

*Chitrick Suwong Sep 20 2017*

# *Living Natural Museum*

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*“...The Centres are demonstrations of integrated development work which means everything and every aspect to earn a living. The people will be able to observe the models of modern knowledge and technology which can be effectively applied to their occupation...”*

*“...On the other hand, the Centres are intended to be the venue for study and research according to different areas because in each particular area there are different characteristics...”*

*“...Various agencies concerned with every aspect of the people’s life can exchange idea, work together and coordinate to have the work done. Normally, each agency has its own independent centre with no other agencies involved. However, the Royal Development Study Centres gather in one place officials and experts from every department and division in various fields; agricultural, social and related educational promotion. This means the people can obtain different fields of knowledge at the same time. It is like two poles. One is the officials who work together in one place. The other is the general public who acquire benefits...”*

*His Majesty King Bhumibol Adulyadej’s Address  
Given at the Huai Sai Royal Development Study Centre  
On 11 September 1983*

# Main Missions of the Six RDSCs

The royal development study centres (RDSCs) were established to be models of success and disseminate knowledge to local people in order to sustainably develop their livelihoods. The royal development study centres give knowledge and support as follows:



## A One-stop Service

The study centres conduct studies experiments and demonstrations on agriculture, water sources, animal husbandry, fishery along with social development and supplementary occupations in the form of a Living Natural Museum



Khao Hin Sorn RDSC,  
Chachoengsao Province  
"Empty Forest, Dry Stream,  
Band Land can all be Developed"



Puparn RDSC,  
Sakon Nakhon Province  
"Generate More Water, Grow More  
Forest, Harvest a Sufficient Life"



Huai Sai RDSC,  
Phetchaburi Province  
"Revive the Soil, Restore the Forest,  
Retain the Sufficiency of Life"



Kung Krabaen Bay RDSC,  
Chanthaburi Province  
"Manage and Rehabilitate  
the Coastal Resources: From  
Hilltop to Sea Base"



Pikun Thong RDSC,  
Narathiwat Province  
"Deteriorated Swamp Forest,  
Accumulated Peat Soil,  
Managed by 'Klaeng Din'"



Huai Hong Khrai RDSC,  
Chiang Mai Province  
"Upstream Forestry, Downstream  
Fishery, In Between Agriculture"

# Coordination

## Between Government Agencies

Coordinate plans, implementation and administration among departments, divisions and concerned government agencies to bring about optimum benefits



## Integrated Development

Each royal development study centre is the model and example on development in a specific area.



## Exchange of Experiences Among Academics, Practitioners and People

The study centres serve as the medium to disseminate the successful results of studies, experiments and research to the people



The place for conducting studies,  
**research and  
experiments**

In search of development  
guidelines and methods  
consistent with different  
surrounding conditions of each  
particular area



One of the major goals of rural development in Thailand is to search for ways to uplift the people's well-being. This entails developing the communities to become strong so that the people can be self-reliant. However, the efforts must conform with the conservation and development of environmental resources in a sustainable and beneficial manner. Also, modern, simple, correct, and economically viable knowledge and technology should be promoted.

Therefore, His Majesty King Bhumibol Adulyadej graciously granted the initiatives to establish the royal development study centres where various studies, research, and experiments are carried out in search of new development strategies suitable to the distinctive conditions of each region. The royal development study centre serves as a “Living Natural Museum” where farmers can explore and apply the knowledge as well as methods of occupations on their own land.





## Royal Development Study Centres

His Majesty King Bhumibol Adulyadej initiated the establishment of the six royal development study centres (RDSCs) which scatter in every region of Thailand and serve as the *“Living Natural Museums.”* The centres gather various studies, research, experiments in multi-disciplinary fields and solutions to agricultural problems relating to water, soil and forests.

The areas where the royal development study centres are located have their own **“specific”** problems and differences according to regions. His Majesty King Bhumibol Adulyadej had thoroughly considered about the problems and made conclusions for each area, as follows:

● **Khao Hin Sorn Royal Development Study Centre, Chachoengsao Province:** Problems were derived from deforestation and mono-cropping of corn and cassava. The soil then became infertile and sandy. In the dry season, wind erosion occurred. In the rainy season, the soil was eroded by water flow.

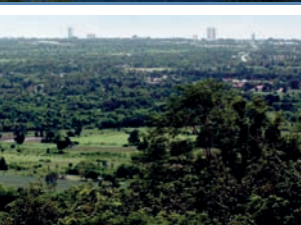


● **Pikun Thong Royal Development Study Centre, Narathiwat Province:** Most areas are constituted of old *“Phru”* or peat swamp forests. The soil consists of the thick layers of organic matters or decomposed plant residues and is mixed with seawater, leading to the increase of the level of pyrite in the soil. When the soil is exposed to the air, the soil oxidizes. Whenever the water is drained from the soil, pyrite which is the combination of iron (Fe) and sulfur ( $S_2$ ) releases sulfuric acid.



● **Kung Krabaen Bay Royal Development Study Centre, Chanthaburi Province:** Problems occurred from saline soil caused by seawater intrusion.





● **Puparn Royal Development Study Centre, Sakon Nakhon Province:** Deforestation was the main cause of water scarcity in the dry season. In the rainy season, the gust flow of water washed away the topsoil and the salt leached to the surface in clusters.

● **Huai Hong Khrai Royal Development Study Centre, Chiang Mai Province:** Problems were derived from deforestation. In the rainy season, soil was eroded by water flow, leaving only rocks and pebbles.

● **Huai Sai Royal Development Study Centre, Phetchaburi Province:** Deforestation and inappropriate field crop cultivation made the soil infertile, sandy and eroded by wind and water. Only the useless hardpan soil remained.

### *Objectives and Implementation Guidelines of the Royal Development Study Centres*

*“...The objective of the establishment of royal development study centres is to enhance the fertility of the people’s land by developing soil and water sources and rehabilitating the forest as well as using the agricultural knowledge in the planning of cultivation and animal husbandry using some funds from donation.*”



*The royal development study centres also serve as the demonstration farms for farmers and development officials to visit and gain knowledge. The centres also act as the main bodies to develop the surrounding areas. When the livelihoods of people have been improved, the establishment of the rice mills for each village may be considered, together with the setting up of the community rice banks for each village to enable the people to achieve self-reliance...”*



The royal speech of His Majesty King Bhumibol Adulyadej reflects the aim of the royal development study centres to be the “**models of success**” for farmers and general public to gain knowledge and be self-supporting as follows:

- **To conduct studies, research and experiments** in search of development methods consistent with different surrounding conditions of each particular area. Each centre is intended to be the “**model**” of success for the people in the surrounding villages and other areas as well.



