The Guidelines for Development of Agricultural Areas Based on Concepts from Participatory Ecological Agriculture to Solve Environmental Problems

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Abstract
The objectives of this project are to design and develop agricultural areas in accordance with the concept of participatory agriculture ecology to solve poverty and protect the environment by using the study of Landscape ecology and agriculture ecology concepts. In-depth interviews were used to explore the problems and impacts of agriculture affecting the economy Society and Environment of Wapi Pathum District Maha Sarakham Province. The key findings showed that the former agricultural area was all forest areas. The forest area was transformed into the agriculture area. This community has been doing agriculture for more than 50 years and the farmers have been using fertilizer and chemicals for a long time. This results in reduced agricultural production and environmental deterioration. Therefore, these solutions not only must add the concept of "New Theory Agriculture" to introduce to the farmers by focusing on growing a variety of plants for various uses, "Khok Nong Na Model" concept should be implemented to help enhance land and water management for agriculture activities throughout the year also. Moreover “Agroforestry” together with "Organic agriculture" will help rehabilitate the completely degraded forest area and the treatment of soil, water, and air with the ecological plants could potentially help reduce toxins in the environment also. Finally, the Principles of landscape agricultural guidelines will help to create beautiful agricultural areas, sustainable, suitable for learning resources and tourist attractions. Combining these concepts together contributes to a new type of agriculture to help and create a better quality environment.

Keywords: Landscape Ecology, Agricultural Ecology, New Theory Agriculture, Khok Nong Na Model

Introduction

Agriculture is the top income-generating profession in Thailand. They are an important occupation because it is tied to the way of life of the community. Mahasarakham is one of the provinces where agriculture is the main occupation. However, there is a space limitation because most areas are flat and hilly that called “Khok”. The soil characteristics are sandy and loamy soils that absorb water badly, lack moisture. The area lacks consistent water resources. The seasonal rainfall fluctuations and frequent droughts affect the quantity of agricultural products. This can negatively impact local and regional household income levels (Ministry of Agriculture and Cooperatives). Agriculture in the past was to modify the natural area for growing crops and raising animals that are born into the farming system (Agro-Ecology Systems) (Surachet, 1997). The agricultural area inserted into the natural ecosystem was small. Farmers would remove weeds and small plants, but large trees would remain. Thus they produced hybrid crops such as fruits, herbs, and vegetables for the kitchen garden.

The farming did not have problems for the environment in the past because taking into account the ecosystem, and the dependence of living, and inanimate matter as a form of sustainable agriculture (Claudia Dinep and Kristin Schwab 2010). Presently, agricultural development has expanded considerably; encroaching upon the forest and altering the natural topography through the use of machines to plow waterways and marshes. Modern agriculture focuses on monoculture of economic crops for export such as rice, corn, cassava. The use of agricultural fertilizers and chemicals causes contamination in the soil, water, and air, negatively affecting the environment. King Rama IX saw these agricultural problems and established various royal initiatives to search for solutions. One such initiative was the establishment of a Research and Development Center Khao Hin Son, Chachoengsao Province. This Center aims to collect, study, experiment, and develop strategies to improve agricultural areas as they become agricultural learning centers. Secondly, the Center aims to create environmental & ecological strategies to develop water resources, reforestation, and land development. They are planning for growing crops and livestock in self-reliant ways by using the "New Theory Agriculture" concept. "New Theory Agriculture" uses community wisdom to be adapted for agriculture that focuses on producing enough to eat; farmers build a sustainable society via a balanced approach.

The "Agro-forestry" concept was farming in degraded forest areas; the main idea was to restore the forest by planting crops or raising animals inserted in degraded forest, to create agricultural systems resonant with the forest ecosystems (Talmud tradition against the criminal, the DEA.). Moreover, the "Khok Nong Na Model" was the new concept of agriculture areas that focuses on process improvement and water management.

The goals of this study are to first, study the three types of farming concepts to analyze the management of three models and study of working processes and the advantages and disadvantages that affected the environment based on ecological agriculture. Secondly, this study shall identify successful strategies for agricultural development, finding new solutions for making agriculture a valuable space, and then create sustainability for the economy, society, and environment, according to

landscape ecology. (Wenche Dramstad, James D. Olson, and Richard T.T. Forman. 1996).

Objective of research

First, to study the three types of farming concepts to analyze the management of three models and study of working processes and the advantages and disadvantages that affected the environment based on ecological agriculture.

Second, to find the quality and potential of agricultural models, and find a new solution of making agriculture a valuable space, and then create sustainability for the economy, society, and environment, according to landscape ecology.

Research process

The guidelines for the development of agricultural areas are based on concepts from participatory of the ecological agriculture to solve environmental problems. It is qualitative research and the research has three parts: the first, study concepts of education and the theories such as Landscape Ecology, Agriculture Ecology, the "New Theory Agriculture" "Agro-forestry" and the "Khok Nong Na Model" for analyzing the agriculture patterns, apace management, planting of vegetation, analyze advantages and disadvantages, and developing the new agriculture. The second, study and survey of the agricultural area of agricultural examples in Nong Saeng district. Wapi Pathum district, Mahasarakham province in order to study agricultural patterns, problems, and impacts, and to find solutions to develop the agriculture areas according to landscape ecology and agriculture ecology. The third, design guidelines for agriculture plan best on the landscape architecture design concept, and create sustainability of the agricultural.

