good example of leader in practicing for members, including construction the rules and regulations with transparent and justice, moreover regularly holding learning program, meeting for ideas and experiences exchange, and monitoring monthly. Distributing on change and benefit to member were included. In addition they had to participate in saving fund without exceptions, and to transfer their knowledge to new generation (descendants). Besides, the external supporting on exchanging of knowledge and experiences in order to link among individuals, groups, networks, communities, and organizations both internal and external sectors. It was the horizontal network relationship, and integrated with the traditional wisdoms and modern knowledge in order to bring knowledge for creating the better health and life. Participating in activity is a part of learning collectively through the subjective practice, simultaneously outcome of learning network development caused the invention of new activities to response their needs and demands.

However, considering on the different parts of this study, it was found that learning network development had 3 pattern as follows:

Pattern I : learning network developed at province level developed from group in the community to join to be community network, and numerous communities networks gathering to be network at Amphur level, and various Amphur networks cooperating to be Province network. The network center was the site for learning as well. Therefore when the learning activity of network was tangible in the economic, social, and environmental aspects, it was acceptable generally both society and involved sectors; finally it become a prototype for policy level further.

Network which developed in pattern I was Inpang Center Network, that developed from group of rattan cultivation, starting with 13 members, and at present it because 3 province networks around Pupan Range. There were 12 Amphurs, 20 Tambons, and 86 villages. The central network was Inpang Center with 2 sub centers, those were learning Center which took 12 years for developing and have been the

network for 8 years. There were incessant expanding work with the cooperating and facilitating of various organizations both government and private sectors. The important pattern concerned on ecological agriculture network which was the pilot project to increase the potential in sustainable agricultural development (2542-2544 BE.).There was the relationship structure within the network as present to in figure 19.

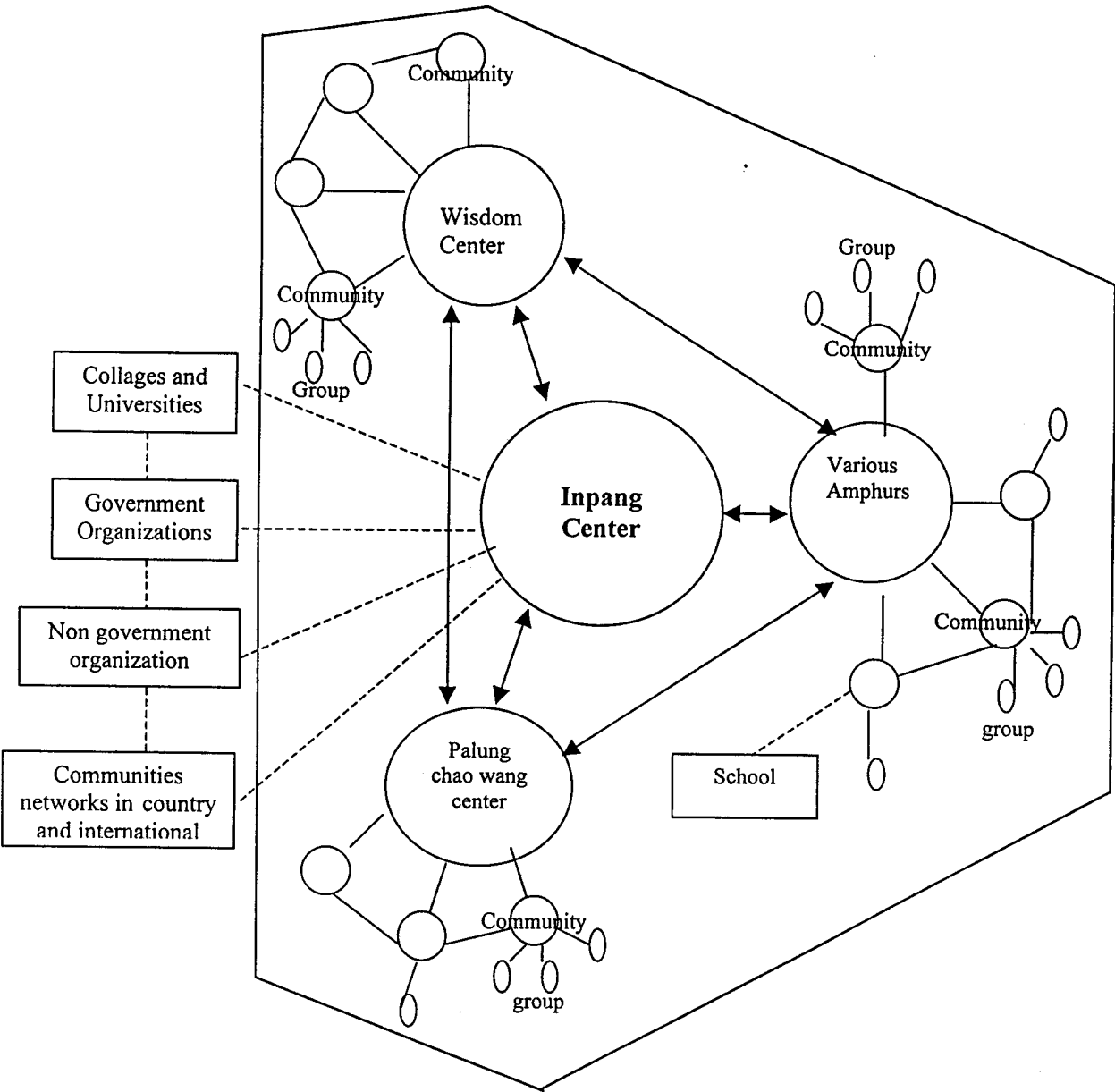


Figure 19 Structure of The Relationship of Inpang Center Sakon Nakhon Province

Pattern II : The learning network at Amphur level as distributed center was the network containing members of the same Amphur, but it had learning center disseminate to 3 centers, which have concentrated on the prominent attributes and roles of network. Various member groups which distributed in community played attention in which aspect, it can participate in learning process. The orchards, owners wild be facet responsible and be the president in that; for instance herbal aspect, integrated agriculture aspect, and saving aspect, they had connection to collaborate between network and organization in the community through the participate in various activities.

Development Network as pattern 2, it was Thepnimit Ecological Agriculture Network, which begin from agricultural group at Bannumlad, then enhance to 5 Tambons, 19 villages in Amphur Thepsatit, Chaiyapum Province. There were 3 center networks, which emphasized on learning up to the success of center. So the Numlad Center emphasized on saving product transformation, and community forest, but for Coke-rung paid attention on herbs, and Na-yang-klug emphasized on integrated agriculture had developed for 12 years, to be network for 6 years, there were linkage connected with local organization, teacher for children and community through the relationship structure of network as following figure 20.

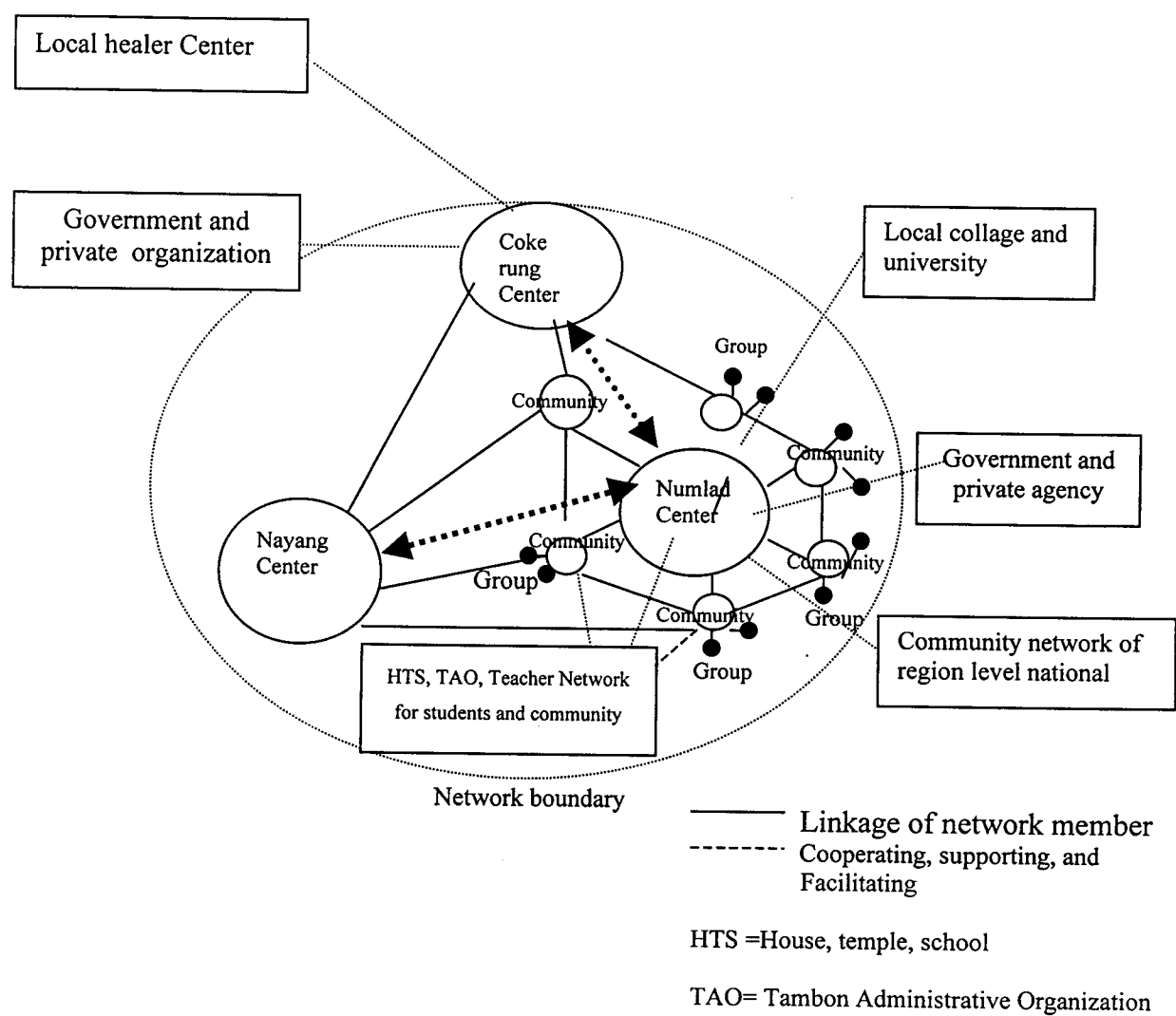


Figure 20 Structure The Relationship of Thepnimit Ecological Agriculture
Network Chaipayum Province

Pattern III : Learning network at Amphur as central pattern, it was network composed of members form different groups in community, simultaneously, project committee practice the administrative development at learning center to be the demonstrated center in order to develop the project committee, and network committee to co-operate for learning management and holding supporting together through the consultants, and internal and external in community to support and facilitate to project and networks, and succeeding to become the prototype of network development and

center of economic, social, and environmental learning as integration through the murderous learning activities such as organize agriculture, micro-organism fertilizer, cooperative, village bank, marketing, and transfer for descendent of member in network.

The developed network in pattern III was Wang-num-kheaw Organic Farming Agriculture Network, there were members in Amphur Wang-num-kheaw, Nakornrachasima Province, totally 4 Tambons, 32 villages, it was developed for 9 years, and to be network member for 3 years. Enhancing groups and activities for mental development follow the Buddhism principle of Santiasoka that harmonized with economic, social development, and environmental restoration through organic agriculture, micro-organism fertilizes, and natural fertilizes instead of chemical substance, including growing diverse plants for sale for short term, and grow the fruits for long term benefit. Leaning management was operated by project and network together in order to developed concept of organic agriculture for members and interested groups. Consulting committee with high potential, simultaneously, supporting, and collaborating, to become the Majesty Initiate Project. There were cooperated supporting with various sectors both inside, and outside, it was the sources of learning to disseminate to different groups such as students, healthy city free from chemical toxic substance project. They were relativistic fracture. it was relationship structure of network as figure 21.