- **To serve as a centre for exchange of experiences among academics, practitioners and people** in conducting the studies, experiments and research to disseminate the successful results. The centre is the place that integrates theory with practice to disseminate knowledge to the people, and serves as a study centre for development workers as well as a place for exchange of experiences and methods for solving problems among academics, development officials and the people.



- **To serve as a centre of integrated development patterns:**

Each royal development study centre is a model and example of development in a specific area which renders maximum benefits. In the development process, it requires integration of interdisciplinary fields of knowledge which complement one another. The integration includes not only the knowledge but also the operation and systematic administration.

- **To build and reinforce coordination among agencies** in project planning, implementation and management among government agencies in order to give utmost benefits

- **To provide a one-stop service** that demonstrates the successful results of research and experiments on the development of agriculture, water sources, animal husbandry, fishery as well as society in the form of a **“living natural museum.”** People can come to see the living demonstrations in one place at one time to achieve efficiency in development efforts.

His Majesty King Bhumibol Adulyadej paid attention to the importance on the development patterns that conform to topographical and sociological conditions in order to enable the people to be self-reliant in a sustainable manner as reflected in His Majesty's speech as follows:

*“...Development must take account of the local environment in terms of the physical environment, the sociological environment and the cultural environment. By the local sociological environment, we mean certain characteristics and ways of thinking which we cannot force people to change. We can only suggest. We cannot go in to help people by trying to make them the same as us. However, if we go in and find out what the people really want and then fully explain how they can best achieve their aims, the principles of development can be fully applied...”*

There are six royal development study centres across the country. Each centre represents the region's local characteristics and addresses the problems particular to the areas. The centre conducts studies and research to determine a development path suitable for each locality in order to make the land arable as well as to achieve productive yields. Once the results have been proved to be successful, the centre then disseminates the knowledge to farmers living in **the surrounding villages** which are the primary targets to apply on their own lands. The centre promotes all fields of knowledge such as cultivation, propagation of crop varieties, animal husbandry, fishery, etc. Farmers can come to participate in the training, or ask for advice from the officials who visit their villages. They can also take a study tour to observe the activities around the centre by themselves. After the knowledge has successfully been promoted to farmers in the surrounding villages, the extension works are then aimed at farmers in other areas.

This gives rise to the setting up of **the centre branches** for carrying out studies on specific issues relevant to the problems of the area. The objectives of the centre branch are similar to those of the RDSCs in conducting studies and experiments to support local occupations by which farmers can put the results to practice and become successful in their occupations.



# Khao Hin Sorn

Royal Development Study Centre,  
Phanom Sarakham District, Chachoengsao Province



*“...The Khao Hin Sorn Royal Development Study Centre is the first of its kind. Much development has not yet been seen at the study centre due to the limitation of its topography. However, the idea of having the royal development study centres has later been expanded...”*

*His Majesty King Bhumibol Adulyadej's Address  
Given on 26 August 1988*

The Khao Hin Sorn Royal Development Study Centre is the first royal development study centre. The centre was founded on 8 August 1979 covering an implementation area of 303.2 hectares. It can be divided into 198.4 hectares of the Khao Hin Sorn RDSC and 104.8 hectares of the Royal Research Project site. The centre operates the full-scale agricultural development by emphasizing soil, water and natural resources improvement and rehabilitation. Formerly, the area was affected by forest encroachment and the repetitive mono-cropping of corn and cassava which made the soil degraded and deteriorated until it turned into sandy soil. After that, it was eroded by wind in the dry season and water in the rainy season resulting in the deteriorated and unusable top soil.

His Majesty King Bhumibol Adulyadej initiated the rehabilitation of soil condition in order for the farmers to make a living in a sustainable way by integrating the interdisciplinary fields of knowledge which requires cooperation among government agencies to operate all development activities such as soil improvement using green manure and intercropping with leguminous plants, pest control using natural means as well as study on appropriate land utilization for orchards. In addition, the centre also conducts the activities on forest restoration and preservation of indigenous, rare and economic plant species, establishes herb garden, and collects rare wild plant varieties of the Eastern Region. Moreover, the centre provides the demonstration of aquaculture in floating basket and ornamental fish raising which can serve as the sources of supplementary incomes for the farmers. Apart from these activities, the centre also introduces and promotes the concept of cooperatives among farmers, provides rice milling service and disseminates knowledge to farmers through trainings on agricultural activities and produce processing for sale while sending officials to the farmers' houses to ensure stable income.



## Extension Works

● Setting up of the demonstration plots to show the results of the studies, research and experiments to the interested to study and apply the knowledge to improve their occupations and communities as well as arranging of officials to provide appropriate knowledge at the farmers' houses. Demonstration plots can be divided as follows:

● Agricultural Development Work (Plants)

◆ Demonstration of the New Theory farming practice according to His Majesty King Bhumibol Adulyadej's initiative

◆ Demonstration of the cultivation of local vegetables such as *Mliantha suavis*, Bracken Fern and *Lasia spinosa*

◆ Collection of herb species such as *Amomum biflorum* Jack, Citronella grasses and *Andrographis paniculata*

◆ Demonstration of the plantation of fruit trees such as mangoes, rose apples and sapodilla

◆ Demonstration of the cultivation of fragrant and flowering plants such as ylang ylang and *Rauwenhoffia siamensis* Scheff

◆ Demonstration of sustainable agricultural practice





- Animal Husbandry Development Work
  - ◆ Demonstration of animal husbandry such as cattle, swine, native chickens, ostriches and Rusa deer
- Fishery and Aquaculture Development Work
  - ◆ Demonstration of fish culture such as *Nile tilapia* and *Probarbus jullieni*
- Forestry Development Work
  - ◆ Demonstration of reforestation in the Royal Research Project site
  - ◆ Demonstration of eucalyptus plantation
  - ◆ Demonstration of para rubber plantation
  - ◆ Demonstration of seedlings propagation such as *Hopea odorata*, *Dipterocarpus alatus*, *Pterocarpus macrocarpus* and etc.
- Soil Development Work
  - ◆ Demonstration of vetiver grass plantation and propagation for distribution to farmers
  - ◆ Demonstration of compost making
  - ◆ Demonstration of the studies and research on vetiver grass