The expansion of the agricultural area in Thailand

Since 2002, Thailand has a national economic development plan and an increase in agricultural development. From 2003 to 2015, Thailand has a survey of the land, all most the area is 320,696,888 rai, the forest area are 106,319,188 rai, agriculture areas are 151,004,165 rai, the rice fields are 68,728,283 rai, the crops farm are 30,734,030 rai, orchards and perennial plants are 36,932,127 rai, the vegetable garden, flowers, and ornamental plants are 1,400,999 rai, and others 11,458,279 rai. The Northeast was the region with the largest agricultural area in the country, with a total area of 63,858,129 rai, followed by the North and the Central and South (Office of Agricultural Economics).

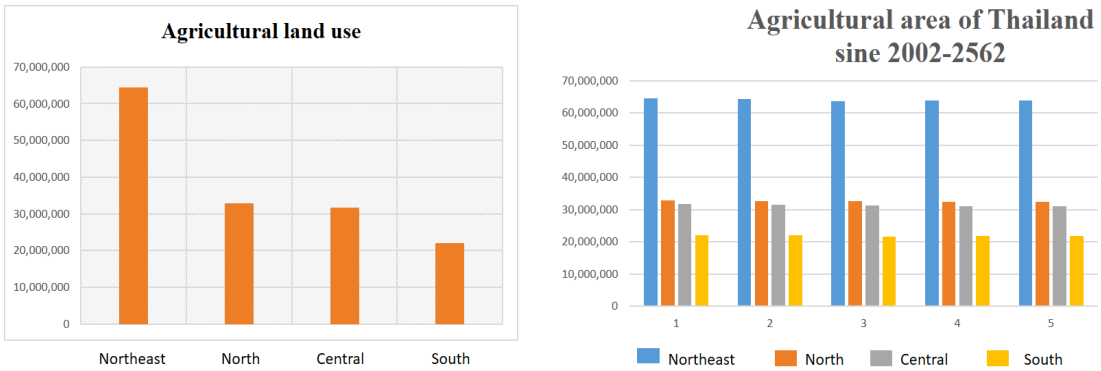

Figure 1: The areas of agricultural in Thailand

The database of the land use from the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, and the National Statistical Office found that the Northeast has the greatest agricultural development in Thailand since 2002. This has caused the amount of forest to decline; from 1963 to 2019 the forest area has decreased by more than 80%. (Seub Naksathien Foundation). Mahasarakham Province has a total area are 3,307,302 rai, forested areas are 121,750 rai, but the agricultural area are 2,830,155 rai. The comparing on the proportion of forest and agricultural areas of Mahasarakham is evident; there is only 3.67% of the total forest area, but agriculture has reached 85.57%. Consistent with the 1973 to 2018 survey, found that the forest area in the northeast region has decreased from 31,669,375 rai to 15,750,099 rai (Royal Forest Department).

The reduction of forests and converted into agricultural areas causes many problems such as hot weather, seasonal rain, and drought because there was no forest to help absorb water, nor increase soil moisture.

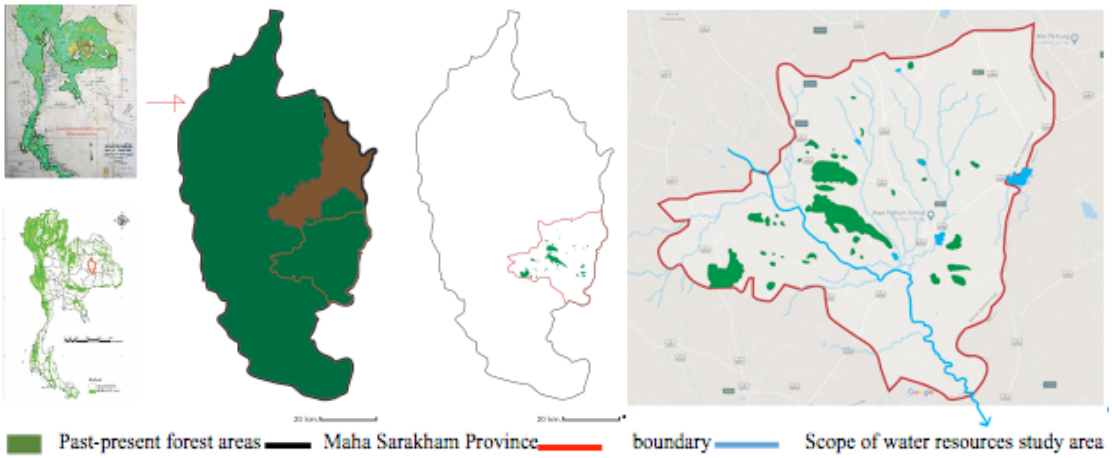

Figure 2: The diagram illustrates information the expansion of the agricultural area from 1963 to 2019

Wapi Pathum District, Mahasarakham Province, it has an agricultural area of 284,181 rai, with a cultivated area of 8 of the totals of 13 districts. Moreover, the number one product is the yield of 102,677.42 tons. Wapi Pathum District has 12,917 irrigated areas, but still not enough as well. There is still a water shortage area of 270,539 rai. (Maha Sarakham Provincial Agriculture Office). Wapi Pathum district exists in the Mun River basin. There are many important water sources such as Huai Chok Kwang,

Nong Hai Hong Song Maew, so the agriculture of this place has more productivity than other places.

In-depth research of the area found the problem of soil degradation, and water shortages, the farmers cannot grow offseason. It also found that the problem of encroachment and destruction of forest resources, such as illegal logging and deforestation, littering in community forests, allowing people to use and produce food in degraded forest areas without proper supervision, and allow monocultures instead of a variety of crops. All of the problems cause the forest degraded areas.