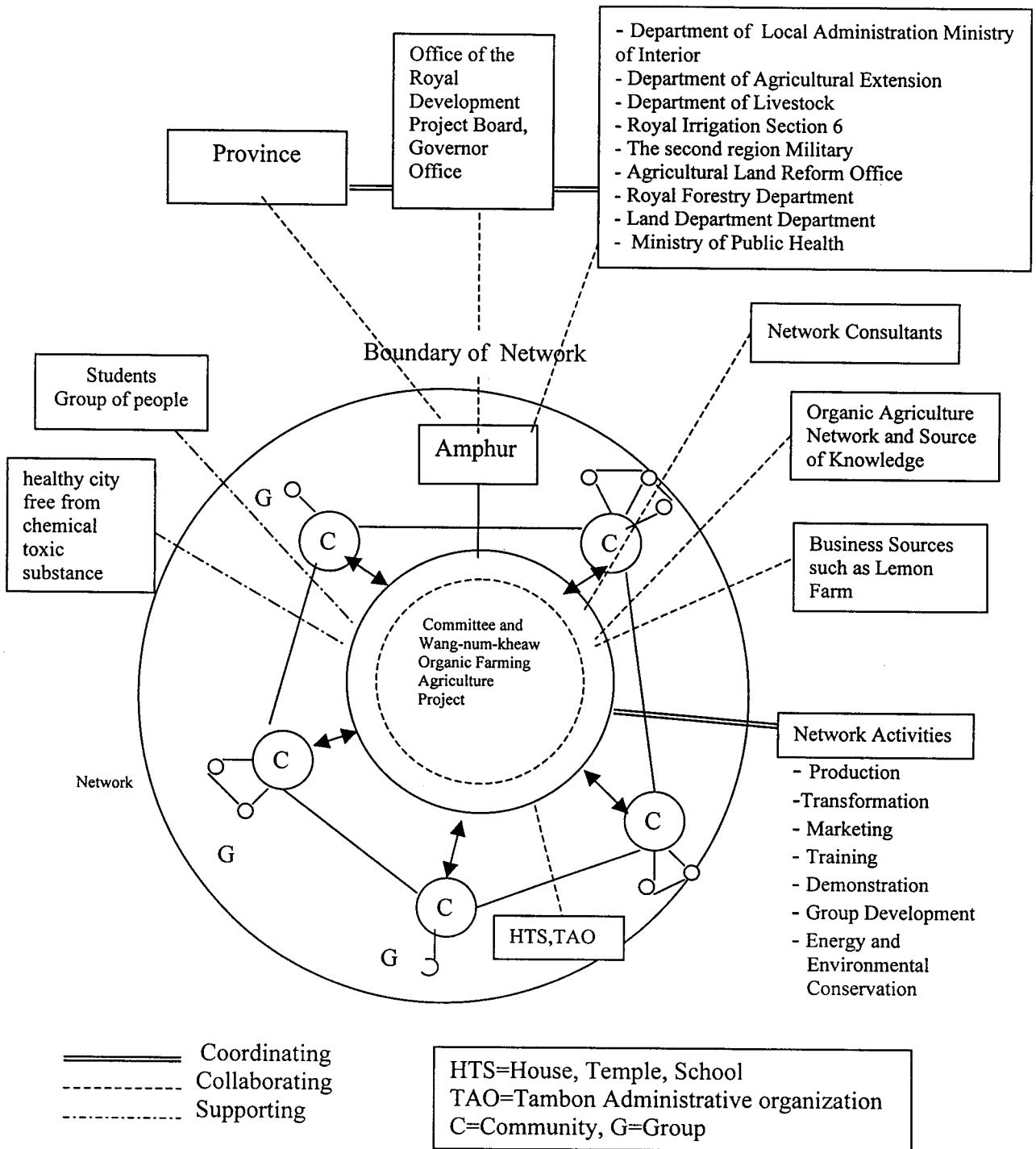


Figure 21 Structure The Relationship of Wungnumkheaw Network
Nakornrachasima Province

3) Components of implementation of network development, the finding illustrated that the most important components caused the learning network development were 5 categories that man, organization, learning activity, and connection.

(1) Man : Network was established and developed by the participation of different groups of people such as academics, developers who stimulated the group to initiate through the capable leader of network who had high competence to collaborate, including having skills and strategy in development, simultaneously the consistency committee, and enthusiastic learning and preaching members. Moreover, the internal and external scholar, academics, and responsible person community in different organization both government and private sector as supporters and facilitators, and developers from government organization and private sectors, network consultants, and organization leaders in local and others. Networks, there were person involved more or less, it depend on structural management and the activity of each network. However, members of every groups who participated in network development had to have fundamental in glory and potential of human being because it was the elementary vision, personality, and good relation and be honorable each other. Network should create the concept of human development of concerning people to seize on the principle of living together of all creatures in nature with equality and love, concerning best wish, and to be honorable each other, including freedom in share idea by practice together or practice separately in some issues but without influencing or commanding. They used the meeting, exchanging, and learning, and making conclusion through, voting freely, and respect to the way of thinking, living of each, and the cultural , traditional of each group. There were appearances at 3 networks. It was obviously seen at the meeting that everyone could obtain an opportunity to be committee or could learn as their wish from the network center, which opened widely all the time for instance.

(2) Organization : Network was composed of individuals or groups that distributed generally in various communities, but how far it depended on the preparedness of the network to extend. The most critical factors were network organization on administration, management, cooperation among network members, organizations, networks and other sectors both in/out network. The network

committee were elected by voting, it composed of president, vice president, secretary, treasurer, and president of numerous departments in accordance with the sort of activity, which was implemented, in addition of the other positions such as the delegation from the communities. There were sharing obligating responsibility, defining the rules and regulations, and term of working. It was found that the successful network should have strong network organization with the complementary of competence of leader and committee having high intention to devote for public. Moreover, the transparent management, justice and decentralize power to sub network and members of different levels. Furthermore, there were having diverse sector consultants with highly potential, adding of developers as collaborators to support, volunteer persons, and permanent personnel in charge standby in communicates for communication, and information. Besides, the local leaders who had knowledge, experiences and willing to devote for community through being network committee such as Inpang Center organization, which had the leaders who were indigenous scholars, Phor Lek Kudvongkaew, Phor Khean Srimukda, and Thep-ni-mit network had Ajarn Suthud Sirisalung, Phor Peng Plodkratoke as well. All 3 networks had developers who the delegation from Non Government Organization (NGO) with experiences of development work with highly capacity, especially, Wang-num-kheaw Network Organization, the leader was the local people who initiate establish the network with highly acceptance and Buddhism practitioners, in addition, the consultants with highly potential from diverse careers, which encouraged the network organization was respected by external people, so it was supported, and would enhance the network in short period.

(3) Learning: the successful of network implementation depended on the capability of learning management in order to increase the potential of members to develop themselves to have the essential factors for enough earning with stability peacefully, moreover they would save from environmental pollution and social risk. Network had to provide learning all aspects such as occupation, technology, and management about life and product as production, product transformation, marketing through the business management in term of group and cooperative, there was emphasizing on learning from actual practicing in order that it was brought to use in real life, in addition, studying after having dinner. The culture

and indigenous wisdom connected with modern knowledge concurring to the local network situation, and it must be knowledge for development of society, economy, and environment parallel, for instance Inpang Center Network, there was management on learning about ecological agriculture, fruit juice transformation, learning of Dek Hug Thin Group. Thep-ni-mit Network, had managed learning on cure the disease by traditional healer, herbs arounded themselves, microorganism for fertilizer. For Wang-num-kheaw Organic Farming Promotion Group Network had learning management on water, organic agriculture, and microorganism fertilizer for instance. There were numerous methods of learning were employed in research action such as learning from prototype, holding seminar, meeting to exchange experience, education excursion, training and monitoring and evaluation. It was emphasized on transferring knowledge from indigenous scholars, but the academics and technology came from outside. Meanwhile, some network was the prototype for knowledge transferring, strategic learning, and activities to various project; such as Inpang Network was prototype of increment of competence on sustainable agricultural development project of Ministry of Agriculture and Cooperative, for Wang-num-kheaw Organic Farming Promotion Group Network was the project of healthy city saving from toxic substance of province in the North Eastern.

(4) Activity: It was the important component of learning knowledge, because learning caused the impact to living subjectively through learning with actual practice. There was management cycle of living concerning production, transformation, marketing, and emphasizing on sufficiency. The activities were done by group process, there were all subgroup activities such as Thep-ni-mit network, there were 4-5 members per group to cultivate 6 stains of plants at least, having the management of production factors. Gathering the product was sent to network for sales. Thep-ni-mit network required the members to be the saving group member like as the 2 networks mentioned above.

However, if the member can participate to which group that he is interested, such as herbal group, and traditional healer, even though he is not the member of that group. For example, the member who was interested the group of herbs and traditional medicine he could participate as he wishes. Mr. Saeng Namta, the president of Ban Coke-rung group, which was the place to learn traditional medicine and herbs

surrounded themselves monthly, including training other issues up to the interest of member for example, training for microorganism fertilizer propagation.

For Inpang Center Network, there were a variety of activities because it had operated for many years ago and strong enough through the external supporting and accepting both from private sector and government sector continuously. There were important activities such as cultivating the local plant, fruit juice transformation, encouraging the sustainable agriculture in all level as groups, sub networks, and networks. It can concluded that all the implementing activities covered all aspects such as economic, social, environment, and life quality aspects through the application with appropriate technology in order that it received the results as holistic view for life and community sustainably. Every networks had the main activity like saving, parallel with the agriculture congruent with environment such as ecological agriculture, integrated agriculture, new theory agriculture, organic agriculture or others caused plants diversity occurrence and biodiversity eternally. The complementary activity depended on preparedness and appropriate. The network could choose the preference to implement such as products transformation, fruit juice, woven with the natural colored thread, microorganism fertilizer, and biological fermentation. There were selected to apply for appropriate agriculture. Holding the cooperative shop, village bank, righteousness bank, activity of children for their home country, foods and desserts transformation, opening shop, manage the group business, and herb production for instance.

(5) Linkage: Network implementation had to use linkage to connect the collaboration among individuals, groups, organization, external sectors activities, and learning process on the basic of connecting units in network because it was horizontal cooperation. From the finding, it shown that all 3 networks, including government and private sectors, in addition all levels; local level, national level, and international level. It was the organizations in all aspects, such as academics, religion, society, economy, business, politics and people organization, and connect at both policy level and implementation level. The linkage of network with various sources, there were funding sources, academic sources, defining action plan, project sources, education excursion sourced, and others. Resulting in creation brought the trust, respect to leaders, implementation, administration and outcomes of networks.

Whereas, there was cooperation, it led to success and to achieved as objectives, goals, and targets. The linkage caused the cooperation among networks, organizations, and others widely, consequently the network development at nation policies further. However, the essential of linkage was creating the collaboration with friendship for social, economic, environment, and life quality development sustainably, such as the linkage of Wang-num-kheaw Organic Farming Promotion Group Network and Office of the Royal Development Project Board until it got the collaboration on development projects of different sectors. The connection of Inpang Center Network and village foundation, Agricultural Land Reform Office, Ministry of Agriculture and Cooperative; and others were performed. To implementation of learning network had to regard on the 5 components as illustrated as following figure 22.

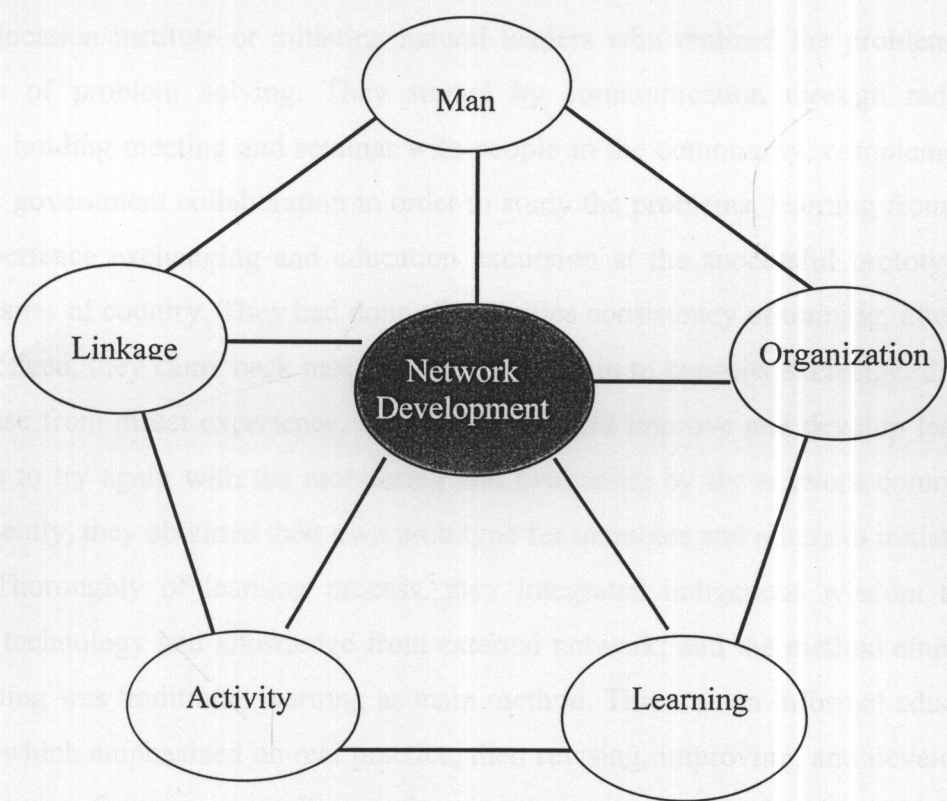


Figure 22 Components of Learning Network Implementation

The finding was congruent with the research results of Witayakorn Chiangkol (1998:15-20) it concluded that developing human to have a good quality it needed to establish the group of organization which had the good execution, and the research result of Kritsada Boonchai and Others (1995:23-27) was found that it had to connect to be network between community and province level through the collaboration of non government organization.

5.1.3 Learning process of plant diversity conservation, from the study was found that learning process of networks had established because they wanted to search the way to solve problems, especially the economic problem, the debt occurring from cultivating monoculture. The learning was started by problem analysis. At first defining the problem issues was done by the action research, moreover the researcher from education institute or initiating natural leaders who realized the problems and methods of problem solving. They started by communication through radio, in addition holding meeting and seminar with people in the community, complementary with the government collaboration in order to study the problems, learning from ideas and experience exchanging and education excursion at the successful prototypes at various sites of country. They had done all activities consistency of training, after they had practiced, they came back meeting again and again to consults exchange, discuss, and revise from direct experience, therefore, they could improve and develop learning methods to try again with the monitoring and evaluating by the network committee, consequently, they obtained their own prototype for members and others to initiate.