The operation of the Khao Hin Sorn RDSC has reached a satisfactory level and rendered great benefits to the surrounding villagers. His Majesty King Bhumibol Adulyadej accompanied by Her Royal Highness Princess Maha Chakri Sirindhorn gave an address during his royal visit to the Khao Hin Sorn RDSC on 23 April 1997 as stated:

*“...At Khao Hin Sorn, various parties joined in to help. After 15 years, the Centre has become a model, and it has become easier for other places to replicate. It needs perseverance. So now, everyone benefits. The people are satisfied, and I am satisfied. Here they could not even grow cassava. Things have changed a lot. The place is now well-shaded and cool...”*





## Triumph of Development

1. Soil, water, forest and natural resources have been rehabilitated. From the comparison between the survey of the present agricultural land and satellite photograph taken in November 2005, it was found that the centre's area of 303.2 hectares has been developed until the proportion of the arable areas has been increased in the former desert-like areas.

2. Farmers follow the New Theory farming practice and integrated farming by growing rice, vegetables and fruits together with raising fish or frogs in farm ponds as well as raising poultry such as ducks and chickens in their farmland instead of relying only on cassava or rice farming.

3. Farmers realize the benefits and advantages of using compost instead of chemical fertilizer which helps to reduce the production cost and gives high yields of good quality without any negative impacts on the environment and health. The centre has promoted the training on organic fertilizer making earnestly and continuously.

4. The centre collects more than 900 species of herbal plants which can be processed to 15 products such as butterfly pea shampoo and conditioner, turmeric liquid soap, *Amomum biflorum*



Jack soap bar, *Barleria lupulina* ointment and citronella grass mosquito repellent. These products are popular among users and will be developed further.

At present, there are 43 surrounding villages covering an area of 18,114.24 hectares in Khao Hin Sorn and Ko Khanoon Subdistricts. The centre also has three branches which are,

- **The Royal-initiated Khao Cha-ngok Area Development Project, Nakhon Nayok Province** (3,705.12 hectares): serving as the comprehensive development project where rice farming and integrated farming are demonstrated for further application by farmers and general public

- **The Royal Development Project at Ban Sang District, Prachinburi Province** (23.2 hectares): conducting agricultural activities such as rice cultivation and chemical-free vegetable plantation

- **The Pluak Daeng Development Service Centre Project**

**According to the Royal Initiative, Rayong Province:** established as an occupational training centre on agriculture, animal husbandry and fishery for daily consumption and food security in crises while giving the utmost benefits in promoting the agricultural occupations in a sustainable manner



# Kung Krabaen Bay

Royal Development Study Centre,  
Tha Mai District, Chanthaburi Province



The Kung Krabaen Bay Royal Development Study Centre was established according to His Majesty King Bhumibol Adulyadej's initiative given on 28 December 1981, concluded as follows:

*...To consider finding a site suitable for implementing an occupational development project in the areas of fishery and agriculture along the eastern coast of Chanthaburi Province...*

Following the initiation of His Majesty King Bhumibol Adulyadej, His Serene Highness Prince Chakraband Pensiri Chakrabandhu went to survey the area of Kung Krabaen Bay and gave an additional explanation on 11 April 1983, as follows:

*“...The desire to achieve the aim was originated from the high potentials of the bay for the development of fishery which are the aquaculture both in saline and brackish water i.e. shells, crabs, fish, especially giant perch. As afore-mentioned, the project should be established at Kung Krabaen Bay. However, agriculture cannot be omitted because we consume rice everyday as stable food. Therefore, the promotion of comprehensive farming has to be carried out as well as animal husbandry such as pig, duck and chicken raising. This is called ‘Comprehensive Agricultural System’ but the main principle rests on coastal fishery...”*

Due to the fact that this area was predominant with saline soil because of the intrusion of seawater and the deterioration of mangrove forest, His Majesty King Bhumibol Adulyadej gave an initiative to conduct studies, experiments, research and improvement of coastal fishery environment as well as the conservation of mangrove forest, which serves as aquatic animals’ food sources and nursery ground, and has been rapidly deteriorated. The project covers an area of 7,360 hectares which can be divided into two sections. The first section is the central area of 640 hectares of Kung Krabaen Bay area which emphasizes on the dissemination of knowledge to the people





and builds the awareness on the importance of the utilization and the conservation of mangrove forest in order to preserve its abundance and maintain the ecosystem. Moreover, the centre also promotes the appropriate methods of shrimp farming together with integrated farming by utilizing sludge from shrimp culture as fertilizer which helps to increase farmers' incomes and yields as well as to achieve self-development in the long run. In 16 surrounding villages and around Kung Krabaen Bay in a total area of 6,720 hectares, the centre promotes other agricultural activities such as integrated farming, herbal

plant cultivation and comprehensive rice cultivation, etc., until the farmers can finally form themselves into a strong community.

The operation method of the Kung Krabaen Bay RDSC is **“interdisciplinary”** with the collaboration from various agencies in order to generate income and utilize local natural resources properly in many activities. The activities cover forest conservation, animal husbandry with the importance on aquaculture such as fish and oyster culture, particularly the eco-friendly shrimp culture in closed system as well as the utilization of shrimp sludge. The aims are to elevate the people's livelihood and promote occupations in Kung Krabaen Bay and surrounding areas. The emphasis is placed on the development of fishery and propagation of coastal aquatic animals to increase the

yields and serve as foundation for fishery development while developing other activities simultaneously. Besides, activities related to the conservation of natural resources are conducted to create natural balance.