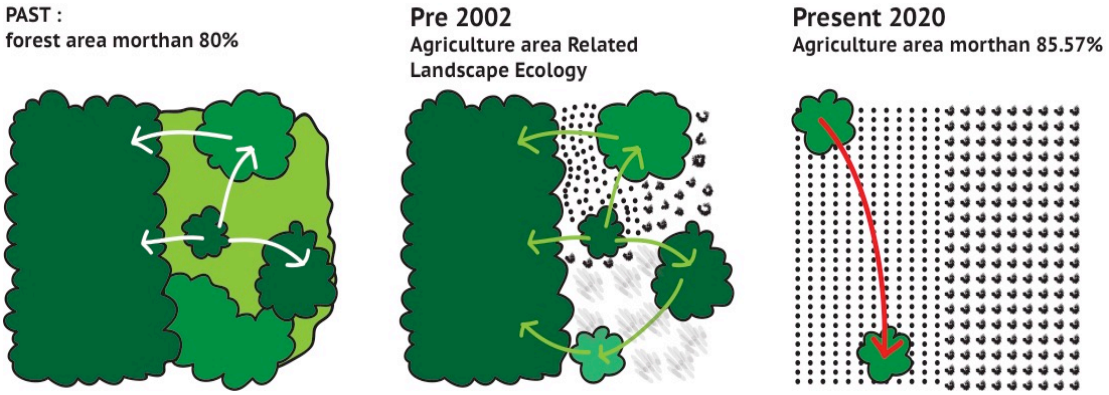

Figure 3: The diagram illustrates information about the transformation of forest areas to agricultural areas in Mahasarakham Province.

Thailand has been importing pesticides for decades, from the documents supporting the urgent report on the consideration of chemical use control of the Department of Agriculture, it was found that from 2008 to 2019, Thailand imported agricultural pesticides including herbicides, pesticides, and plant protection agents totaling 1,663,780 tons since a month. From October 2018 to July 2019, there were more than 3,000 cases of poisoning from pesticides and more than 407 deaths and 2,193 deaths in 2016-2019 (Department of Agriculture Office of Agricultural Economics)

Mahasarakham's agricultural area also uses many chemicals. Since the production process uses growth accelerators, chemical fertilizers, and fertilizer application acceleration. Chemical fertilizers accelerate flowering chemical fertilizers to expand the fruit and herbicides. Those factors cause an accumulation of toxins in the soil, water, and air, and affect the ecosystem in the area, making the shells of benthic worms' die-hard, dry, and so on. Moreover, post-harvest incineration is a major problem affecting air pollution. Along with the lack of forests to help clean up the air, the air pollution is more severe.

Current agriculture affects the environment and the ecosystem.

1) The process of agriculture caused farmers to manage the original ecosystems in the area, such as topography management, climate management, soil management, and water management.

Modifying the nature and properties of the plowing area, adjusting soil makeup, digging canals, ponds had destroyed the original physical characteristics. The adjustment of the mound, which used to be a major plantation area, has led to a lack of green space, lack of shade, and animal shelter. In addition, the filling of wells to

increase farmland brings water reservoirs to decrease, and the lack of moisture severely affects underground animals. Determining the scope of the production system, quantity, quality, and characteristics of the output by accelerating the process, and using of chemicals and pesticides lead to pollution to both living and non-living environment.

Additional materials, equipment, food, technology, and the energy from outside into the ecosystem exceed that which is needed. The first example, using chemical fertilizers to accelerate the growth, to add toxins in the soil, add residue to vegetables. Increasing the cost of production promotes fertilizer and chemical plants that emit toxic fumes and wastewater, creating a chain effect for the broader ecosystem. The second example, using chemicals to kill pests instead of natural parasites. It is convenient and quick to get rid of weeds but this can harm animals in the soil. Finally, using electrical energy to accelerate the growth of some plants or using machines, fuel oil in agriculture that increases the cost of production and pollutes.

2) Monoculture agriculture, reducing the diversity of plants and animals.

The monoculture such as corn and sugarcane is absent for dependence on plants and animals. The structure of the system is less complicated, but it lacks sustainability. The sustainability of the ecosystem is the variety of plants, which leads to a variety of animal habitats. The tilling and tilling, there were no hills, not waterways, not water receiving areas, and in the rainy season, it may be because of flooding, the plants may rot and die. According to ecology, the original condition of the area should be preserved. Keeping the canal, and digging wells to get water can reduce flooding and provide adequate water resources for agriculture.

3) The farming operations make food chains shorter and less complex food web systems.

The mono-cropping making a shortening of the food chain has not complicated unsustainable, if disease and insect outbreaks are made quickly. By collecting humus yields, natural fertilizers are not created, burning weeds will cause pollution that they should be allowed to decompose naturally, including crop rotation. The consecutive a short-term harvesting leads to inadequate nutrients in the soil, for example, year-round continuous production acceleration without the occurrence of soil holding and natural nutrient accumulation. This causes the soil to be incomplete, and to continuously add nutrients and chemical fertilizers to deteriorate the quality of the soil, affecting farming practices in the long run.

4) Farming is an open ecosystem rather than a natural ecosystem.

Agriculture has rapidly input and exits, and ongoing acceleration in the production of a single plant, such as rice, that has resulted in the lack of diversity of ecosystems and the inability of ecosystems to recover itself. And by growing the number of plants for the specified time, accelerating the plant's growth, such as using fertilizers to accelerate green leaves, accelerate pregnancy, accelerate starch, accelerate seed weight gain, and use herbicides and insecticides to induce chemical residues in crops and ecosystems.

5) Current agriculture practices low the stability of the agro-ecosystem.