Thoroughly of learning process, they integrated indigenous wisdom to the modern technology and knowledge from external network; and the method employed for learning was traditional learning as main method. This was an informal education system, which emphasized on real practice, then revising, improving, and developing, consequence of re practicing. It was the experiment to search for the methods of restoration and utilization of plant diversity usefulness. The network provided the learning activity for members to revise and change the way of thinking to depend on external economic system to self-reliance in all facets as society, economy, and restoring the environment as well. Therefore, it was obviously seen that the education excursion and training of 3 networks provided for members, through emphasizing on

knowledge transferring from the successful scholars such as Inpang Center Network, there were Phor Lek Kudvongkaew, Phor Khean Srimukda and others scholars to be the transferors the experiences. Wungnumkheaw Organic Farming Promotion Group Network, there was providing for members on biological fermentation by Mr. Amnarj Maiyodklang, and Miss Fakfar Maiyodklang were the transferors. Afterward, the members had experimented, consequently they found the new body of knowledge by themselves such as fermentation of fertilizer, *F. Apocynaceae* to pour on plant like lettuce and cabbage for more firmly. It can conclude that learning process of network for plant diversity conservation. There were components which presented as figure 23.

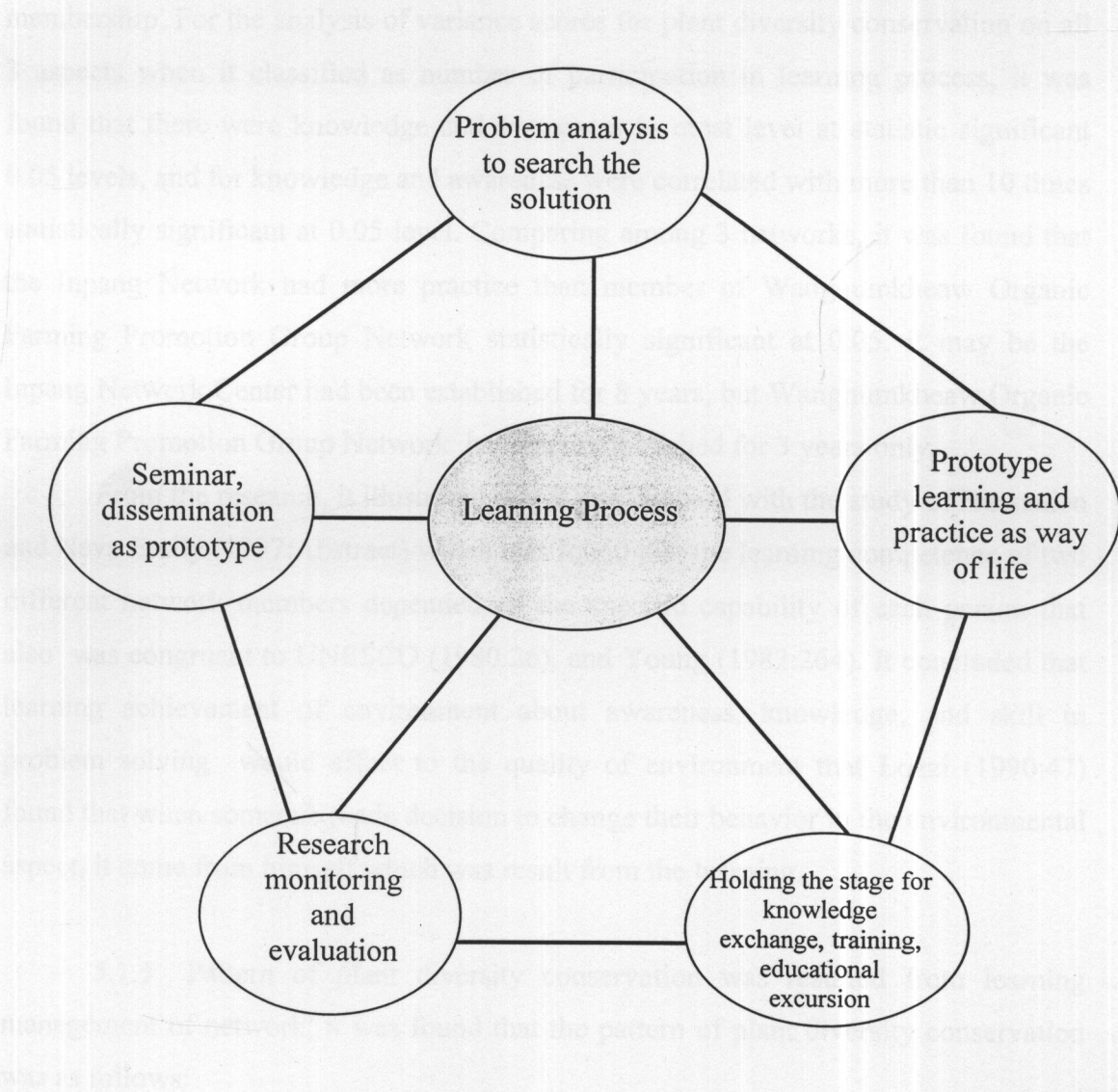


Figure 23 Components of learning process of network for plant diversity conservation.

5.1.4 Member behavior occurred from learning for plant diversity conservation which was provided by network, it was found that most of the member gained knowledge, awareness, and practice in order to restore, and utilize the plant diversity usefulness at more, and most levels, when it classified the correlation between knowledge, awareness, and practice with sex, it was found that only awareness was statistically significant at 0.05, the male had more than female, but the rest was not significant. For classification according to the length of membership, it was found that only practice on plant diversity conservation aspect was statistically significant at 0.05 level, at 3-5 years length, and more than 7 years length of membership. For the analysis of variance scores for plant diversity conservation on all 3 aspects when it classified as number of participation in learning process, it was found that there were knowledge and awareness in most level at statistic significant 0.05 levels, and for knowledge and awareness were correlated with more than 10 times statistically significant at 0.05 level. Comparing among 3 networks, it was found that the Inpang Network had more practice than member of Wangnumkheaw Organic Farming Promotion Group Network statistically significant at 0.05. it may be the Inpang Network Center had been established for 8 years, but Wangnumkheaw Organic Farming Promotion Group Network had been established for 3 years only.

From the research, it illustrated that it was concord with the study of Hassanien and Neva Emily (1997:Abstract) which was found that the learning competence of two different network members depended on the specific capability of each person that also was congruent to UNESCO (1980:26), and Young (1982:264). It concluded that learning achievement of environment about awareness, knowledge, and skill in problem solving would effect to the quality of environment that Lozzi (1990:47) found that when someone made decision to change their behavior in the environmental aspect, it come from himself which was result from the learning.

5.1.5 Pattern of plant diversity conservation was resulted from learning management of network, it was found that the pattern of plant diversity conservation was as follows:

- 1) There was forest restoration through cultivating plants in the agricultural plot with diverse plant for instance, the original strain from forest close to

the community, fruit, utilized wood, and herbs in order that maintaining the environment of plot was the same as forest condition, for consumption, and decreasing to take products from forest simultaneously allowing forest to have a chance to achieve natural succession. In addition, they managed community forest conservation and in the same time keeping the forest surrounding waterfall to be tourism site and sources of plant strains; besides learning site for nature and ecosystem. The Thep-ni-mit Ecological Agricultural Network had successful implementation.

2) Using pattern of environmental agriculture, they had done agriculture which facilitated the environment, simultaneously, they gained benefit on economic, social, and life quality facets as well. Pattern of environmental agriculture are sustainable agriculture, ecological agriculture, natural agriculture, organic agriculture, integrated agriculture, and new theory agriculture. All sorts having the same main principle that is planting with diverse strain as pioneer in order to obtain the biodiversity for long term, because they will provide mutually among plants, animals, and natural environment in the plot. It will restore environment of plot through the natural principle of balancing ecological system. To use microorganism fertilizer, biological fertilizer, non chemical substance, 3 networks had emphasized on different factors for example. Inpang Network Center had emphasized on ecological agriculture, sustainable agriculture, and integrated agriculture as well as Thep-ni-mit Ecological Agricultural Network; but Wangnumkheaw Organic Farming Promotion Group Network had emphasized on organic agriculture or non toxic agriculture.

3) Breeding and cultivating diverse plants of local strains and forest plants for consumption and decreasing expense, they grew the vegetable and fruit as the market requirement in order to increase the income through selecting plant strains, which are proper to the environment and consumption tradition such as Inpang Center Network selected rattan cultivation and local plants, for Wangnumkheaw Organic Farming Promotion Group Network selected vegetables as market requirement, subsequences; temperate zone vegetable, local vegetables, and fruit, with the non toxic substances utilization through mixing with fruit in order to increase income.

4) Using the local technology integrated with modern knowledge and technology properly without destroying environment such as members of Inpang Center Network fed the cattle in their own field instead of using lawnmower, including

having factory for fruit juice and herbs transformation, Thep-ni-mit Ecological Agricultural Network made herbal steaming for healthy care, and Wangnumkheaw Organic Farming Promotion Group Network prepared microorganism fermentation from plants, vegetable, and fruits.

5) Plant product transformation for value added, they managed marketing in order to be valuable all consumption, transformation, and sales such as Wangnumkheaw Organic Farming Promotion Group Network had transform fruits by fermentation as fruit wines for instance, passion fruit wine, lychee wine. in addition, plants, vegetables, and fruits were fermented for other purposes like as face caring lotion, dish washing liquid, floor cleaning liquid, it was value added. Moreover, they prepared the biological fertilizer from wet garbage, and the residue was prepared fermented fertilizer or grass killer instead of chemical substance, it was name as SUMO, which was abbreviated from sustainability, unity, and microorganism and “Phuninsee” which combined of Phumi and Julinsee. All products would facilitate the member for local use and increase income, therefore, the cooperative activity produced and sold the products, gathering the product for wholesale. But for Thep-ni-mit Ecological Agricultural Network had herbal transformation as drug for sale and dissemination for members and interested people. Inpang Center Network had local fruits transformation such as Mak Mao juice, Mafi Juice, and Mag-ngew (wild lychee), and others. There were product transformation group, investment according to cooperative system, the benefit from selling were shared for members at the end of the year. The consumers were the member themselves, and people who came for educational excursion. At present the products are not enough for customer requirement.

Therefore, when the plants in field and forest are diverse, it caused interdependence and ecological balance and occurring of biodiversity consequently. Pattern of conservation, restoration, and plant diversity usefulness of network. It was concluded as it presented in figure 24.

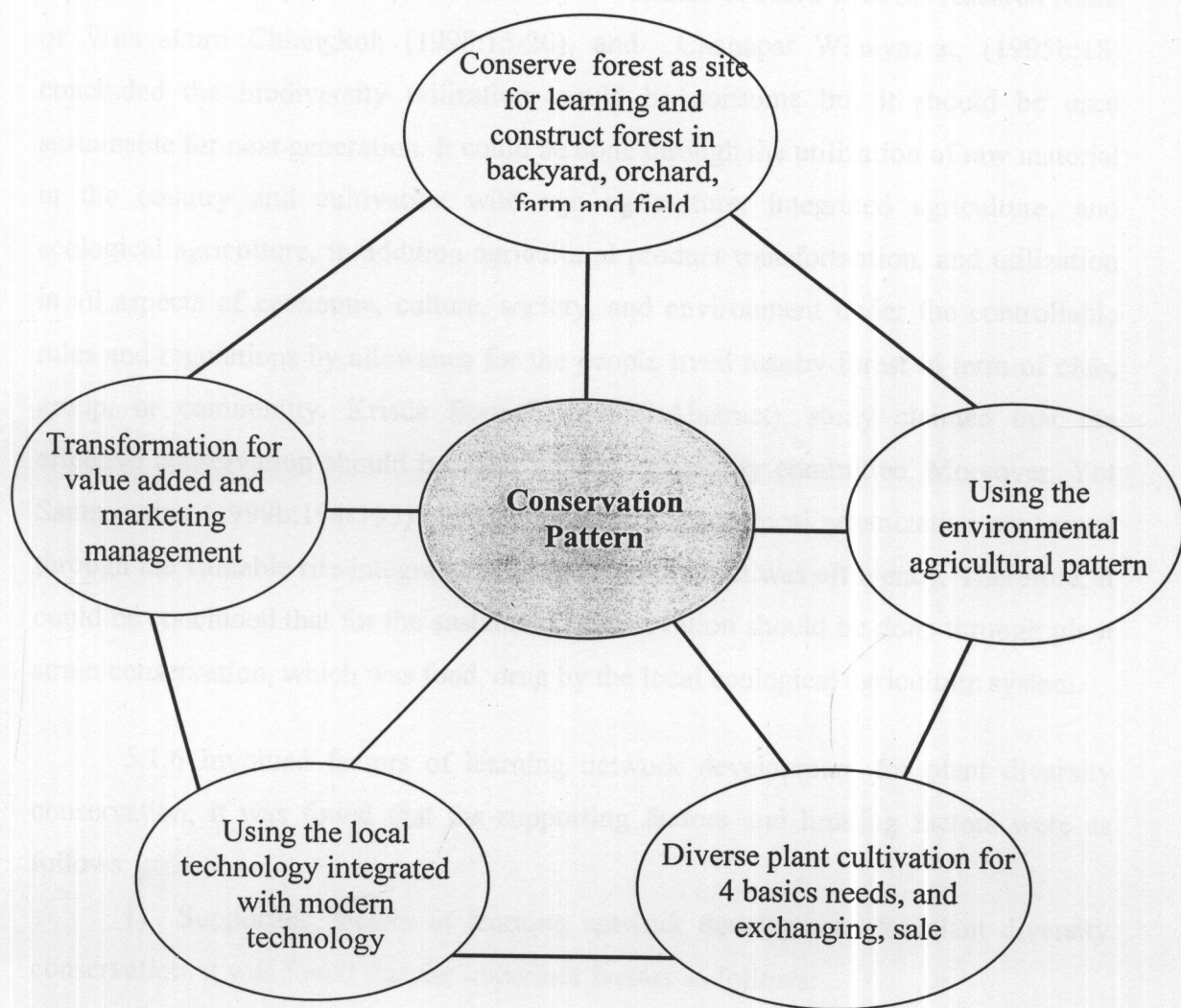


Figure 24 Pattern of Plant Diversity Conservation.