## Extension Works

● Setting up of the demonstration plots to show the results of the studies, research and experiments to the interested to study and apply the knowledge to improve their occupations and communities as well as arranging of officials to provide appropriate knowledge at the farmers' houses. Demonstration plots consist of:

● Coastal Fishery and Aquaculture Development Work

◆ Demonstration of the integrated shrimp culture by setting up the seawater irrigation system for shrimp culture

◆ Demonstration of sea cucumber culture

◆ Demonstration of oyster and giant oyster culture by hanging culture

◆ Demonstration of fish raising in floating baskets such as grouper and sea bass

● Agricultural Development Work

◆ Demonstration of integrated farming practice

◆ Demonstration of integrated orchard management

● Land Development Work

◆ Demonstration of the prevention of soil erosion and the propagation of vetiver grass

◆ Demonstration of compost making



## ● Coastal Natural Resources Conservation and Rehabilitation Work

◆ Demonstration of mangrove trees plantation around Kung Krabaen Bay

◆ Experimentation on reforestation in the deteriorated area in the form of Nature Study Promotion Centre



● Dissemination of the theoretical and practical knowledge through training in the aspects of:

◆ Agricultural development such as chemical-free rice production

◆ Coastal fishery and aquaculture

◆ Economic and social development

◆ Promotion and monitoring of development works

◆ Provision of knowledge by setting up a nature study trail in the mangrove forest to be the place of learning



## Triumph of Development

1. Annual household incomes of villagers surrounding the centre have increased which helps the people to live a sufficient life.

2. The abundance of the natural resources around Kung Krabaen Bay is preserved

and renders benefits to the occupational development of the people in a symbiotic manner.



3. The centre becomes an eco-tourist attraction for general public and can create consecutive activities to promote development-oriented tourism in the long run.

At present, this centre disseminates its development work to 33 surrounding villages for the farmers to have occupations and gain higher yields. The surrounding villages are located in Krachae and Sanamchai Subdistricts in Na Yai Am District; and Ramphan and Klong Khut Subdistricts in Tha Mai District, Chanthaburi Province. In addition, the centre provides on-site training on various subjects by the development officials and continuous monitoring.

Moreover, the Kung Krabaen Bay RDSC has developed the development-oriented tourism to disseminate knowledge and provide recreation for tourists. In addition, the centre also supports the new style of tourism development which conforms to cultural heritage, folkways and existing natural resources in the area. Besides, the development does not affect the environment while increasing the capability in an integrated manner to be the place for ecotourism, cultural and agricultural tourism as well as sports and physical health tourism. Furthermore, the quality of the service and tourism-related products has been developed to meet safety standard at all levels.



# Pikun Thong

Royal Development Study Centre,  
Mueang District, Narathiwat Province



*“...Large areas of Narathiwat Province are lowland areas of poor soil quality, facing water-logged condition all year round, amounting to roughly 48,000 hectares altogether. They consequently deprived most farmers of any meaningful land utilization. And even after the land has been completely drained, it still would not prove viable for any agricultural purpose, due to such high content of pyrite in the soil giving rise to sulfuric acid, and would turn further acidic when dried. Therefore, it would be necessary for various agencies concerned to come together, and jointly study and finding ways to improve this ‘Phru’ or peat swamp area, in a common harmonized approach. Afterwards, the project success may be applied to develop other peat swamp areas further elsewhere...”*

*His Majesty King Bhumibol Adulyadej’s Address  
Given during his royal visit to Daksin Palace, Narathiwat Province,  
Between 18 August–3 October 1981*

Upon his visits to the Southern Region of Thailand, His Majesty King Bhumibol Adulyadej found that most areas were constituted of “*Phru*” or peat swamp forests with acidic and degraded soil which could not be utilized for agriculture. His Majesty the Late King then initiated the establishment of the Pikun Thong Royal Development Study Centre on 18 August 1981 to conduct studies, experiments, and research to improve the organic soil and other problematic soil in peat swamp forests for agriculture. These have been done in couple with the search for the methods and development patterns in agriculture, animal husbandry and agro-industry which are suitable for the conditions of the Southern Region to become the model of success for other areas.

The Pikun Thong RDSC is located between Pikun Thong Village and Khok Saya Village in Kaluwo Nuea Subdistrict, Mueang District, Narathiwat Province, covering a total area of 278.40 hectares which can be divided as follows:

- Highland area of 32.32 hectares where the centre’s main building, office buildings, training buildings, palm oil distill and processing factory, accommodation building and official residence are located. There are also the demonstration of fruit plantation, animal husbandry, rubber tree plantation and forestry work.

- Peat swamp area designated for the research, study and experimentation plots in wetlands condition which covers an area of 49.28 hectares. It represents the areas with problematic soil both acidic soil and organic soil in old “*Phru*”. There are also the experiments of soil improvement for the cultivation of rice, vegetables, fruit trees as well as for fishery.





- Khao Samnak para rubber plantation area on the highland at the foothill covering an area of 32 hectares with experimentation plots on para rubber plantation, inter-cropping of fruit trees in para rubber plots, horticulture, cultivation of flowering plants and ornamental plants

- Klai Ban Reservoir covering an area of 164.80 hectares which is a small reservoir for storing rainwater. It is located in the southern part of the centre. The reservoir has storage capacity of two million cubic metres with irrigation system to deliver water to the centre and surrounding areas for conducting the experiments, studies and research.

The Pikun Thong RDSC implements the development activities in various fields such as the study and experimentation to solve acidic soil problem using “*Klaeng Din*” method or “Soil Acidity Acceleration and Amelioration” according to His Majesty King Bhumibol Adulyadej’s initiative. The concept *entails drying and wetting the soil alternately to accelerate the soil’s chemical reaction and raise acidity to the maximum. The soil is then de-acidified with the use of lime (Marl) to improve soil to become arable.*

*Regarding the improvement of highly acidic water in the canals, His Majesty King Bhumibol Adulyadej granted the initiative to conduct the study of the emulsion of limestone powder in the acidic water to de-acidify before being delivered into agricultural land. Moreover, His Majesty also suggested the appropriate agricultural practice to increase farmers’ income sustainably.*





Besides, His Majesty King Bhumibol Adulyadej also granted the initiative about fish raising in waters of three tastes as stated *“...This Three Tastes of Waters Project aims at increasing fish raising. Freshwater fish cannot survive in acidic water. This problem has been solved. Now, let’s try raising fish in brackish water as a project to be an example....as a mean to solve the problem....Amphidromous fish cannot survive neither in mild water nor in acidic water. It can only survive in brackish water which is the combination of a little bit of saline water and fresh water. If raising this kind of fish is promoted as a project, it would be very useful...”*



## Extension Works

- Setting up of the demonstration plots to show the results of the studies, research and experiments to the interested to study and apply the knowledge to improve their occupations and communities as well as arranging of development officials to provide appropriate knowledge at the farmers’ houses. Demonstration plots consist of:

- Fishery and Aquaculture Development Work

- ◆ Demonstration of fish raising that is suitable to the water in peat swamp area by digging the mud ponds to raise the parent stocks for propagation such as Gourami and red *Nile tilapia*