The monoculture makes the agricultural system and self-reliant lower, and lack of natural structural balance, both living and inanimate Agro-ecological instability, when there is a drought or an outbreak of disease and pests: the plants will die at the same time. Therefore, farming can generate products and generate income for farmers in a worthwhile manner and positively affects the environment. But there must be a study of the original ecosystem of the area in order to analyze agricultural patterns and to find suitable agricultural practices, both economically, society and environment.

The concept of agriculture to ecosystem restoration, coupled with revenue generation.

Landscape ecology is the study of looking back at an area and using the space under a traditional ecosystem. This focusing is to study the origin or the original environment and nearby areas to find relationships in the area such as species of fauna, flora, water, water source, drainage, material in the area, and including energy and circulation ecological changes. The focusing on, first, Components of the Landscape. second, Structure on the Landscape, third, Function, fourth, Change. Finally, apply this knowledge as a basis for the study of the area to find the concept of the issue. The problems and solutions to be in line with the original ecosystem for sustainability.

Agro ecology systems are the study of the relationships of life, nature, and agriculture, which involves concepts of economics and social factors. Agricultural ecosystems are divided into three sizes. First, micro-level agriculture such as vegetable plots, rice fields. Second, meso-level agricultural ecosystems, the systems of farms for each household. Third, a large macro level of agricultural ecosystems, moreover it was a regional, national, continental, and global agroecosystem, each size of an agroecosystem is different in complexity.

Farming must take into account the original ecology of the area. Forest ecology Plant Ecology of aquaculture animals. Ecology of mixed agriculture. This is to be used in conjunction with quality farming to generate income for farmers but not create problems for the condition surrounded. Once we understand this ecosystem, it can be applied to management agricultural systems at the household level. Especially in the Northeast, where Meso-level agriculture was abundant, and if all areas were used as a common practice, it will benefit macro-level agriculture and affect landscape ecology.

The New Theory of agriculture is resource management at the farm level, also, focuses on land allocation and cultivation of a wide variety of plants, this principle based on the principle of natural circulation, moreover it can do both small and large areas. The main principle is the allocation of land use. It is divided into four important parts.

The first area, which creates 30% for water sources because the water was essential for agriculture and consumption. And can be a fish pond for sale. Second area, around 30% of the rice cultivation area because rice is the main food, and if there is a large quantity that can be sold or processed to produce the products. The third area, growing the planting is for large trees to use; to provide shade, absorb water, create moisture, an increase in soil nutrients, and habitat for animals. Growing a variety of

farm crops for distribution is in order to generate income for the household such as planting the herbs for health, vegetables for the kitchen garden, or selling. The final area was 10% of living space is to create a house or use it as a resting area. The "New Theory of Agriculture" is integrated agriculture that allows farmers to support themselves, earn income, and have food to consume throughout the year. This principle is beneficial to the farmer's household economy, and ecological sustainability.

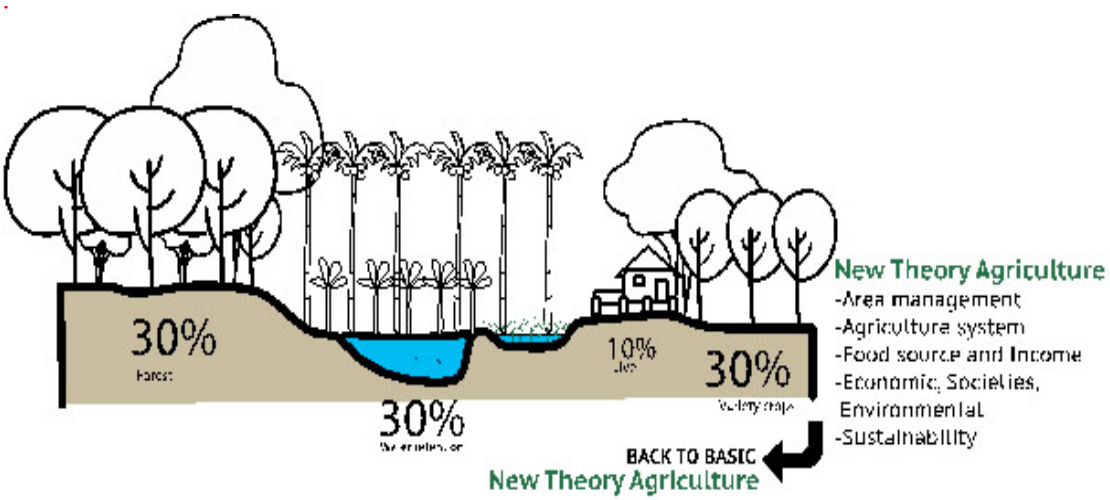

Figure 4: The diagram illustrates information the proportion of land use for agriculture, based on the new concept of agriculture

Agroforestry is agriculture that brings sustainability principles of the natural forest system as a guideline for agriculture. It focuses on the diversity and levels of vegetation, the emphasis is placed on the cultivation of perennial trees, fruit trees, and usable trees, combined with farming patterns or horticulture. The important crops in the agroforestry system are:

4.1 Nanny plants will provide shade to young plants. They will make plants stronger, able to survive and find food for themselves. A suitable nanny plant is a banana because it is easy to find, it can also be used for a variety of purposes, such as raw bananas for cooking, boiled banana, vegetables, dip chili paste, papaya salad with bananas. The ripe fruit was eaten, sold, or processed, banana leaves for selling and, used in favors and traditions or taken as packaging.