From this study, the result was congruent with the concept of Wisut Baimai (1995b:37-38), Yot Santasombat and Witoon Panyakul (1994b:21) that the biodiversity has values in the aspects of agriculture, medicine, and industry including the benefit in social, culture, economic, ecosystem, and environment. Moreover for biodiversity conservation would be effective when it was the implemented by network. So it concord with the conclusion of Hoyt (1998), Cite in Somporn Patanakamjorn (1999b:178) that To conserve the biodiversity through in-situ conservation was one part of the natural habitat and it was the development the buffer zone in order to

rehabilitate the degraded ecosystem through the local wisdom and practice of local people as daily life pattern, simultaneously it was also concord with the research result of Witayakorn Chiangkol, (1998:15-20), and Chanapat Winayawat, (1995b:18) concluded the biodiversity utilization would be consume but it should be used sustainable for next generation. It could be done through the utilization of raw material in the country and cultivation with ago agriculture, integrated agriculture, and ecological agriculture, in addition agricultural product transformation, and utilization in all aspects of economic, culture, society, and environment under the controllable rules and regulations by allowance for the people lived nearby forest in term of club, group, or community. Krisda Boonchai (1997:Abstract), study claimed that the effective conservation should be done by the community committee. Moreover, Yot Santasombat (1999b:194-195) also summarized that the local organization conserved through the valuable rite integrated with the environment was efficiency. Therefore, it could be concluded that for the sustainable conservation should be done through plant strain conservation, which was food, drug by the local ecological agriculture system.

5.1.6 Involved factors of learning network development for plant diversity conservation, it was found that the supporting factors and limiting factors were as follows:

1) Supporting factors of learning network development for plant diversity conservation, it was found that the important factors as follows:

(1) Suitable location and environment: It facilitated the sources of breeding, learning, products sale, and growing plant such as Inpang Center Network and Thep-ni-mit Network located close to forest and mountain which the national park and protected forest which had diverse plants for sources of natural learning. Plant diversity in forest the source of breeding strains of local plants, and herbal plat. But for Wangnumkheaw Organic Farming Promotion Group Network located at high land which had temperate weather that was appropriated for vegetable, fruits of cold country and near market, it was Bangkok, which is the big consumption source. Planting diverse vegetables and fruits, it should not use chemical insecticide in order to preserve water, air, and soil because this area was appropriate for cultivating. Therefore, 3 networks had implemented to cultivate with organic agriculture on non-

toxic agriculture in order to create the balance of ecosystem, that can restore the environment.

(2) People involving with network, there were leaders, developers, academics, volunteers, government officers, and consultants because they had basic concepts of acceptable on human dignity with equality, and on the believe that human potential could be developed. It was value on human wisdom and morality more than money and materials. The concept of community culture was employed to create the relative relationship, which was benevolent and the based on the Buddhist principles. Training people continuously, it was training, seminar, and education visiting programs for instance. Moreover the leaders were the good exemplars for having morality, devoting for public, in all of 3 networks, there were bank of righteousness, and training to devote for public.

(3) Supporting and encouraging the natural leaders to be stronger, there was increasing the amount of leaders. Most of the practicing, to create the plant diversity in their orchards, moreover, They were able to transfer knowledge to members such as Phor Lek Kudwongkaew, Phor Khean Srimukda, Phor Peng Plodkratoke, Mhor Saeng Namta, Mr. Amnarj Maiyodklang, and Ms.Intra Mulpimine for instance.

(4) Members would participate in the implementation of network, including sharing idea, decision making, learning, practicing, and looking after the benefit.

(5) Using the traditional wisdom, they also used the modern knowledge and technology, learnt and developed body of knowledge continuously.

(6) There were supporting, facilitating, and commenting among networks, organizations, individuals both internal and external network in order to develop the network, including joining with other sectors to be the prototype for enhancing the results to developed to policy level such as expanding the sustainable agriculture of Inpang Center Network cooperating with ministry of Agriculture and Cooperative.

(7) There were network organization which composed of administrative committee that defined policy, target, method of development, setting

rules and regulation, and structural management with highly flexibility and changing up to the suitability.

(8) They produced products, transformed, and sold the product as management cycle, through the saving activity to build the stability, and cooperative method for management.

(9) There were developing, and learning were holding for members in order to develop social, economic, and environment through the integrating consistency, and it could be brought for practice the agriculture was the fundamental method to develop and create the plant diversity which was the main activity to initiate other aspects of development.

2) Limiting factors in learning network development for plant diversity conservation, it was found that there was important factors as follows.

(1) People who are not the member are still persuade, so the network should have more public relation to open or give a change for interested people to enter to be member more than present.

(2) Lack of data system, it dues to the lacking experience of management.

(3) Monitoring was not enough when the number of member increasing and areas expanding, and the committee had work overload, so they had lesser time to monitor, but they may used the document for public relation and monitoring.

(4) Linkage of collaboration for learning with local organization was little because the government officers concept and mean of working, were still used the commanding more them supporting, and administrating.

(5) Exchange knowledge of learning are not distributed to every group because the community leaders had different potential and responsibility, and it should support to increase the quality continuously. Therefore, it should be dissimilate more information to members monthly or once every three months, including with the conclusion of implementation results and the successful members news.

(6) Learning in the management cycle aspect, and the specific issue, which member need to learn, but not receive enough, but it should be surveyed the learning demand of members, then managed learning in that aspect combined with

production management, marketing administration, in order to get outcome of practice.

5.2 Model proposed of learning network development for plant diversity conservation.

Model of learning network development for plant diversity conservation was proposed, it was composed of pattern, and implementation which were the important principle of synthesis. From three case studies were mentioned above in the result discussion illustrated that the model which was applicable to create and develop learning network, for plant diversity conservation and biodiversity which was proper to environment, social, and economic situations of each specific area or each characteristic of people group to implement in the network, it had patterns as follows :

5.2.1 Pattern of construction and learning network extension were established in the community, there were the methodology as follows :

1) Network establishment was started by the initiation of leaders in community to stimulate the people in community to think and initiate to solve the problem, which they had been facing through the join together for self-reliance, including to searching the alternatives of learning the surrounding condition with far and wide vision.

Moreover, they had applied the experience of education excursion, and study from successful example in order to make decision to choose the alternatives. The main guideline had 2 attributes as follows :

(1) It was academics, developers, idealism person from external community through the action research process or small group seminar both formal and informal styles in order to set the questions for the participants to revise and review themselves. Therefore members could search their problems and the answers with the facilitation of leaders to ask questions and conclude the issue continuously, then providing to experiences extend through education excursion from the different prototypes, simultaneously the members were encouraged to select the alternatives to start with small groups about 10 persons. It needs contain the person who brave to risk the new thing with high intention and start to run activity, which was selected by

group even though there are still lack of group structure and system management, but they had the unofficial leaders respected by group trust. For the initiator would stimulate concept by external group, afterward these external might be the members of network.

(2) It was the local people who had cause to devote as fundamental concepts, moreover, they contained consistency practice to be the model for others, consequently, they were accepted widely. Local people had changes to learn from outside, and had experience from various works or Buddhism practitioners, developer believed in way of community. It was the empowerment of society, but they had cause, and guideline with the self confident to meet the mean to solve the community problem through the experimentation and practice by themselves until they were successful by themselves and they persuaded the others to follow. It may be the people who lived nearly and if they follow, they would attain the same results At beginning it may be started by about 10 persons, then cooperates with the leaders. Afterward, it may be defined, the goals to initiate to establish the group, and public relation was included. into the meeting and seminar. There were proposed the idea and guideline which were practical, it was the mean able to solve the problems virtually. Therefore, they would join to establish group formally, in order to ensure the members to set the group in accordance with this guideline, however the initiator had tried to practice until the outcome was achieved, in addition the leader should have high self-confident, responsibility, and capacity of cooperation, who could use his potential effectively, generally most of the initiators were fully become a leader of group afterward. To be aware, the initiators and leader of 2 patterns that when the group developed so far and developing to be bigger group, they should not think that the group was belong to them. It should decentralize power to members, and let them had change to be leader, consequently, there were a lot of leaders full all areas, and disseminate according to sex, age, occupation and others. It should emphasize the collaborating between present leaders and new generation leaders to sustain network further.

2) Expanding from group to network, it started from group, then they implement for a period of time and the member succeeded and gained benefit, So the peoples outside group would play attentions to join and learn, meanwhile the members

of group should had open mind to accept and persuade them to join, Both initiators and leaders may collaborate with person or organization in/out community to support group with funding, materials which made the members to have more powerful mind, simultaneously, the new member felt warm and hopeful. However this period the group must manage and strengthen structural system to be more stable, and decentralized power in order to give an opportunity for new member to participate in administration by rotating every 2-4 years as properly.

When the members increased, and distributed from one group in village to many groups, and to many villages, to many Tampons, to many Amphurs, and to many provinces at the end. Management system must be adjusted the structure of group to the network. The leaders and the committee of each level must define rules and regulations, goals and objectives. formally by having the delegation from every groups to be central committee of each level, including to expending activities up to needs, demands, and preparedness of members such as production to sale, and product transformation accompanied with management systemically, until cooperative, and shop established. Moreover, factory for transformation, bank of network in cooperating with the internal/external community, all sectors as government, private, and business organizations which had targets, goals, and trends which was congruent to support, exchange product, and experiences continuously. These organizations should be established the project, budget, and expert s to support as network needs or project established to support the network work in order to increase benefit for society as a whole, but it must be the project that the members of network had the cooperation in decision making, then operating together to increase the results efficiency.

In the meanwhile, the leader and member of network had an opportunity to learn and gain more experiences through exchanging experiences, training, seminar, and education excursion both internal and external network continuously. There were learning through the direct practicing experience from activity participation in order to increase their potential and ideal for public benefit as a whole in the same time.

3) Stability of Network : Network could sustain permanently or decaying, it depended on the success to reach the targets, and objectives as members expectations. The administration was transparent, justice, honest without concerning the hidden benefit. The leader must not use the position to gain the benefit both

directly and indirectly, simultaneously leader and member must do the good thing for group or network or community, they should be honorable and supported. The members gained benefit from network equality. The activity of network should respond the members needs, in addition it was accepted from external society. The network should be the prototype for development. However, the competence of activity extension should be accelerated the competence of problem solving to life and community, as management cycle and as holistic approach. Besides management for member welfare, it facilitated benefit to community to connect both external and internal organization of community. When the leaders were accumulated enough and new generation leader added, the members had better quality of life, more security ; the administrative structure, rules and regulation, goals, the rigid of call these may be more flexible in order to concurrent with the satiation, but it still kept the justice for members equality. In order that the quality of members would be better and better, the network must to improve and hold the activity to train, exchange experiences, and connect the data information open regularly for the members would be trust each other, consequent process, when the network was more firmly, it can be registered as legal organization or business organization.

4) Conclusion of Network Construction and Extension it was very commonly of life cycle, when something was born, then growth and expanding, stability or decaying at anytime, and then it might restore again and decay again the network was similar when it achieved the goals or not at the meanwhile of network development or during the establishing group or network, the capability to keep the network stability it needed time and different strategies, because of different problems, goals, components, structures, rules and regulations, leaders, members, supporting agencies, and communication

5.2.2 Pattern of network implementation were composed of the compartment as follows :

1) The components of network should be 2 parts that were the concept and network implementation components.

(1) Conceptual component was the moral as fundamental Concept was similar or the same vision, and problems and problem realization, and

alternatives of problem solving were alike. After participation jointly the group process and continuous implementation on the basis of accepting and being honorable each other, in addition the principle of thinking together but separated practicing were employed, moreover on the basis of mutually benefit on the fundament of sincerity and morality complemented with best wish and good relationship. Therefore, they had exchange learning knowledge and experiences happily with the person who had the target of self-reliance and interdependent to create the group power in order to solve problems, facilitate, and support and collaborate each other as relative.

(2) Implementation components composed of man, knowledge, resources, fund, technology, and management.