- ◆ Demonstration of fish raising in floating baskets in water sources





- Agricultural Development Work
  - ◆ Demonstration of the “New Theory” farming practice
    - ◆ Demonstration of fruit tree plantation such as coconut, durian, mangosteen and guava
    - ◆ Demonstration of soil improvement for rice cultivation
    - ◆ Demonstration of *Klaeng Din* or Soil Acidity Acceleration and Amelioration for rice cultivation
    - ◆ Demonstration of oil palm and sago palm plantation
    - ◆ Demonstration of chemical-free vegetable plantation
      - ◆ Demonstration of vegetable plantation such as asparagus, kale, broccoli and chemical-free vegetables
      - ◆ Demonstration of field crop cultivation such as corn, mung bean and sugar cane
      - ◆ Demonstration of para rubber plantation and inter-cropping with *Zalacca*
      - ◆ Demonstration of pepper plantation together with *Morinda citrifolia*
      - ◆ Construction of mushroom cottage, demonstration of mushroom culture and media preparation
      - ◆ Construction of small-sized bio-diesel refinery to distill diesel from oil palm
- Educational Work
  - ◆ Setting up of the study trail in the model of “*Phru*” or peat swamp forest

## Triumph of Development

1. Agricultural produces increase. For example, after using *Klaeng Din* method, the 17.92 hectares of rice cultivation area at Khok it-Khok Nai Village that could not be cultivated formerly can give the yield of 32 buckets (A bucket full of rice weighs 15 kilogrammes) per 0.16 hectare in the first harvest and 41-50 buckets per 0.16 hectare nowadays.



2. The supplementary income increases through Muscovy ducks raising. The centre also suggests farmers to produce fodder by themselves to replace the expensive one and try to obtain ducks that weigh 3.0 – 3.5 kilogrammes each, which meets market demands.

3. The indigenous animal species, namely goats, chicken, ducks, etc., in the villages surrounding the centre and centre branches has been improved by breeding with premium parent stock or artificial insemination.

4. Vegetable plantation has been promoted among farmers by selecting the varieties that are suitable for acidic soil such as bell-pepper, Angled Loofah, Chinese bitter gourd, baby corn, orange, coconut, mango, sapodilla, durian, etc.

5. The bio-diesel produced by the Pikun Thong RDSC, is utilized among local fishermen in Narathiwat Province at Narathat Beach following the initiative of Her Royal Highness Princess Maha Chakri Sirindhorn.





Two groups of fishermen who have utilized bio-diesel first tried out with small fishing boats in January 2006 are as follows:

1. The group of local fishermen at Pulakapa Village
2. The group of local fishermen at Tha Ruea 2000 Community

The result showed that the engine started smoother and produced less amount of exhaust gases without bad smell. In addition, the engine power increased and ran smooth. (Offshore sailing for 9-14 sea miles uses bio-diesel about 15-20 litres per day per one boat). The use of bio-diesel in substitution of

diesel can reduce the expenses.

Car users in general including pick-up trucks and vans use bio-diesel from time to time. The Pikun Thong RDSC uses bio-diesel in two truck tractors and water pumps. The production capacity of bio-diesel refinery at the Pikun Thong RDSC is about 350 litres each time. (Refinery distillation cycle is seven days)

Nowadays, the Pikun Thong RDSC has 13 surrounding villages and five centre branches as follows:

- **The Royal-initiated Daksin Palace Para Rubber Plantation Project** located in the compound of Daksin Palace at Khao Tanyong Village in an area of 2.53 hectares. This project demonstrates good - variety para rubber plantation and inter-cropping.



- **The Royal-initiated Pi Nae Mu Do Village Development Project** located at Pi Nae Mu Do Village, Bukit Subdistrict, Cho-airong District, Narathiwat Province, covering an area of 2.16 hectares. This project demonstrates water delivery system as well as effective soil and water management.

- **The Royal-initiated Muno Village Agriculture-Livestock Project** at Khok Sai Village, Moo 4, Kho Sit Subdistrict, Tak Bai District, Narathiwat Province, covering an area of 240 hectares. The project area is divided into residential areas and agricultural areas for the retired volunteers and impoverished and landless farmers or those who have highly acidic land. In these areas, there are soil improvement, plant cultivation, flowering and ornamental plantation, animal husbandry, fish raising as well as handicraft making.

- **The Royal-initiated Khok-It Khok-Nai and Yuyo Village Area Development Project** at Pron and Bang Khun Thong Subdistricts, Tak Bai District, Narathiwat Province, covering an area of 4,810.4 hectares. This project demonstrates soil and water management in the area with acidic soil in order to implement integrated farming following the New Theory farming practice as well as the ridge tillage for field crop and fruit tree cultivation, and soil development for rice cultivation.

- **The Royal-initiated Pak Phanang River Basin Area Development Project** in Nakhon Si Thammarat, Phatthalung and Songkhla Provinces, covering ten districts of Nakhon Si Thammarat Province which are Pak Phanang, Cha-uat, Ron Phibun, Chian Yai, Hua Sai, Chulabhorn, Chaloe Phra Kiat, Phra Phrom, Mueang and Lan Saka Districts, two districts of Phatthalung Province which are Khuan Khanun and Pa Phayom Districts and a district of Songkhla Province which is Ranot District. In total, the project area covers 76 subdistricts and 599 villages. This project resolves the problems of water quality and quantity, preserves and rehabilitates the environment and develops supplementary occupations for local people.



# Puparn

Royal Development Study Centre,  
Mueang District, Sakon Nakhon Province



*“...Puparn Royal Development Study Centre, Mueang District, Sakon Nakhon Province used to be sparse forest, then people cut trees for firewood and used clear land for agriculture. The natural forest in the upper area was destroyed. As a result, there was little water in the dry season and far too much in the rainy season which caused soil erosion, top soil eroded and salt leached to the surface in clusters...”*

*His Majesty King Bhumibol Adulyadej’s Address  
Given on 25 June 1997*



Thailand's Northeastern Region covers 33.1% of the whole area of the country which makes it the largest region with an area of about 17 million hectares or 170,218 square kilometres. The region was faced with three main problems. The first one is soil related problem due to the lack of fertility of forests, soil, water and minerals, making the soil infertile, unable to hold water and salty. The second one is water and forest related problem because of inadequate natural water sources, making the soil arid and unproductive. This is coupled with forest encroachment in order to make a living which ruins the watershed area and ecological system. The last one is the lack of knowledge needed for making a living, especially the appropriate technical agricultural knowledge and the maintenance of production factors such as forests, land utilization, produce processing and marketing.