4.2 The top-level plants are Coconut and Areca palm; they are a plant that grows in the tropics. There have been with Thai orchards for a long time, they were grown in the backyard for cooking both savory and sweet dishes such as red curry, coconut milk, used for making desserts; bananas, paprika, grated to sprinkle over desserts. Planting banana should be planted near a water source because it grows well, do not maintain, and can be planted alternately between the canopy fruit trees.

4.3 The canopy tree is about 10-20 meters high and has a deep root system, so it can absorb more than 10 meters of water and nutrients in the soil. The shrub contributes to the formation of nutrients in the area because when fallen, it degrades into plant nutrients on the soil surface and is washed down deep into the soil. The big canopy was the main mechanism of the nutrient circulation system in the agroforestry system

for example Jackfruit, Tamarind, and Mango because these three fruits can be grown in areas with drought and hot weather, and then can be used as food for eating and bringing products to sell.

4.4 The low shrubs are Common guava, Sugar apple, Key lime, Orange, Grapefruit, Star fruit, and in the northeast, the carambola should be planted with lemon, gooseberry, grapefruit, it is a fruit that is easy to grow and does not require maintenance and has a sweet and sour taste. It has health benefits, contains vitamin C, folate, potassium, magnesium, and low calories. The carambola can be processed into various products such as carambola jam, carambola compote. It is popular for both Thai people and foreigners.

4.5 Vegetables were early crops that generated income for farmers because it was short-lived, and can be planted and stored for sale throughout the year. The vegetables can be grown all year round, for example, in summer and high temperatures, they use less water, such as Cucumber, Luffa acutangula, and Napa cabbage which are recommended. The rainy season has a lot of water; some vegetables should not be planted because they will rot easily. Suitable plants are Malabar spinach, Diplazium esculentum. Moreover, growing vegetables in an agroforestry system affect the growth of other plants in the system due to the coexistence of water, moisture, and nutrients.

4.6 Field crops can be planted in conjunction with agricultural forestry such as Cassava, Corn, field rice by inserting into the plot, each field crop affects the growth of another crop. Cassava can absorb nutrients better, thus slowing down the growth of other plants nearby. The peanuts or soybeans may be planted instead because they will make other crops grow better. Moreover, growing legumes create nitrogen in the soil and humus, and can be mulched around the plant, and can be degraded into natural fertilizers for plants.

4.7 The herb plants are an alternative to raw material production for health and economic benefits. The nature of the herb will grow well in the shady forest area so it does not require much maintenance. The important herbs are Green chiretta, Turmeric, Barleria lupulina Senna alata. Herbs obtained from agroforest plots have high medicinal value because it grows from an abundance of nature.

4.8 The windproof tree, usable wood, it was wood that has a height, sticky branches, not easy to break, such as Pterocarpus macrocarpus, Neem Tree, River tamarind, Earleaf acacia, Bamboo. The windproof timber will protect the wind and prevent damage to crops in the agroforest plots. Especially fruit trees in the phase of flowering or young fruit because when being hit by the wind, it will damage the flowers or the weak. The windproof shield prevents broken branches, and then help prevent fruit trees from toppling. The windproof stick is used for various purposes such as neem to be eaten. The leaves can be fermented as an insect repellant. Not only is the bamboo can be grown to eat shoots, bamboo is used to build housing, selling, or processing it to make wicker also. This is the wisdom and way of life of the community.

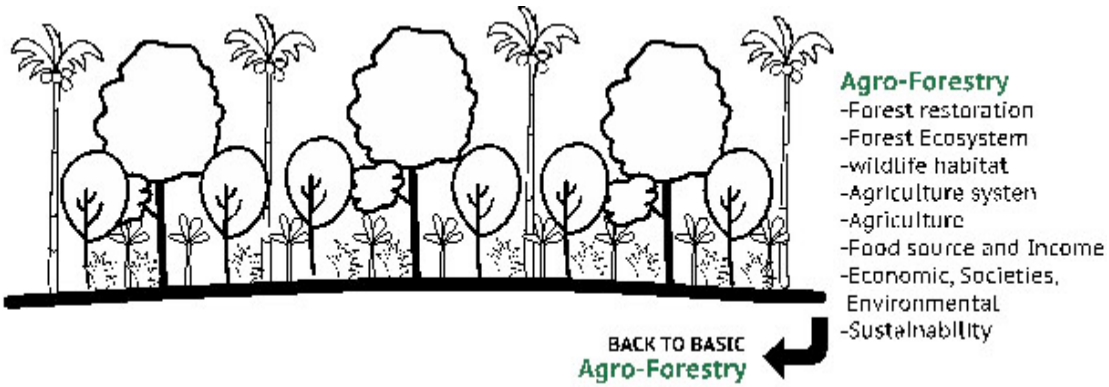

Figure 5: The diagram illustrates information the cultivation patterns of various vegetation hierarchy according to the agroforestry concept.

The Khok Nong Na Model

The Khok Nong Na Model is an area modification that mimics nature. Both modifying the area and growing crops Ie by digging a water reservoir. The soil obtained from digging wells to build hills and plant 3 forests, 4 benefits according to the royal initiative of His Majesty King Rama IX. Tree types of forests are plantations for use of edible wood planting and grow economic trees. Four benefits are obtaining wood for use; building a house, burning charcoal, and getting fruit, and getting economic wood for distribution to generate income.

The Khok Nong Na Model has dug a canal around the area to distribute moisture to agricultural areas. Making a dam to irrigate water and to collect water in the area for use in the dry season, after that the area has been adjusted soil remediation. It starts with planting crops for soil maintenance and focuses on a wide variety of agriculture such as rice cultivation, animal husbandry, and fishing.