(2.1) Implementation components composed of members, leaders, scholars, supporters. The members must be willing to participate, having intention to devote for better life and society, and having preparedness to cooperate, to learn, to do activity, to be committee, and to accept the network agreements and regulations. For the leaders, they must have causes to devote for public to be able to communicate, be transparent, and be good example, and creative thinking, far vision, justice, good relationship, be honorable to member, having capability to collaborate, problem understanding, member requirements, clear target, objectives and regulations, network achievement, able to connect the problems and guideline of problem solving as wholly. However, the leader must have an opportunity to open to outside community and understood the actual life of members and community, and having management competence. Out side acceptability should be in name of network in order to prevent the conflict, bias, and breaking down of network. If it was promoted, it should be let the network members to greet on the concept of network outcome, not individually, so the leader were everyone in committee.

The scholars in network were local philosopher or local scholar, academics, and developers in local or outside, who were the leaders of wisdoms or thinking, including advising, knowledge and experiences transferring for members. The scholars may be consultants or committee or members, or scholars may be developers, and idealism persons, Buddhism practitioner business man, or politicians because of people diversity, it made the network member to receive knowledge and have, wide

and far vision. For Conclusion, the scholar who supported network should come from in/out community in order to benefit for integration local wisdom with modern knowledge properly and congruently to the solving the actual problem of network because each scholar had special skill, so network should gather the scholars from different sectors both from concerned institutes and organization.

The supporters were volunteers, developers from government, and private sectors ; academics or general people who was interested to support and to work, including to metered supporting, aid of project collaboration, agency cooperation for instance. Most of these people aided with admiral the network work, and did not want the return payment. Some network had budget enough to afford the expense of volunteer, the network may be hire them as permanent officer to help in data information and document, and be coordinator of network, however it depended on the preparedness of network. For the developers from institute or, organization they would receive the payment form their on institute or network, so network had no need to pay anything.

(2.2) Knowledge : Knowledge that network used for transferring experience directly, modern knowledge and technology were developed for real life problem solving. Both of indigenous wisdom and external knowledge were applied, by starting using knowledge to solve the basic problem such as plant cultivated knowledge to obtain fast products but specific; for example rattan cultivation, then bringing other body of knowledge to connect with the original knowledge like as local plant cultivation, ecological agriculture, herbal utility, fruit juice transformation, sustainable agriculture the for instance or starting with organic vegetable cultivation, and addition with micro-organism fertilizer knowledge, fertilizer preparation, local herbs, fruit planting, production management, marketing, cooperating, saving and banking. The main knowledge were used to develop network was agriculture to conserve the environment. Those were ecological agriculture, natural agriculture, organic agriculture, integrated agriculture, new theory agriculture, and knowledge to life quality development, society, economics and environment as integrally.

(2.3) Resources : Resources were used from network development was natural resources, soil, water, forest, local plant strains, vegetable

seed breeding, instrument for microorganism, besides need fund for training, seminar to members, building construction, and buying the needed instruments and technology, in addition with local technology, land for operating and experimenting plot. Most of budget got from the government and provide supporting, the majority from government sector. The networks and organizations purposed the project by themselves or assist by government and private sectors.

(3) Administrative Structure

(3.1) Network administration used collaborative principle, the administrative committee came from members and group delegations at community level to be committee at Amphur level or network center, exception the network which had area cover province level and numerous provinces, it would have delegations from Amphur level to be the committee in province level. Every level had meeting monthly, once or twice a monthly or every two months in the provincial level. In the network might have center for cooperative administration which managed learning process for members, and had sub-center in accordance with the suitability. However sub-center could be developed to center when it was strong enough to self-reliance, when situation changed to be big center it changed the relationship from dependence on become partnership, through the external and internal both government and private sectors supporting as show in Figure 25.

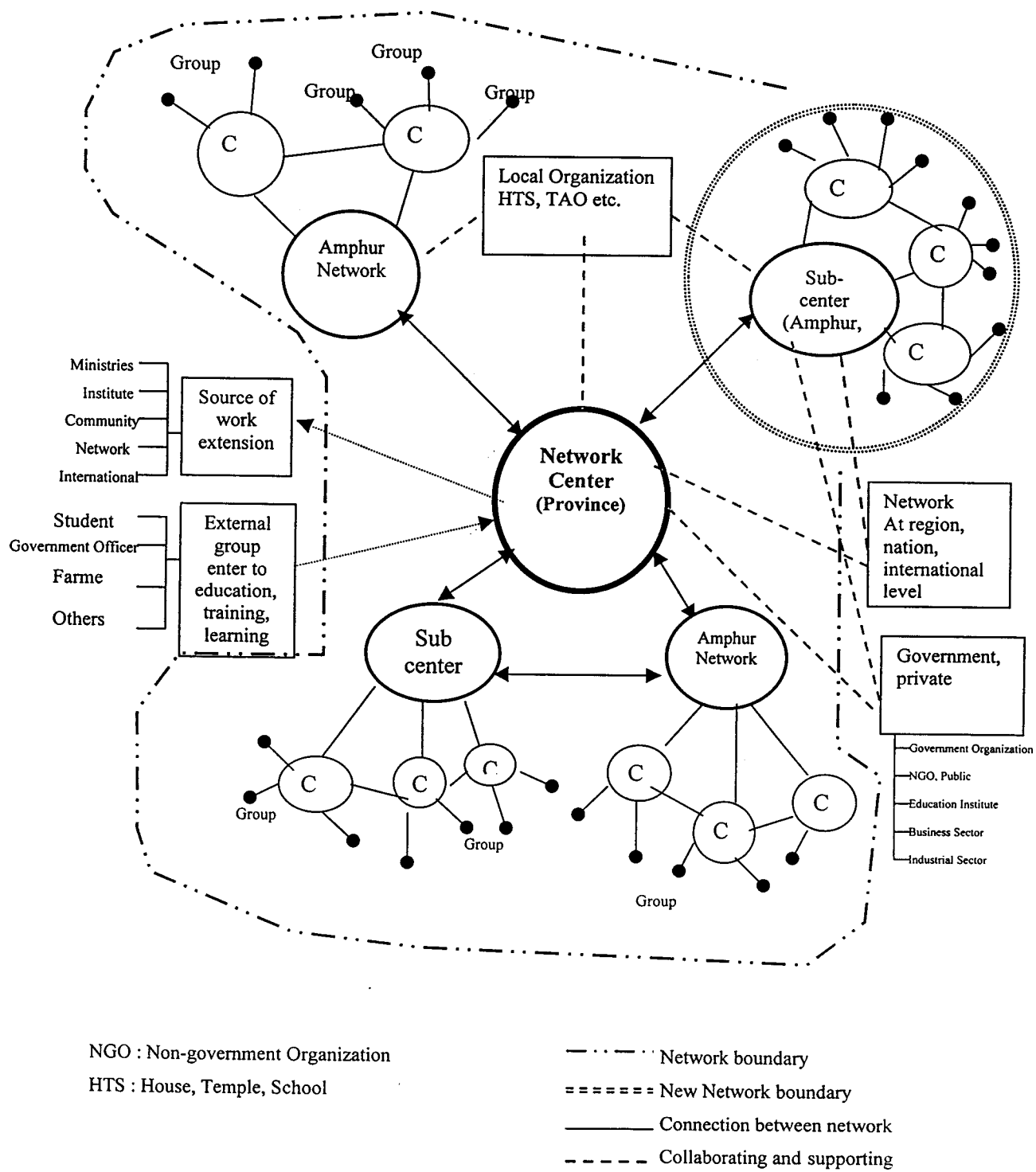


Figure 25 Administrative Structure of Learning Network for Plant Diversity Conservation

(3.2) The relationship within the network was likely relative system, and interdependent but in the case of regulation and rules, members must obey and practice in harmonization such as the agreement of saving system about interest return. For decision making in implementation at group level and community, they can much independently without against network policy, exceptionally, some activity was participation in the network level, it must considered by the general meeting at network or considered by committee at network level.

(4) Rules and regulations that was used in network might be constructed to be charter for practicing through the study of committee or person who had knowledge and experiences in network to make the guideline, and presented to committee, and let members in the meeting to improve and consent. Every member must follow the charter, and it was used in same guideline for members practicing, especially, the activity involved money, it should have clear description for each topic. For the network which just began or involved less benefit, may have a regulation generally through agreement to practice together. Afterward, the network had more members, and more activities, it should have more clearly regulations. All regulations or rules or charter could be practiced, and aimed to provide the benefit for member as important point, offer it had been used for a period it should be revised and improved properly.

(5) Objectives, and targets of network should be the one to solve the problem of real life, mind, social, economic, environment, and quality of life, but it could start by which objective, it depended on nature of problem or situation that was urgent or not, it should benefit to members and community at present and future or for next generation continuously. Targets should cope with every members and family to participate and receive benefit with regard to social and community as a whole, Moreover, it emphasized on the new generations to have morality, devoting, natural loving, and local loving in order to transfer to network and community further.

(6) Body of knowledge and learning activity, the network should have body of knowledge in local wisdom integrated to modern body of knowledge that was appropriate and concurrent to objectives of network. This knowledge could raise the level of mind, economics, social, and environment concurrently, they should select

the body of knowledge which could solve the problems and meet the urgent needs of network first, simultaneously, members had learning to construct body of knowledge through the case research study by reaching the truth and using result from improvement of that one. The learning activity should be easy and uncomplicated. through practice together and then exchange the experiences each other, including, education excursion, training, seminar, experimenting, demonstrating, and learning from community history, in addition technological media. It emphasized on learning by doing, and direct experience through the man and real material, successful example, and applied for next use.

5.2.3 Pattern of management of learning process of network for plants diversity conservation, it wheel the following components:

1) Learning Components

(1) People who concerned learning management of network were the scholars who had known about species, strains, characteristics, breeding, and plant usefulness; most of them were the people who had experience on agricultural field and loving tracking in forest for hunting, and accumulated the knowledge from direct experience and be transferred through practice by learn from ancestors. The new scholars were the network members who tried on the rehabilitation agriculture in the mean of plant diversity creating and succeeded. There was a lot of plant diversity in local to have a change to transfer accumulated knowledge to new generation. External scholars were the agricultural officers at Tambon level, successful inspectors, academics. The scholars were employed by every network. The leaders of network should be the scholar and prototype of plant cultivation for plant diversity restoration.

The descendant of knowledge transferring should be every member in network and they grew the plant in the backyard, orchard, farm, and field in order to have diverse plants. They learnt from the scholars in group form such as for adolescences as Dek Huk Thin Group, herbal group, local fruit juice transformation group, local plant breeding group, including learning from each other through knowledge exchanging. The knowledge descendants were expanded in school to teachers and students the educational visitors were included as well.

(2) Body of knowledge on plant diversity conservation the network should pay attention to the aspect of roles of plant diversity to other creatures, community, environment, and ecosystem of present and future. Knowledge on local plant breeding, endanger species, plant as food, herbs, wood utility through using the natural ecosystem knowledge to create an imitated plot or called creating forest in home and orchard in order to have product for consumption and irritate forest lesser. It needed to use the knowledge on ecological agriculture, sustainable agriculture, agro-agriculture, integrated agriculture, new theory agriculture, natural agriculture, and organic agriculture as mechanism to restore the biodiversity in growing plot. For the forest area and community forest should be used as body of knowledge in form of ecotourism sites, to create members' awareness raising. For the utilization of plant diversity should be used for health and economics facets through the herbal restoration, consume food as drug to prevent diseases more them to cure. To know the way of life in previous time, there were using branch of trees as charcoal, the rest of fruits and vegetable as microorganism as fertilizer preparation. Using the modern knowledge did not destroy the biodiversity such as grafting, bud grafting.

(3) Knowledge transferring and development for plant diversity conservation in different opportunities to interrelation between network members and scholars both external and internal such as at meeting monthly, training, seminar, visiting, and successful example utilization, and natural forest tracking to ensure the members to turn back to cultivate plant diversity, including exchanging and sharing, seeds, and seeding, in addition defining activity for Dek Huk Thin Group and students to participate that activity for usefulness of transferring plant diversity to enrich protected forest, community forest, backyard, garden surrounding house. Learning to use plant directly, it was to prepare drug from herbs, to ferment microorganism fertilizer, fruit juice transformation for instance. It emphasized on method of transferring through real place, and giving benefit to real life.

(4) Objectives and goals of learning management for plant diversity conservation, network should manage learning for members to emphasize on consumption primarily, such as food, drugs, and utilized wood. The rest would be sold so the preparedness network must provide learning management for numerous members to grow the plants until they had knowledge much enough to be managed by

themselves about marketing as group system. When the product increased amount enough for sale in order that they could gain money and could decrease their debt faster such as Wangnumkheaw Network emphasized on nontoxic vegetable (organic vegetable) with various vegetables for each sub-group composing of at least 4 persons, and each member should grow the vegetables at least 6 kinds. So when they accumulated together they would have various kind of vegetable, simultaneously it kept the biodiversity in the plot as well

Learning management should stimulate the member to create knowledge and awareness in the value of plant diversity and to practice seriously, consequently. They attained the sustainable learning management for plant diversity conservation, which covered the development of human to be energetic person, and was able to use natural resources properly, including loving nature and restoring environment in order to create the biodiversity in orchard and forest, consequently, having good quality of life and interdependent society and harmonized with nature.