With different geographical conditions, natural resources and tradition from other regions, the local problems and ways of life have been taken into account in finding the appropriate development patterns for the Northeastern Region. In this regard, His Majesty King Bhumibol Adulyadej chose the area to establish the Puparn Royal Development Study Centre by himself to be the representative of the whole Northeastern Region. The Puparn Royal Development Study Centre was established on 25 November 1982 to be the model in tackling the problems in the Northeastern Region and to develop the area in order to restore its fertility.



The Puparn RDSC is located at Huai Yang Subdistrict in Mueang District, Sakon Nakhon Province. The centre covers an area of around 368 hectares with an adjacent natural forest of about 1,760 hectares. The total area is 2,128 hectares.

Regarding the implementations of the Puparn RDSC, His Majesty King Bhumibol Adulyadej gave the initiative to consider setting up a project to acquire water to support the centre's studies, experiments, and activities on various agricultural development on the land with sandy, salty soil and inadequate water. The successful results of the studies and experiments are disseminated to the people to apply on their land in order to increase yields and incomes which will help to uplift their living standard.

The Puparn RDSC has succeeded in conducting studies and experimentation on various activities, for examples the production of good rice varieties suitable to the locality such as RD6 Sticky Rice, Khao Dok Mali 105 (Jasmine Rice) or Puparn Fragrant Rice, the cultivation of chemical-free field crops, and good-variety horticultural crops, including mango, lychee, papaya, mushroom, para rubber, *calamus siamensis*, and the raising of animals such as Meishan pig, indigenous chicken, native cow and integrated fish raising. The centre introduces the farming system and appropriate method for soil conservation together with disseminating the knowledge on household industry in order to develop the occupations of Northeastern people to achieve a better standard of living.



## Extension Works

- ◆ Setting up of demonstration plots.

The Puparn RDSC has set up the demonstration plots to conduct studies, experiments and research for the interested farmers to learn and utilize the knowledge in developing their occupations and communities as follows :

- ◆ Development of agriculture such as the promotion of crop rotation in the rice field, cultivation of field crops such as soybean, mung bean, maize, the studies and experiments on fruit tree plantation such as mango, sugar apple, longan as well as para rubber and the integrated farming system which comprises rice cultivation, crop cultivation, animal and fish raising

- ◆ Development of animal husbandry such as Meishan pig, Muscovy duck and indigenous chicken

- ◆ Development and improvement of soil such as planting of legume to improve the soil and planting of vetiver grass to protect and increase soil surface, together with its propagation

- ◆ Development of forestry such as reforestation, planting of eucalyptus and black soap, seed and tiller propagation

- ◆ Development of fishery and aquaculture such as raising of *Nile tilapia*, carp, java barb, etc., as well as frogs





## Triumph of Development

Owing to the development efforts to improve this arid land together with the studies and experimentation on the appropriate technology as well as the promotion and dissemination of the outstanding achievement to the farmers throughout the Northeastern Region, this area has been changed in many aspects as follows:

- The once dry forest area of 1,760 hectares has been revitalized into sparse forest abundant with diverse natural resources.
- The formerly drought-stricken area of 368 hectares has turned to be a fertile land with plenty of water all year round.
- The land that was sandy has become fertile.
- From having no technologies, now the area turns to be the place which collects multi-disciplinary knowledge suitable to the topography and sociology of locality. The Northeastern people, who formerly could not conduct farming, can earn their livings from agriculture with the sustainable soil and water management by having ponds according to the New Theory farming practice following the royal initiative.

With adequate water even in the dry season. They can grow RD6 Sticky Rice, Khao Dok Mali 105, fruit trees such as Nakhon Phanom Lychee, E Dor longan, and homegrown vegetables. The farmers have the knowledge on the growing of *Lentinus squarrosulus* Mont., Angel mushroom, *Pleurotus djamor*, and the animal raising such as Black Puparn chicken, Meishan pigs, Puparn pigs together with the raising of *Nile Tilapia* and *Cirrhinus microlepis* in floating baskets. These enable the villagers to have food security, higher income and better standard of living.

After acquiring the certain outcomes from the studies and experiments, the successful results are extended to the villagers of 15 surrounding villages through the promotion and dissemination of knowledge, the demonstration of Model of Success and the provision of trainings for the villagers to effectively apply on their own lands.

At present, the successful results of the centre have been extended to other nearby areas in the region through the setting up of four centre branches which are:

- **The Royal-initiated Upper Bang Sai River Basin Area Development Project, Dong Luang District, Mukdahan Province:** involving comprehensive area development in all aspects including agriculture, forest conservation, water source development and promotion of royal folk arts and crafts

- **The Royal-initiated Kam River Basin Area Development Project, Sakon Nakhon and Nakhon Phanom Provinces:** solving the problems of the farmers living along the banks of Kam River, which are flooding in agricultural areas during the rainy season and the lack of water to support agricultural activities and consume during the dry season





- The Royal-initiated Upper Lam Payang River Basin Area Development Project, Khaowong District, Kalasin Province: conducting studies, experimentation and demonstration of agricultural development according to the “New Theory” farming practice

- The Royal-initiated Phu Sing Agriculture Development Centre Project, Phu Sing District, Si Sa Ket Province: acting as a service centre that provides agricultural knowledge, training courses and models on agricultural development as well as supports plant species and animal species in order to

increase the people’s income and enhance the quality of life

The Puparn RDSC is the main agent in providing assistance relating to knowledge, technology, training courses, plant species and animal species to the centre branches in order that the people in the Northeastern Region can pursue occupations that are suitable to the locality to have enough to live, enough to eat and become sustainable self-reliant.

Furthermore, the centre has also established a learning centre in each village with model farmers in each area being the examples in several fields such as agricultural development, animal husbandry, fishery development and aquaculture by giving advices and basic knowledge as well as helping farmers that face problems in farming and making a living.