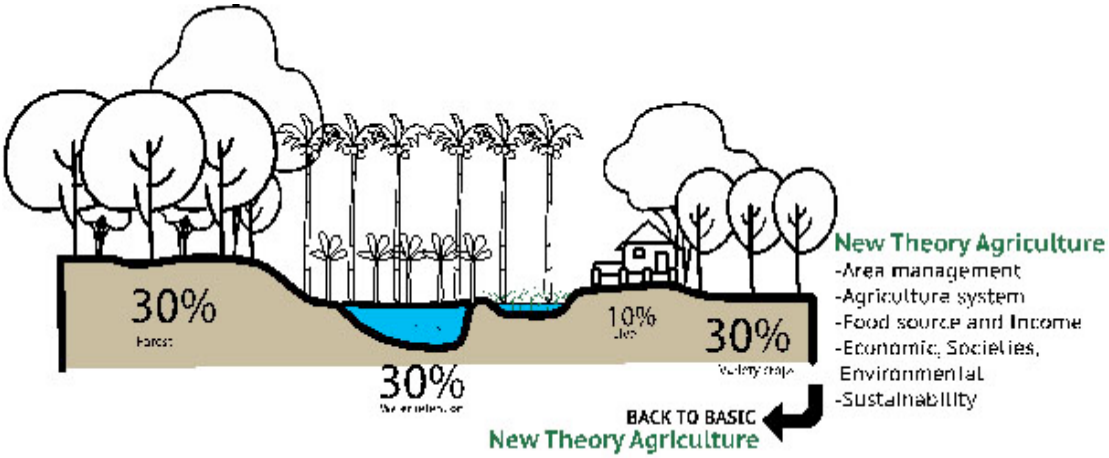

Figure 6: The diagram illustrate information The Khok Nong Na Model and apace management and water management

Conclusion

Agriculture has affected the environment since the agricultural pattern that has changed the original forest characteristics. Farmers use the machine for tillage, clay makeup, filling the original well to increase the cultivated area. Moreover, the effect

of the physical appearance changes is the reason to water reservoirs to decrease. Furthermore, adjusting the land for agriculture causes the slopes to disappear, does not have the waterways, does not have the water catchment areas. In the rainy season causing flooding, the runoff water leaching, the soil surface is damaged.

Modification of the original physical appearance of the area causes an ecological imbalance. Birds and insects help to control natural pests that have decreased. Farmers accelerate production by using chemical fertilizers to accelerate growth and accelerate leaves green, the pregnancy, the flour, and the seed to gain weight. Adding extraneous supplies and energy into the ecosystem was unnecessary because it makes the cost of production to increase. Moreover, they use more chemical pesticides then cause toxic residue in production, the death of animals in the soil and farmers as well. The use of agricultural machinery causes pollution and impacts on the environment.

Monoculture crops reduce the diversity of plants and animals. Especially planting rice for more than fifty years has reduced the diversity in the agricultural ecosystem. And now agriculture makes ecosystems unable to rely on or sustain by themselves, and ecological complexity, diversity of flora and fauna decrease also. Significant farming will be counter to creating sustainability.

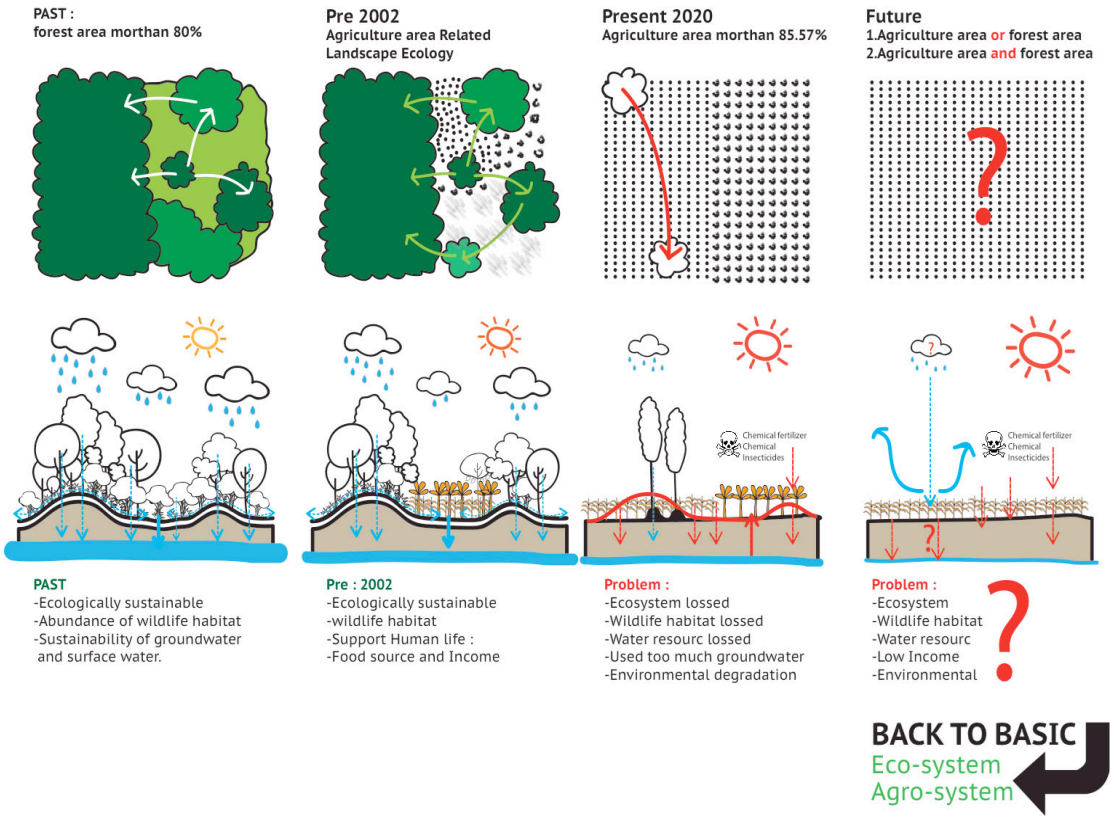

Figure 7: The diagram illustrates information about the concept of the extended and developed agricultural areas.