2) Phrase and method of learning for plant diversity conservation

(1) Phrase of network learning, it should stimulate member to realize the problem and find the mean for life and environment for next generation. The action research process was employed to stimulate members to revise their lives through question asking and solution searching reasonably by themselves. Subsequently, they created their self-confidences through studying in the forest actually, in addition educational excursion from the successful prototype, supplementary learning on traditional wisdom, and from the external scholars with the integration between modern knowledge and local wisdom. They had tried out through the actually practice of local plant breeding, cultivating the diverse plant surrounded house, and in orchard, including participation of herbal group, fruit juice transformation, integrated agriculture group, organic agriculture group, or others were established by network. The group level would control and monitor each member resulting, afterward the results were extended to external network.

(2) Learning method of plant diversity conservation, network should provide learning for members through the group process, and various projects were held by network or different agencies, including managing the members to present their work or prototype in order to enhance the effect to impact the society.

Most of activity was agriculture. Furthermore, it was enhanced in herbal aspect, merchants, wood product, transformation industry for instance. Learning methodology, it was constructed from the concept, then practice continuously, process of product management such as marketing management for products, group educational excursion activity through overnight in orchard to learn the activities, causing plant diversity cultivation to effect in economic aspect, particularly the member would gain the benefit from actual product.

(3) Learning activity for plant diversity conservation, network was able to hold learning activities, and other aspect paralleling for instance agricultural aspect, product transformation aspect, and marketing aspect. All these activities facilitated each other, there were local learning activities through sharing experiences among individuals, group by meeting, seminar, and educational excursion, furthermore directly experience practicing, demonstrating, and experimenting.

Network had meeting about supporting activities such as saving fund, cooperative shop. All activities were both group setting or member holding. Moreover, other agencies, or network or external network held together or supplementary holding all methodology like observation, discussion, group discussion, data collecting, forest tracking, network study, interviewing, attending lecture, folk tale story, rotating of meeting at network members' house, visiting scholars, community history, or bibliography for example.

3) Evaluation and Monitoring of learning plant diversity conservation, network evaluated learning achievement of members in various activities through the observation the members' interesting, and practicing, in addition the products of plant diversity in orchard both amounts and types were learning achievement. The leaders at group level and network committee would monitor and visit the members' orchard by chance such as meeting monthly at members' house. The instrument for monitoring was people, and recording form of plant cultivating both numbers and strains in order that the members could revise themselves.

5.2.4 Pattern of plant diversity conservation, it was such as pioneer to biodiversity conservation as follows:

1) Method of preservation and restoration of plant diversity conservation.

(1) Plant breeding, networks should emphasize local plant breeding, herbal plant, fruits, and woods utilization all purpose such as consumption and energy (charcoal), through integrated cultivation with interdependent between man and forest. It liked move forest to be place surrounded houses or in orchard, because there were local plant breeding for cultivation and sale generally. Therefore, there were irritating forest decreasingly, furthermore the forests are the sources of natural study, ecotourism, and the source of plant strains and other creatures for breeding. To cultivate diverse plants, it was assisting them for self-sufficiency. Moreover, it facilitated the environment to attain the balancing of ecosystem, including to conserving soil, water, forest through the natural method. In some area, network might support to grow the non-toxic plant (organic agriculture) by natural agriculture such as preparing the biological fertilizer or microorganism fertilizer in order to enrich soil, which of saved for health and environment. Therefore, to achieve the sustainable development, it was not only conservation the natural resource and environment through plant diverse conservation, it needed to manage in economic aspect through the efficient administration, management, and marketing by saving fund, and cooperative style in order to decrease the previous debt loading with the high interest rate.

It could be concluded that the various natural agriculture as mentioned above were employed, it would preserve the diverse plant strains, including to integrating the modern knowledge to traditional wisdom to breed. The plants strain and to spreads the strains such as grafting, bud grafting on top grafting in order to obtain the strong and good strain, particularly, endangered species.

(2) Cultivation in plot to create the plant diversity, it used the pattern of ecological agriculture, sustainable agriculture, integrated agriculture, natural agriculture, organic agriculture, ago-agriculture, and new theory agriculture. In order to have plants for consumption as food, herbs, and utility as shelter, clothes for short term and long term. It should be selected the cultivating pattern for environment and

land, including up to market requirements. At primarily, it should grow for consumption first, the rest would be sold. The area for vegetable planting should be nearby market because it would be convenient to sell and it should grow by the biological fertilizer or microorganism fertilizer to preserve and restore the soil and plant in order to conserve the ecosystem, it should be grown the fruit, perennial true, and vegetable correspondingly.

(3) Cultivation method for plant diversity conservation, there were various methods that should be selected properly. The local plant cultivation was selected as main plant for cultivating, breeding. Moreover, they cultivated the diverse plants in their field, and farm through the combining the different stories such as high, middle and low. The purpose of cultivation in order to consume, and the rest was sold. There was planting by using local technology such as manure, fermented fertilizer and the modern technology were employed, it should be environmentally sound technology such as biological fertilizer and microorganism by using spraying system. Besides, having water source for supplying, it should produce product all the year.

(4) Plant diversity preservation and restoration in the forest Conservation. Community forest or protected forest, it would be tourism site, and the forest would be restored by nature, and was irritated as least as possible when the members were able to grow essential plant in the cultivating plot.

2) Method of diverse plant usefulness

(1) Using the diverse plants as food, and drug, grow with natural agriculture method, it would save not only health but also environment, and it also decreased the expense in the family, increase the income for product sale.

(2) Using diverse plant as drug through traditional pattern, there were in different forms such as steaming, balling, and attaching.

(3) Plant products were transformed as food, local wine, dish washing liquid, fruit juice, and fermented fertilizer liquid, cloth washing liquid, health fermented solution, and skin nourishing solution.

(4) Using diverse plant, was products to increase income for family.

(5) Using diverse plant products, it was to build modern body knowledge such as food formula, herbal drug, biological fermented liquid.

5.2.5 Regarding factors on learning network development for plant diverse conservation were as follow:

1) Natural resources.

(1) Land

(1.1) Attributes, the member should be the land owner, and intend to grow the diverse plant for sustainability.

(1.2) Specific attribute, some members were not land owner, the network might provide land for vegetable growing at short period, but they also use the natural agriculture in order to produce high quality products, including to using the biological fertilizer preparation by themselves. In addition cultivating the local diverse plants for seeding sale.

(2) Water supply sources were important factor for plant restoration and biodiversity rehabilitation water was not only water resource for planting but also for consumption, and feeding animal. It was important to prepare for water supply such as using the new theory agriculture of his majesty the king in water management.

(2.1) Co-attribute, the area should have well which had size appropriate to land size

(2.2) Specific attribute, the area which could not dig a well, it should adapt according to land feature such as cultivating with agro-agriculture or using the public water source or other members' water source.

(3) Forest and Plant strain.

(3.1) Co attribute, the network located closely to forest, it still keep the enrichment, moreover, they were able to use forest as studying site, plant strain sources, and ecotourism site, which were all promoting factors for biodiversity value.

(3.2) Specific attribute, the network located far from forest or could not be capable to bring members to learn from forest. The network might bring them to educational excursion at network forest park or community forest in other network areas. However, they could buy the forest plant seeds or seeding or local plant strain from other areas for cultivation.

2) Human factor

(1) Scholars of knowledge transfer, people or wisdom leaders

(1.1) Co-attribute, network must search the local scholar who had knowledge on cultivation, preservation restoration, breeding, and plant utilization in various forms. These persons were local wisdom or traditional scholars, including external academic from educational institute of government sector with supporting the appropriate technology, and the successful persons in diverse plant cultivation of different natural agriculture as mentioned above.

(1.2) Specific attribute, some scholar had idea for specific pattern such as Buddhism practitioner like “Suntiasoka” guideline: They cultivated by organic agriculture technique and played respect to nature ideally, moreover, they were vegetarians, in addition the scholar in the specific aspect such as herbal drug.

(2) Member at individual level.

(2.1) General members, most of there were the people in community who had good status, education, same or alike occupation. Some network would accept only the landowner to be member, including some had grown plant with the ecological agriculture or integrated agriculture already. Network should provide opportunity of learning equally.

(2.2) Specific attribute members, they might had knowledge and experience much enough or as idealism concept or the previously be monk before or others who had specific potential. It should stimulate them to devote then specific skill for network in order to help the others.

(3) Leaders

(3.1) Co-attribute, the leader by position, network should select leader to administrate in various position of committee, including to the delegation from group level, community level or village level to be committee as Amphur level or Province level with a certain period according to agenda.

(3.2) Specific attribute, network leaders would be the person who assisted network willingly, they may be leader by position or not., but they were respected by the members. Moreover, they had creative thinking, which came from internal or external network. There leaders might be a leader as wisdom,

respecting, social status, economic status, or leader of other organization in community or education institute for instance.

3) Factors of Network Structures Aspect.

Co-attribute, administrative structures of networks these were as center, administration, and collaboration by network leader and network committee, which were delegation from sub-network or community members. They cooperated network in horizontal line, including collaborating with external organization from various sector, but most from the government as community development sector, educational institutes through the activities of ecological agriculture, natural agriculture, and sustainable agriculture, which were the types of agriculture that facilitated plant diversity in the orchard, saving, and plant product transformation in various forms.

(2) Specific attribute of administration structure, network could be able to develop, and establish sub-network when the members increased enough the collaboration with the external sectors it depend on leaders' competence and skill

4) External supporting factor

(1) Co-attribute, network had an opportunity to be supported by external organization both government and private sectors when they recognized fund the network work. External supporting might be people, fund or material.

(2) Specific attribute, network might get special supporting, it depended on the special attribute and work success that networks had implemented. The capability of leader to collaborate was congruent with objectives, principles, target, and goal of the supporting agency.

5.2.6 Attributes of successful model of learning network for plant diversity conservation contain 5 important parts. Organization called the model of the five attributes, which were the follows:

1) Developing from group to be network, it gradually developed as preparedness, work success, and members' happiness in order to attain sustainable network.

2) Network organization strength, it composed of high competent leader who had for vision. In addition to having rules, regulations which

were regulated by members, but it must be flexible to practice in the part concerning culture and way of life., democratic management, having development target as integrated style all aspects of life, social, economic, environment, and quality of life, including management cycle, such as production, consumption, transformation, and marketing.

3) Having learning process, there was integration local knowledge to modern knowledge without destroying culture and environment, including emphasizing on learning by practices. Moreover, evaluation was made subjectively from the actual result of plant diversity in cultivating plot or orchard. It was obviously seen that Richness index of network members had higher value than non-member. There were various learning methods were employed such as training, seminar, researching, and experience exchanging, educational excursion and actual practicing. In addition to learning from internal and external scholar, there were knowledge transforming to members and new generation in order to create the understanding of ecosystem and valuable of biodiversity.

4) Having patterns of biodiversity the environmental agriculture or agriculture for environmental conservation were employed through plant diversity conservation without chemical utilization in order to decrease irritating the forest and let it had natural succession, and the environment would return to balance ecosystem lastly.

5) Having promoting factors for supporting the development of learning network, there were knowledge resources, management that related continuously. If it lacked of one part, they would not success in network development as the model of the five attributes as concluded in figure 26.

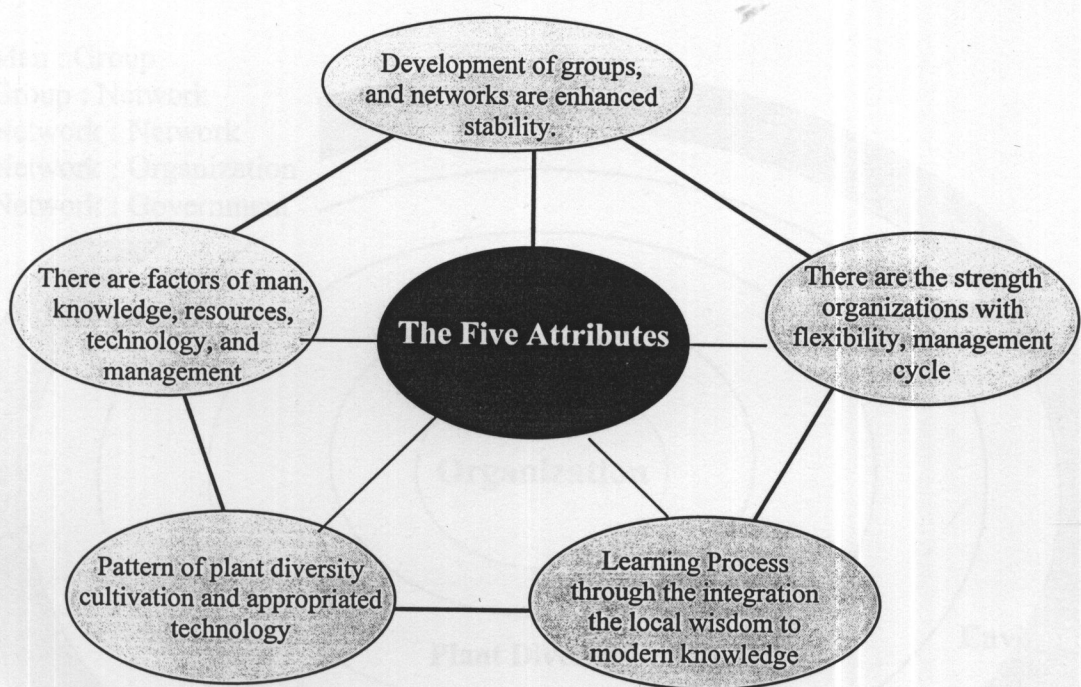


Figure 26 Attributes of successful Model of learning network for plant diversity conservation.