# Huai Hong Khrai

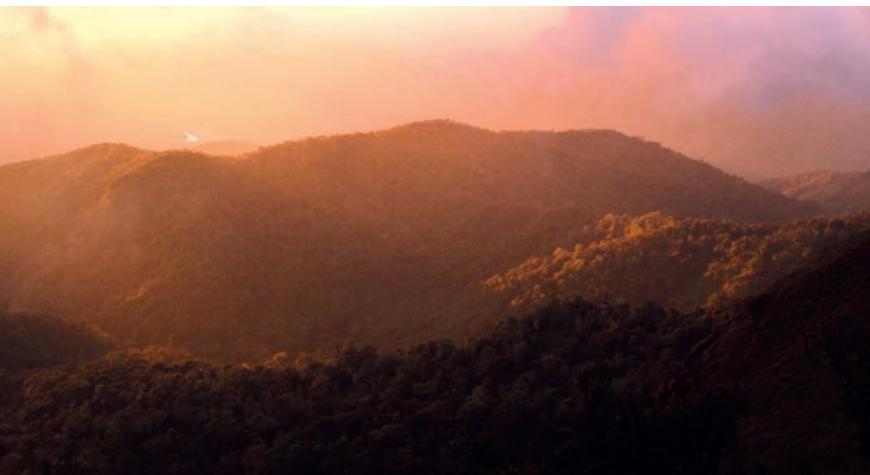
Royal Development Study Centre,  
Doi Saket District, Chiang Mai Province



*“...The main objective of this project is to rapidly rehabilitate and preserve the watershed areas of Huai Hong Khrai which are arid by experimenting new methods such as diverting water from reservoirs in the upstream into water channels downstream to let the moisture disperse. The rest of the water shall be flow into other reservoirs downstream to be use for agriculture later...”*

*His Majesty King Bhumibol Adulyadej's Address  
Given on 3 February 1984*

His Majesty King Bhumibol Adulyadej initiated the establishment of the Huai Hong Khrai Royal Development Study Centre on 11 December 1982 in an area of about 1,360 hectares in Khun Mae Kuang National Forest Reserve, Doi Saket District of Chiang Mai Province. The centre is aimed to serve as the place to conduct studies, experiment and research in search of the development patterns that are suitable to the conditions of the Northern Region and disseminate knowledge to the villagers to apply by themselves. In addition, His Majesty expressed his wishes to develop the watershed areas due to deforestation which caused drought and forest fires. The centre then focuses on determining guidelines for conserving the watershed forest. The upstream is aimed for studying of forest while downstream is for studying of fishery together with agriculture, animal husbandry (milch cow) and agro-industry to serve as a learning centre which are beneficial for the people who come to study the activities at the centre and apply in their daily life.



There are three methods in the conservation of watershed areas including:

1. Planting forests in the areas that are supported by irrigation system
2. Planting forests in mountain's creeks with the construction of **check dams** to help maintain the moisture
3. Planting forests in rain-fed areas

The conservation of the watershed areas leads to the fertility of the forests in a sustainable manner. In addition, there is also the setting up of **wet fire break system** which can prevent forest fires and increase moisture in the forests. The water that flows downstream will be stored in the reservoir to support agricultural activities, animal husbandry and fishery.

## Extension Works

● Setting up of the demonstration plots: The Huai Hong Khrai RDSC sets up demonstration plots on the studies, experiments and research for the farmers to learn and apply in their occupations and communities. At the same time, the officials of the centre are dispatched to give knowledge to the farmers at their plots. The demonstration plots include:

◆ Development of forestry such as the study on the ecological system in the irrigated area, the prevention of forest fires using wet fire break method by laying the water delivery system to let water disperse around the forest area, the study on agroforestry which represents the economic development together with forest development such as growing of pepper and macadamia nut trees in forest area



◆ Development of land such as the demonstration of methods and patterns of soil and water conservation which are suitable to the geography of the upper Northern Region as well as the plantation and propagation of vetiver grass

◆ Development of animal husbandry and milch cow such as the raising of cattle, pigs, chickens and ducks as well as the growing of different varieties of animal fodder such as Ruzi grass, signal grass, and para grass, etc.

◆ Development of fishery and aquaculture such as fish raising in the floating baskets, *Nile Tilapia* raising in cement ponds installed with the flowing water system, frog raising in cement ponds such as field frogs and bullfrogs

◆ Development of agriculture such as the growing of fruit trees such as mango, tamarind, longan, jackfruit, and pomelo; industrial crops such as pineapple, passion fruit; para rubber, macadamia and cashew nut; vegetables such as *cucurbitaceae* and eggplant; rice such as upland and wetland rice (RD); mushroom such as angel mushroom, oyster mushroom, abler mushroom and shitake mushroom



## Triumph of Development

1. Deteriorated forests have turned to be mixed deciduous forests.

2. Wildlife species has returned to the nature such as green peafowl, siamese hare and red jungle fowl.

3. No forest fires occurred since 1995.

4. There is great diversity of plants for both consumption and sale to earn extra incomes in households and communities. In this way, people can live their lives without causing harms to the natural resources and environment of the watershed area.

5. The water diverted from nearby area (Huai Mae Lai) to the centre has been decreasing every year since 1994.

There are 18 surrounding villages and five centre branches which are:

**1. The Royal-initiated Fruit and Flower Propagation Development Service Centre Project at Rai Village, Hang Dong District, Chiang Mai Province:** involving occupational training and promotion for local people through the propagation of flowers and fruit trees

**2. The Royal-initiated Ping Sub-River Basin Integrated Development Project, Hod and Chom Thong Districts, Chiang Mai Province and Ban Hong District, Lamphun Province:** developing water sources and constructing check dams in watershed areas to nourish forest and supply water for agricultural activities and consumption



**3. The Royal-initiated Khun Mae Kuang Forest Area Development Project, Doi Saket District, Chiang Mai Province:** demonstrating systematic management of the river basin together with the allocation of land for the local people, and reforestation in the destroyed areas in an attempt to restore the watershed areas

**4. The Doi Tung (Implementation Site) Development Project, Mae Fa Luang District, Chiang Rai Province:** reviving the deteriorated areas and solving poverty and health problems of the local people, with an aim to reduce drug problems in the areas

**5. The Royal-initiated Huai Lan Area Development Project, San Kamphaeng District, Chiang Mai Province:** distributing water supply to agricultural areas and establishing forest and fishery stations

The Huai Hong Khrai RDSC has also developed a study trail in order to serve as a learning ground and a development-oriented tourist attraction on soil, water and forest.