The guidelines for development of agricultural areas based on concepts from participatory ecological agriculture to solve environmental problems.

The design guidelines of agricultural areas to be sustainable must consider the economic, social, and environmental components. Emphasizing the restoration of the community's original forest ecosystem has to take into account the maintenance of biodiversity and the balance of nature, and maintain a variety of agricultural plants that do not conflict with the original ecosystem.

Physical modification of agricultural areas must maintain a drainage system or build a new waterway. The design guidelines of the catchment area to solve the problem of water shortage, drainage design following the nature, helping slowly the flow of water, trap sediment, and helping the drop water into the soil from flowing outside the area. Then it has to maintain a balance of groundwater levels, keep up the soil moist, and protect the soil ecosystem. Moreover, the planting plants need to develop the diversity of nature, create a place of residence by using indigenous plants and herbs to enhance identity and increase interest, and combine with the principles of agricultural ecology. In addition, the planting must take into account the agricultural system, agricultural processing, and income from selling farmers' production.

Table 1: The table shows that the agricultural practices that can be applied for environmental conservation

conceptual	Layout / Area Management	The benefits to the ecosystem
The New Theory of Agriculture	allocation of land has to create a water source for integrated farming. This manages land to create the diversity of planting and rotation in the agricultural ecosystem. This allows farmers to support themselves, earn income, and have food to consume all year.	- Help to conserve and revive agricultural ecology - Rely on natural mechanisms in agriculture - Self-reliance on the means of production - Balance and variety of associated ecosystems. - Create an abundance of nutrients in the soil
The Agroforestry	The systematic use of space farming mimics forest ecosystems in order to resolve the original degraded forest area. This system also plants trees and economic crops in degraded areas such as large trees, a variety of plants, garden plants, vegetables, kitchen gardens, and herbs. The focus on management with natural systems emphasizes the dependence of plants and animals, and humans.	- There is a variety of physical diversity, and creating a balanced relationship in the system. - Create food rotation in the agricultural ecosystem, and create nutrients in the soil. - Rehabilitate and conserve of traditional agriculture. - It relies on natural mechanisms for agriculture.
The Khok Nong Na Model	The modified to mimic the natural area is to solve the problem in the flat areas that cannot hold water by digging a water reservoir. Planting perennials for use retains moisture and provides a habitat for birds and	- There is a variety of physical diversity, and creating a balanced relationship in the system. - Create food rotation in the agricultural ecosystem, and create nutrients in the soil.

conceptual	Layout / Area Management	The benefits to the ecosystem
	insects. A canal was dug to distribute moisture to agricultural areas, then it focused on agricultural diversity.	- Rehabilitate and conserve of traditional agriculture. - It relies on natural mechanisms for agriculture.