5.2.7 Subsequent results of learning network development for plant diversity conservation to reach the biodiversity.

1) Subsequent results, when the learning network plant diversity conservation were developed, and consequently network members were able to create plant diversity in the plot or orchard for long term, it caused the natural resource environment restoration, and moreover, the biodiversity occurred. When the debris of leaves, branches had decayed, it become natural fertilizer. Therefore the amount of mushroom, fungi, microorganism in soil, insets, ants, termites, rats, snakes and birds, including other animals which had to live mutually would have occurred and finally the ecosystem become balancing. The other activities were sequential occurrence.

2) Components for subsequent result construction for biodiversity conservation at national level, it needs the excellent cooperation in network among people, groups, networks, various organizations both government, private sectors, networks at national level, and international level illustrated in Figure 27.

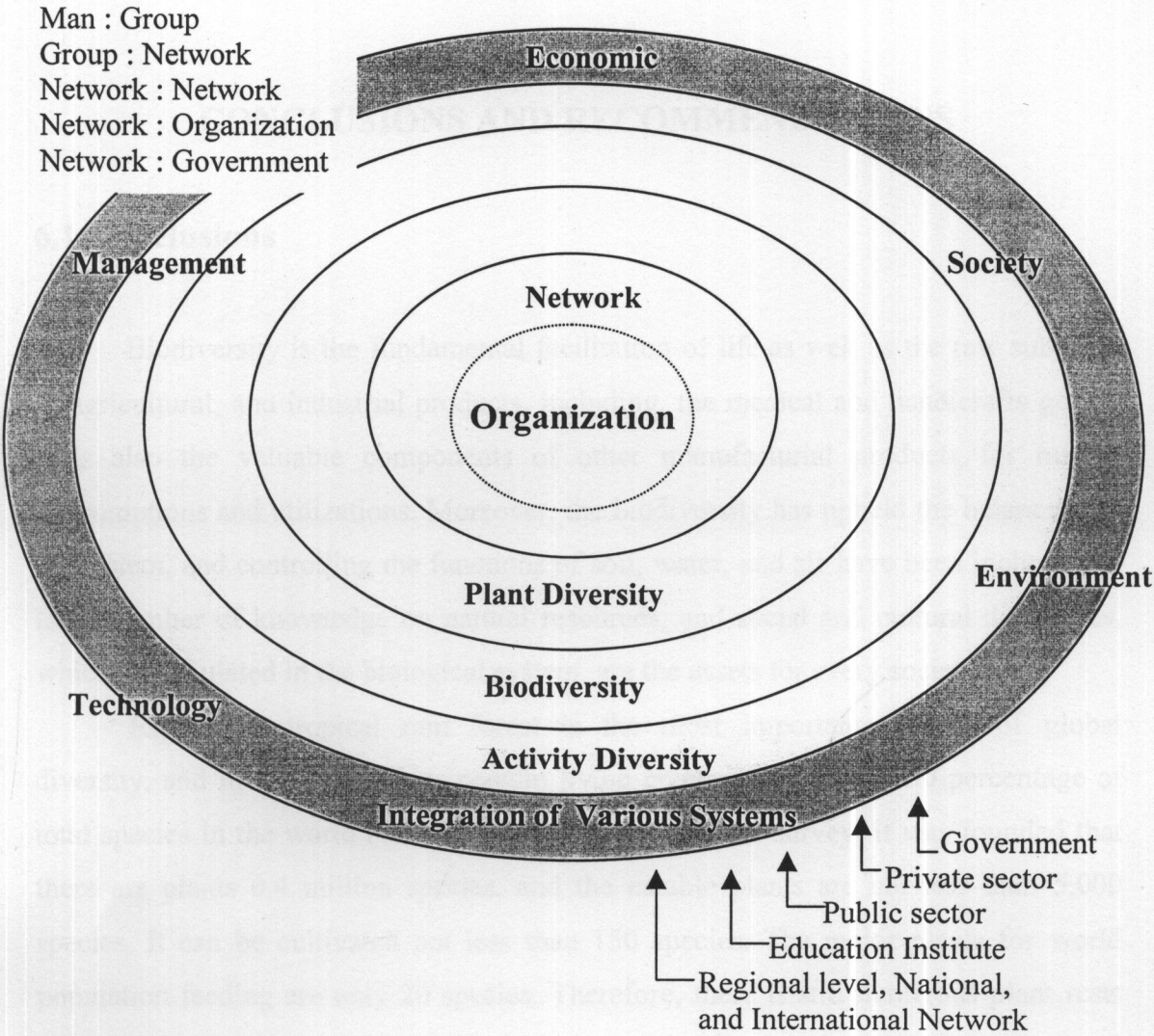


Figure 27 Subsequent results construction from leaving network development for plant diversity conservation to reach biodiversity conservation.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Biodiversity is the fundamental facilitation of life as well as the raw substrate of agricultural, and industrial products, including, the medical and handicrafts goods. It is also the valuable components of other manufactural products for human consumptions and utilizations. Moreover, the biodiversity has upheld the balancing of ecosystem, and controlling the functions of soil, water, and air have been included. A large number of knowledge on natural resources, and social and cultural diversities, which accumulated in the biological system, are the assets for every society.

Especially, tropical rain forest is the most important sources of global diversity, and in this boundaries contain living creatures more than 50 percentage of total species in the world (1.7 million species). From the survey, it was founded that there are plants 0.4 million species, and the eatable plants are not less than 5,000 species. It can be cultivated not less than 150 species. The major plants for world population feeding are only 20 species. Therefore, there is still numerous plant rests that can be used as foods more than present so people can take advantage more and more from biological diversity.

This study, looks for the model of learning network development that was able to be implemented plant diversity conservation appropriately for applying overall the country. The research was designed to “Learning Network Development for Biodiversity Conservation”, it searches for the model of learning network development for plant diversity conservation, through the analysis the construction and improvement of characteristics in order to sustain learning network, process, learning method, including, the factors involving on learning network development for plant diversity conservation cause behavior changing, subsequently, pattern of plant diversity conservation occurred properly. The researcher defined research implementation, which composed of research model through the qualitative and

quantitative techniques in order to be for analysis ease study and inclination the proposal model by the integration of 3 networks that were Inpang Center Network, Thepnimit Eco-Agriculture Club, and Wungnumkheaw Organic Farming Promoting Group. It was the purposive sampling Technique, by defining the site selection through the population of region which had lowest income and the rest forest area at present by company with total area of region. It has found that the northeastern region had forest proportion was the least which the forest was the important origin of biodiversity, particularly people located nearby the buffer zone or community forest that they depend on forest for living. Subsequently, some forests decrease in both natural resources and biodiversity, especially plant diversity. However, it was found that the communities surrounded the three important ranges, the people in these areas had gathering to be network and holding learning management. Therefore, the members knew one way to do plant diversity conservation through alternative agriculture in order to erect biodiversity in the cultivating plot until they got the acceptable results as seen in the experts' recommendation and presentation of the academic documents. The research was surveyed at three actual areas. Therefore, they were selected as case studies.

The researcher had collected data from three sampling groups. The collected samples from three networks were equal in numbers, including 1) three presidents from three networks, 2) fifteen persons of network committee, 3) three network consultants, 4) twelve presidents at group level, 5) thirty committee members at group level, 6) sixteen networks persons at individual level, 7) seven consonneurs (experts), which makes a total of 138 persons.

Data Collection Method. In-depth interviews, focus group discussions, history Records, questionnaires, participatory observations were employed to collect documentary information regarding plant strains in experimental plots, and plant diversity records as well as evaluation forms.

Monitoring and Analyses of data, the researcher had examined the quantitative data by triangulation technique, considering different times, places, and man, but the data would be same through analysis through comparison of events, the compilation of types and attributes of data. Moreover, it was enhancing the data comparison more

extensively and it was concluded subjectively, but for quantitative data. The program SPSS for Windows was employed for analysis.

This research conclusion was defined into six phases, concluding through holistic view of research from the important contents of three case studies in order to attain the research objectives and answer the research problem of all six aspects as follows:

Attributes of construction and learning network development, which are concluded as follows:

- 1) For learning network development, it was found that the network establishment occurred from the stimulation through learning, exchanging by the change agents (leader). They might be the researchers from local educational institutes and the successful prototypes by developers who are Buddhist practitioners, such as “Santiasoka” Furthermore, there was group establishment by people who had congruent problems and needs, in order to implement the activity to search for the meaning of life and community problems. After the implementation was successful, it was extended from a small group to a big group,, and having variable activities, including expanding the area of one community to numerous communities, and connecting together as a network. Moreover, there were organizations that act as centers and administrators of the network.

- 2) There were goals of established networks in order to exchange learning through using activities or actual practices. According to the principle of thinking together, including linking as collaborators who had equal relationships, but they were independent decision making. The group level had authority to manage without against the policy, goals and network regulations of network.

- 3) Organizations played as network centers, which are called centers, clubs, or groups in order to cooperate among groups at different levels in the policies, goals, and objective aspects. There should also be a gathering of different groups to assist each other in solving problems and fulfilling the members’ needs, in addition to supporting the community development.

- 4) Organizational structure is composed of network organizational committees, like presidents and committees of different sectors. The numbers depend on the group of members, because each group would send the delegation to be a

network committee. After there was a committee selection, the committee would elect presidents and vice presidents. Moreover, they would define the obligations and roles of different sectors according to the job burdens, and activities which more or less are in each network loading. There also was a collaborator position in the community at village level and up.

5) The internal administration of the network uses decentralization principles out of the network organization to network at community level through province network to Amphur network, Tambon network, village network, and in the village network there were various groups according to the type of activity.

6) Linkage relations between members and network organizations are connections of administration those are equal to an unchanging relationship between network members in each level. The relationship emphasizes on the objective as main, and the relationship as self-dependent and interdependent as well.

7) Linkages with the external networks are interdependent collaborations with each other by external organizations supporting in academic, concepts, projects, budget as network proposals, or through the cooperation in thinking, decision making. The external organizations were all levels of organizations such as local, regional, and national, including the government or private sector.

Most of the external organizations participated on the basis of concepts and causes more than policies. When they accepted the outcome of network works, so the network would be a prototypes for extension of project implementation which was congruent to network policy through the network personnel and practical guideline in the local area. However, the external organization had budgets, policies, plans, and academic support.

8) The network enhancing occurs from the successful work, and various activities that participate as freely exceptional. The main activity that everyone must participate such as saving, and training the first time when members entered. Moreover, when the number of members increases, it needed to increase the positions in the organization, or when the sub-network increase.

9) The network objectives aimed to empower the society by using wisdom, potential, existing natural resources to join together in order to cause the knowledge exchanging for problem solving. The members' potential development

through the goals for development of economics, society, quality of life, and environment as a holistic aspect in order to strengthen the network and community for self-dependent sustainability.

10) Rules and regulations as network criteria come from the community culture on fundamentals of relative interdependence, integrating with the concept of management of external knowledge. The members would establish the rules and regulations as chartered together, which was flexible and adjustable as network dynamics but through the agreement of members.

11) Network leaders are of two kinds: leaders by position, from the election, and natural leaders, such as those with wisdom, a cultural leader, respected leader through the prototype leader as practitioners who had competence in communication and knowledge transformation, including traditional wisdom, experiences, and vision. The successful development as network guidelines also depended upon whether they had good relationships with others, a sense of justice, and open-minded aim for public interest.

12) Network members are people in the community who have basic problems, concepts, way of life, needs and goals. They cooperate in meetings, participate in network activities seriously, including accepting the network motto, believe in potential, and other human values by aiming the public benefit and individuals properly.

13) Body of knowledge is brought to exchange for learning regularly. The knowledge for life and community benefits all aspects of the society, health, culture, economy, and environment. It is the knowledge that is gathered in the same issue through both local wisdom and modern knowledge.

14) Learning method in networks include the scholar who plays roles in knowledge transferring to members and youth. The energetic members would integrate local wisdom to modern knowledge and then try to practice in order to create the innovation knowledge to disseminate and provide continuous learning, through both internal and external networks.

15) Learning activities have both informal learning among network members through meetings, discussions, visiting, and formal learning that the network provides to members such as educational visiting, seminars, training, meeting, and

experiment exchanging that held in both inside/outside network. The important point was to hold monthly meetings that cause learning each other through the learning activity of successful samples by communicating with men and materials as media. It emphasized on setting the question to search for answers, including research action. It was found that the external developers and thinkers played important roles in supporting experimental learning to members through permanent developers as the consultant of networks.

16) Strategies of learning through the group process include participating in thinking, practicing, and exchanging regularly.

17) Learning results occur from practice, and the successful measurement that include objectives occurring from all economics, society, and environment, and become the pattern or sample for others.

Learning process of networks for plant diversity conservation, it was found that the learning process of network simple implemented to get the results must compose of important components that were man, knowledge transferring with the objectives, goals of learning, and methodology of learning which had activity concerning the plant strain preservation and restoration usefulness as food, herbs, and plant utility. These include using both products directly and transforming the product for added value indirectly. The members would learn from scholars or among themselves, or through the learning from the successful examples about ecological agriculture, natural agriculture, and organic culture that made the members realize the plant value and growing diversity of plants in the plot or orchard. The network committee and group collaborators would monitor the result by asking questions and report in the monthly meetings. In addition to visiting to examine the plant product, product transformation and marketing was done by network management. The important issues were concluded as follows:

1) Persons who are concerned in providing learning for plant strain conservation. Most of them were the persons who had tracking experience in forests, hunting, and cultivating as local agriculture.