# Huai Sai

Royal Development Study Centre,  
Cha-am District, Phetchaburi Province



*“...The Huai Sai Royal Development Study Centre in Cha-am District, Phetchaburi Province used to be a deciduous forest, but people cut down trees for firewood and charcoal. Then, there were predominantly field crop and pineapple cultivation which made the soil unfertile, sandy and eroded by wind and water leaving only hardpan soil, which becomes solid when exposed to the air and has no useful nutrients...”*

*His Majesty King Bhumibol Adulyadej's Address  
Given on 25 June 1997*

In the past, the areas in Phetchaburi Province, Prachuap Khiri Khan Province, and nearby provinces were abundant. Then deforestation occurred, together with wrong agricultural practices and the overuse of chemical substances by the villagers which caused adverse effects on soil and water. The topsoil was eroded and no longer productive. The soil turned to be sandy and hardpan. The ecological balance had been destroyed. The rain became unseasonal. Drought spreaded widely.

On 5 April 1983, His Majesty King Bhumibol Adulyadej gave an initiative to develop the area surrounding Mrigadayavan Palace because ***“...If these conditions are allowed to continue, the place will become a desert...,”*** stated His Majesty. Therefore, the Huai Sai Royal Development Study Centre was established with the implementing area of approximately 1,392 hectares to be the study centre on the growing of multipurposed forest, appropriate patterns of agricultural development, together with forest conservation and reforestation, allocation of water sources in order to restore its former fertility. His Majesty King Bhumibol Adulyadej gave the initiative to form a ***“forest village”*** by letting people take care of the forests surrounding their

villages. At the initial stage, the government agencies provided demonstrations and guidance on how to grow tillers of fast-growing trees, fruit trees and economic trees. The centre also conducts the study on the prevention of forest fires called ***“wet forest system”*** and cultivates vetiver grass to improve soil quality. Vetiver grass can serve as a living natural wall that helps to slow down the water flow while trapping soil sediments which helps to create soil surface and moisture.



## Extension Works

The centre also extends the achievement results to the people who are interested by providing training courses in both theory and practice and sends the officials to disseminate the knowledge among the farmers. In addition the centre sets up the demonstration plots such as:

- Development of agriculture such as:

- ◆ Experimentation on good-quality rice varieties and planting of chemical-free vegetables

- ◆ Growing of various plant varieties such as chili, eggplant, tomato, luffa

- ◆ Propagation of good seeding such as mango, star fruit; planting good quality of lemon, grape, dragon fruit

- ◆ Growing of plants such as *Melientha suavis*, brinjal, indian mulberry, gotu kola, physic nut

- ◆ Propagation of herbal plants such as Thai croton, java plum, Chebulic Myrobalans, *Pterospermum littorale Craib*, persimmon, common fig

- ◆ Growing of flowering and ornamental plants such as red ginger, pink ginger, gladiolus, flamingo flower

- ◆ Cultivation of mushroom such as angel mushroom, oyster mushroom



- Development of animal husbandry such as dairy cow, Muscovy duck, indigenous chicken
- Development of fishery and propagation of aquatic animals including frog farming such as *Rana tigrina*, bull frog, fish raising such as giant gourami, catfish
- Development and improvement of soil including planting of vetiver grass in different patterns and methods, improvement of soil using green manure and compost, creation of a new forest garden while developing the existing one, inter-cropping in eucalyptus plot and propagation of tillers
- Development and conservation of wildlife species such as breeding and propagation of wildlife animals in the forest around Tao Poon Mountain by releasing animal species such as hog deer, brow-antlered deer, barking deer and bird species such as peacock, pheasant and red junglefowl

Moreover, the Huai Sai RDSC develops and promotes the occupations in various aspects such as integrated farming, agro-forestry or organic farming, rehabilitation of forest and economic forest, breeding and propagation of wildlife species especially hog deer,

which is an indigenous animal, for releasing back to the nature. His Majesty the Late King expressed his appreciation on this success on 14 July 1997 at Klai Kangwol Palace, Prachuap Khiri Khan Province as follows:

*“...What we have done at Huai Sai is a wonderful success. We must make note of it as a theory or as a book. I am very pleased...”*



## Triumph of Development

The results of development activities at the Huai Sai RDSC are considered the outstanding achievements of the development of natural resources and environment which can be applied in other areas with similar problems. From a destroyed and dry-stricken land 50 years ago, now the land has been restored to its fertility once again with mountainous areas, watershed areas, wildlife species especially hog deer. The quality of life of the people in the area has also been improved and the people become self-reliant and live happily properly.

At present, there are 29 surrounding villages and a centre branch which is:

- **The Royal-Initiated Cha-ngum Mountain Deteriorated Soil Rehabilitation Project, Photharam District, Ratchaburi Province:** involving the soil development work with the method of “*reforestation without planting*” and the utilization of vetiver grass to increase the fertility of the soil





His Majesty King Bhumibol Adulyadej intended that the royal development study centres would serve as venues for carrying out studies, experiments, research and demonstrations and a comprehensive development that is “the Model of Success” for the interested people as reflected in an excerpt from His Majesty’s speech as follows:

*“...The Centres were established with two main aims. One is to serve as the demonstration ground of integrated development, covering every aspect of life of the people in order to make a living in their locality. Second is to let the people see new technologies which can be effectively applied in their occupations...”*

For more than 20 years, the six royal development study centres have conducted studies, research, experiments and organized training courses for the people which render them enormously benefits and the results can be extended to the surrounding areas. The people have a better living standard and stable occupations which make them have enough to live and to eat. The royal development study centres are the **“Living Natural Museums”** that continue to expand and serve as ever-lasting knowledge development ground according to His Majesty the Late King’s wish and determination to alleviate the difficulties the people are facing and bring forth good living conditions to live a happy life forever.



## **Living Natural Museum**

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# Royal Development Study Centres

**"Upstream Forestry,  
Downstream Fishery,  
In Between Agriculture"**



Huai Hong Khrai  
Royal Development Study Centre  
Doi Saket District,  
Chiang Mai Province



**"Empty Forest, Dry Stream,  
Bad Land can all be Developed"**



Khao Hin Sorn  
Royal Development Study Centre  
Phanom Sarakhram,  
Chachoengsao Province

**"Generate More Water, Grow More  
Forest, Harvest a Sufficient Life"**



Puparn  
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Mueang District,  
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the Forest, Retain  
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Huai Sai  
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