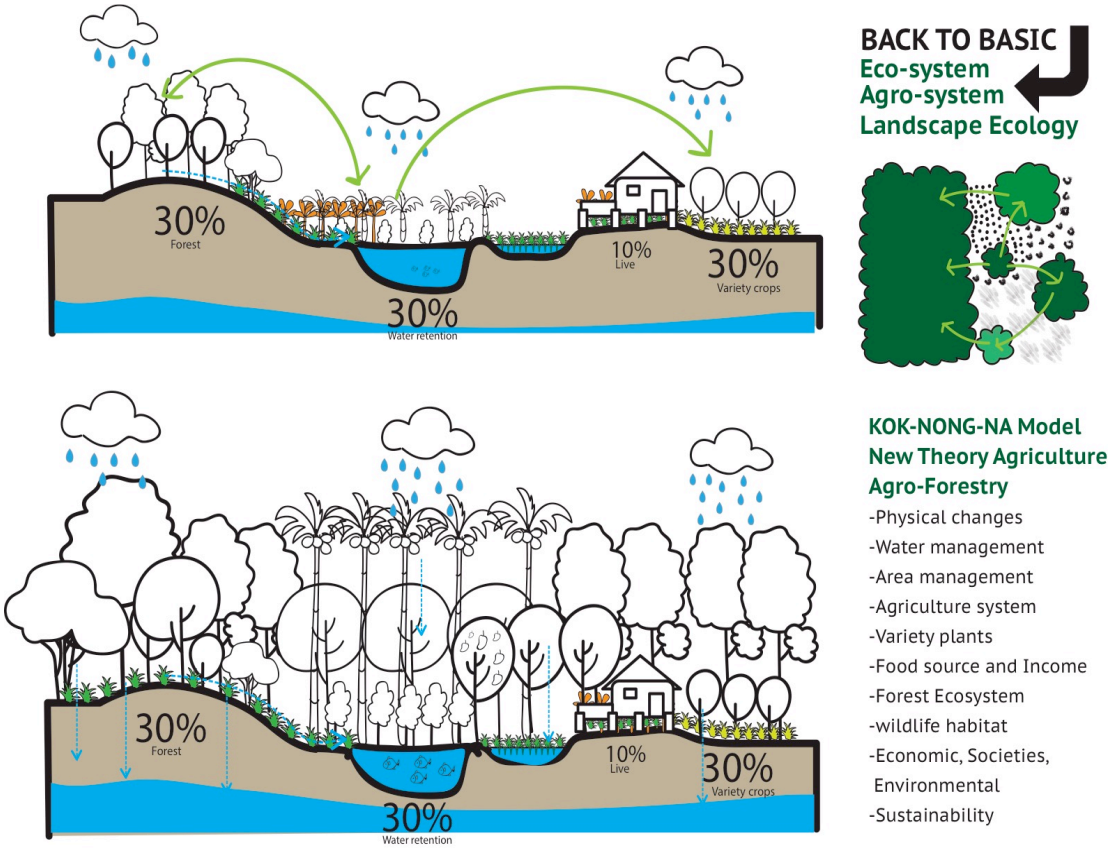

Figure 8: The diagram illustrates information application of landscape ecology concept in combination with new agriculture to preserve the environment.

The design agricultural land by using the concept of agricultural ecology based on ecology principles together with the concept of the "Khok Nong Na Model", The "New Theory Agriculture" and "Agroforestry" to mimic the natural ecology.

The first step is to use the concept of "Khok Nong Na Model". In the process of adjusting the physical diversity of basic; dig a pond to receive water and save water for use in the dry season. Then, a canal is used as a fish pond and digging the small canals to distribute moisture to plants without the need for machinery or the sky to waste energy.

The second step is area division using the new agricultural theory. Area division using the new agricultural theory has separated the area 30% of rice fields, 30% of forest, vegetables, gardens, and herbivorous plants, (30%) water storage areas and finally, (10%) living areas. The concept may be adjustments to suit the lifestyle and farmers needed. Therefore, it focuses on growing a variety of crops including the use of the concept of organic agriculture that will benefit the economy, society, and environment.

Moreover, the design of the area by applying the principles of landscape architecture will bring beauty, an ability to transform the area into a learning center and along with tourist attraction.

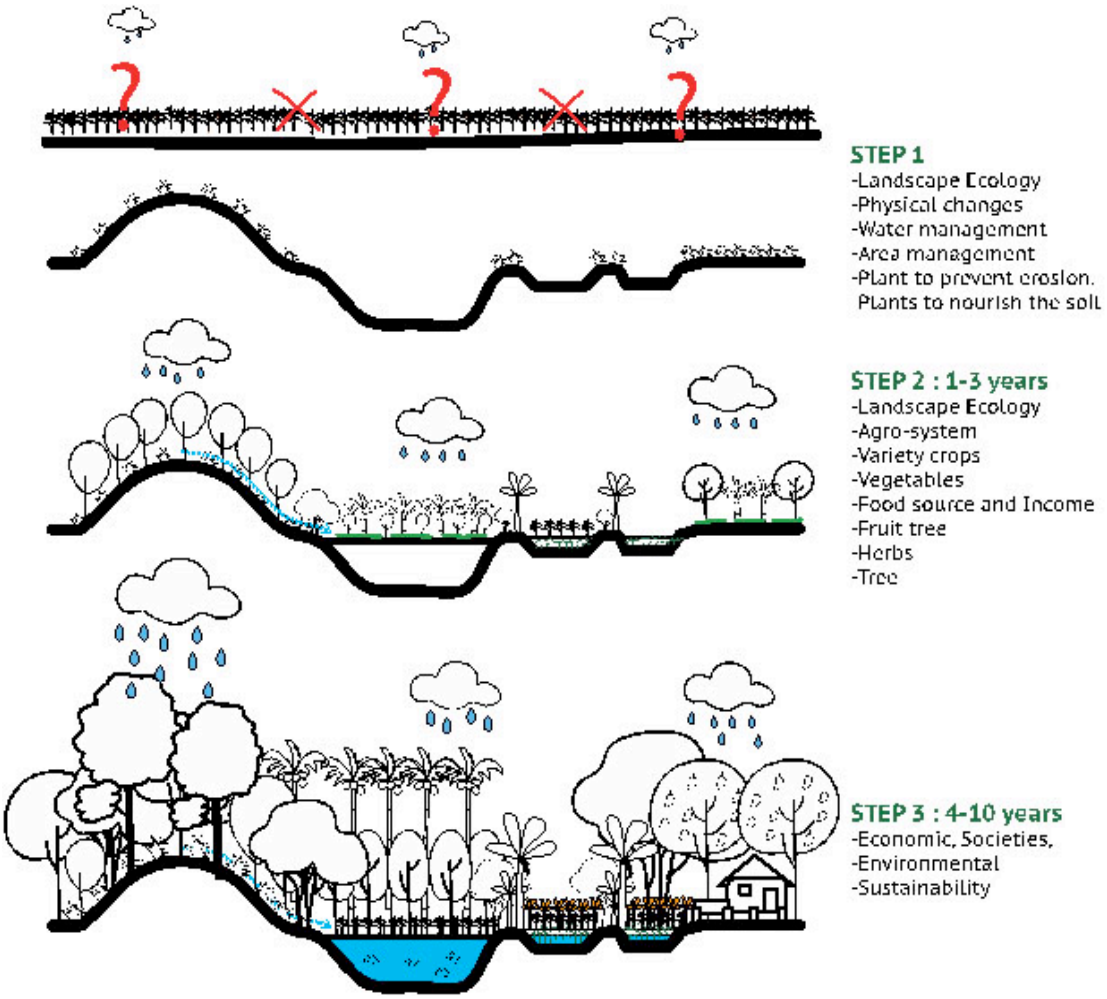

Figure 9: The diagram illustrates third steps for development agricultural area.

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