2) New scholars act as knowledge transfers in plant strain breeding was the successful person of ecological agriculture, natural agriculture, integrated agriculture, and herb enlightening. It was the success from the actual practice. Most

of them work hard, and have basics of nature loving, forest loving, and learning from studying of prototype of successful person.

3) Member learning on plant conservation is learned from observation of nature from other orchards, and learning from the successful prototype and trying by actual practice.

4) Components of learning, the importance was the knowledge on ecological agriculture, natural agriculture, and integrated agriculture, which had the same basic that was cultivation the diverse plant in order to interdependent, adding the non-chemical substance such as utilization of natural fertilizer assist in planting, simultaneously, they had knowledge on biological fertilizers preparation from plants, utility of plant transformation, as fruit juice, biological solution for health, , and wine, including the knowledge on management on marketing of plant cultivation and plant breeding. Moreover, they should knowledge on herbs as health product for prevention, drugs treatment. In addition to supporting for preservation and rehabilitation of forest and natural environment all sites such as surrounded their home, fields, farms, and orchards. The most important point that know how to use the plant diversity usefulness because it was the essential compartment in the knowledge about environmentally sound agriculture technique, herbal utilization, and fruit, and vegetable transformation.

5) Knowledge on nature and forest conservation located nearby network community that was the knowledge on balancing of ecosystem, the interdependence among plants, between plants and animals, and the human was dependent on forest in forms of food, drugs, shelters, and clothes.

6) Media and places for network learning, those were forest, educational walking in forest, ecological agriculture, organic vegetable planting, herbal plot, integrated agriculture, protected forest, seed for seeding cultivation, plant product for drug preparation, fruit juice transformation as products. It was using the media from the genuine and natures.

7) Curriculum management on plant diversity conservation directly, it had never seen before, but it was found in the sustainable agriculture, ecological agriculture, herbal learning curriculum, microorganism fertilizer preparation, and marketing management on plant products by the cooperation of network and various

organizations which supported the issue that had the goals on cultivation, rehabilitation, and utilization on plants diversity at all.

8) The persons concerning the learning management supported plant diversity conservation were the network committee, which most of them had plant diversity conservation existing, the officers of both government and private sectors who brought about agricultures, herbs, and product transformation to support the scholars inside and outside community who had been successful before, including to the network member participated in the learning process and went back to practice.

9) There were using the community forest and protected forest for community tourism in order to learn the management for plant diversity conservation in forest.

10) The learning criteria, those were the goals of ecological agriculture, natural agriculture, integrated agriculture, and sustainable agriculture as the main criteria of learning through the group process, practice, external organization supporting as projects, budget, and academics because it had no rigid learning criteria, but it emphasized on local plants cultivation, fruit tree, perennial tree, endangered tree, particularly, in some area they grew the vegetable under the tree but it needed the special study on the compatible plant and vegetable mutually.

Pattern for plant diversity conservation was used by network, it could be concluded as follows:

1) There was attribute which emphasized on conservation outside the protected forest such as in farm, and field in order to breed for cultivation for consumption, utilization, and drug purposes. It would effect conserving the forest for having an opportunity to rehabilitate and have natural succession. Some community used the community forest, protected forest as tourism sites as pattern of plant diversity conservation which existed in forest sustainably.

2) Implementation was used through agriculture, breeding, product transforming, and microorganism fertilizer preparation as principle of practicing, including to highlighting on creating the forest in house. The forest was the source of plant genetic supply, and the studying site, otherwise as source of breeding strain more than as product collecting, exception, some kind of plants, fruits, and insect which had in forest only.

3) Plant species and strains conservation, it was highlighted on endangered species, local plant strain because of its strength, in addition herbs, insect propellant plants, the modern strain plant brought for approach grafting, top grafting, and bud grafting. In the ecological agriculture network was developed on the guideline of culture, it emphasized on local plant conservation, but for the natural agricultural network would stress on soil enrichment promoting through the natural fertilizer utilization.

4) Method of cultivation of network members, the local natural method was employed, they used the simple instruments such as manure, fermented fertilizer, fresh fertilizer, and supporting with the modern agriculture such as grafting. Some area they used the microorganism fertilizer, non toxic substances, and spraying system, and water dropping system, plough machine, however it depended on the instrument supporting, and policy of network.

5) Land for cultivation of members, It contained richness of plant strains, and numbers more than the area of non-member agriculturists.

6) Plant strain sources, most of them were collected from natural forest, and it was origin of plant strains. The network grew the various kind of vegetable by the organic agriculture, the members used the seeds for breeding from the network cooperative, including to using the local strains as well.

7) The plant strains usefulness, they used both directly as drug, herbs, vegetable, fruits and indirectly as product transformation for consumption and sale. The network would manage marketing, simultaneously, training members to know marketing management as well.

Network learning management would effect members' behavior of plant diversity conservation.

The network managed learning activity for members regularly, and implemented for long time enough, it should members to raise awareness and practice increasingly.

The members' behavior on plant conservation, it could be concluded that network members had knowledge, awareness, and practice for rehabilitation and utilization plant diversity at more and most level, and the member who participate

more than 3 years, would practice for plant diversity conservation at more level, and the members who participate more than 7 years, would have knowledge and awareness at high level. The network would establish more than 8 years, the member would participate plant diversity conservation more than the member of network which established for less than 3 years.

The important involved factors of network learning for plant diversity conservation, it could be concluded as follows:

- 1) Network leaders were the good prototypes to devote for public.
- 2) Network members learnt and practice recurrently, would intend to cooperate for sustainability.
- 3) External components were government organization and private practice other networks, business organization, and educational institutes would support both funds, and projects, afterward it was used network as prototype to cause impact and outcome.
- 4) Utilization of local wisdom and knowledge of appropriate technology were employed for knowledge transferring in the network.
- 5) Network organization would cooperate for meeting, and supporting knowledge and experience for members regularly.

The proper model of learning network development for plant diversity conservation was the five attributes network which had 5 attributes as follows:

- 1) Network established and development by the cooperation among individuals, groups, networks, government organization, and private organization through the goal of successful work and members' happiness more than benefit regarding.
- 2) There was strong network organization which composed of leaders who had far vision and high competence to practice as prototypes and high capacity of knowledge transferring, in addition to committee who were delegations from community level, simultaneously, there was administration democratically.
- 3) There was using the learning process through knowledge body as integrating of local wisdom and modern knowledge, which stressed on learning activity on practicing, subsequently, evaluation the network success on creation of plant diversity and biodiversity in orchard. The various learning pattern were

employed such as successful example, meeting, discussion, experience exchanging, learning from scholars, and using the actual media in community in order to make members to learn about social, economic, and environmental development to achieve self-reliance as well.

4) There was pattern of biodiversity construction starting through plant diversity conservation in orchard which contained plant in form of food, fruit, herb, and utilized wood. It was to build the forest in house and orchard, consequently, the occurring of balancing ecosystem and biodiversity in long term. Furthermore, it emphasized on local plant rehabilitation, endangered plant protection through the sustainable agriculture, ecological agriculture, and others which was proper for soil, water, and forest by natural method. There were community forest and natural forest as the learning sources and plant strain restoration and biodiversity existing.

5) There were the important factors which supported the learning network development such as man, knowledge, fund, resources, management, appropriate technology, and strategy of harmonization of power of body, mind, thinking, knowledge, fund, and resources as social synergy power, including using research action, public relation, meeting, seminar, and knowledge exchanging in order to stimulate the network establishment and development continuously, through the supporting and facilitating of internal and external organization.

6.2 Recommendations

Recommendations on utilization for result extension of learning network development on biodiversity conservation, it has implementation as following.

6.2.1 Recommendations from the Study

1) Learning network development of community, it should link and cooperate between network and organization in all local, regional, national, and international levels to connect to be social community for cooperation of development in various aspects.

2) Responsible bureau on environment and natural resources, particularly, Agricultural Land Reform Office should stimulate and support to

establish learning network in different areas to pay attention to environment, simultaneously development on society, economy, and life quality through the successful network prototype for result extension.

3) Bureau had obligation to watch over forest, especially the Royal Forestry Department should support communities or networks which have been already developed the agricultural orchard to create biodiversity through co-planning and supporting communities to use protected forest as source of seeds and seedlings stock for breeding; and the site of natural learning.

4) Connecting among networks, even though there were existing implementation on the base of different causes, and concepts. However, it should have an opportunity to exchange body of knowledge, strategies on biodiversity conservation, and environment in accordance with social, economic, and life quality developments by the educational institutes or involved organizations to work on environmental aspect that have obligations to link and collaborate continuously.

5) Community network should provide more changes for people in the community to be member increasingly. Including information development for members and interested persons in term of monthly newsletter, or every three months to inform the mobilization in order to stimulate member development to achieve the sustainable development.

6) Concerned bureau and educational institutes on environmental education aspect should cooperate to support environmental learning through the people process in term of organizations and community networks increasingly for benefit of environmental education development to people, and construction body of knowledge for institutes such as holding seminar, meeting, conference, workshop, and research action.

7) Bureau of biological resources, these should pay attention to the roles and functions of community to develop the local people potential in order to capable of guarding biological resources in the nearby forest, and agricultural areas through appropriate technology, action research, including supporting the network projects, or upholding to establish more learning network.

6.2.2 Recommendations for further research

The research results concluded that the learning network had played very important roles for biodiversity conservation, especially whenever plant diversity conservation was successful, it would be the essential strategy for environmental education management by community. Therefore, it should have the succeeding research on the issues as follows:

1) The implementation of community network and learning network in other aspects should be employed such as evaluation on the project of the involved factors to sustain the network, life cycle of network, the strategy for network management.

2) Roles and functions of organizations had supported the learning network in order to search the methodology to create the collaboration between networks and different organizations.

3) Gathering the body of knowledge on plant diversity conservation in different areas in order to synthesize to be Thai wisdom.

4) Environmental education management should be provided by the community or community network in other aspects such as soil and forest conservation, including garbage management and others which concerned to environment in order to develop the environmental education management by community or network.

5) Comparative research on pattern on environmental agriculture on biodiversity conservation should be set to analyze to propose the appropriate model on biodiversity conservation.

6) Analysis the chemical characteristics of biological fermentation solutions which were prepared in the various formulas by networks, in addition it should be developed the standard of production.

7) Surveying and mapping community network in term of environment over all country should be employed.

8) It should have the action research on learning network development for biological conservation and improve the network implementation strategy for sustainability.

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APPENDIX A

Authorized Experts' List

1. Assoc. Prof. Dr.
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Faculty of Industrial Education
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Ladkrabang
Ministry of University Affairs
2. Dr. Kasem Suuksathan
Department of Agroforestry
Faculty of Agriculture, Kasetsart University
Ministry of University Affairs
3. Dr. Bunthinee Sutharasukon
Department of Agricultural Economy
Faculty of Economics, Kasetsart University
Ministry of University Affairs
4. Dr. Vichien Petpisit
Director of Botany and Weed Science
Department of Agriculture
Ministry of Agriculture and Cooperative
5. Mrs. Rataya Chantien
Chairwomen, Seub Nakhasathien Foundation
6. Lecturer Preecha Uitrakul
Rajabhat Institute Nakorn Rachasima
Rajabhat Institute Council
Ministry of Education
7. Mr. Vithawat Sarasalin
Economist Level 7
Office of Agriculture Economics
Ministry of Agriculture and Cooperative
8. Mr. Surin Kitnitchi
Expert in Indegenous Knowledge
Tambon Bangnomko
Amphur Sena
Pranakornsriayuthaya Province
9. Mr. Viboon Khemchalerm
Expert in Local Wisdom
Tambon Talad Krathing
Amphur Sanamchaihket
Chacheangchao Province

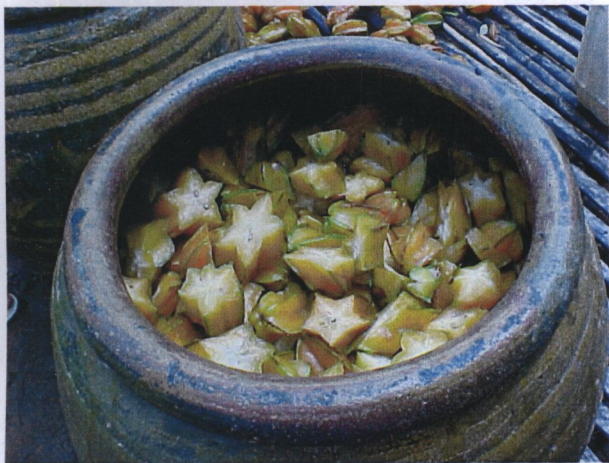
Conservation APPENDIX B

Thepmit Ecological Agriculture

Conservation Activities for Plant Diversity in Inpang Center Network



**Conservation Activities for Plant Diversity in
Thepnimit Ecological Agriculture Club Network**



**Conservation Activities for Plant Diversity in
Wungnumkheaw Organic Farming Promotion Group Network**



BIOGRAPHY

NAME	Miss Suwaree Sripoona
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