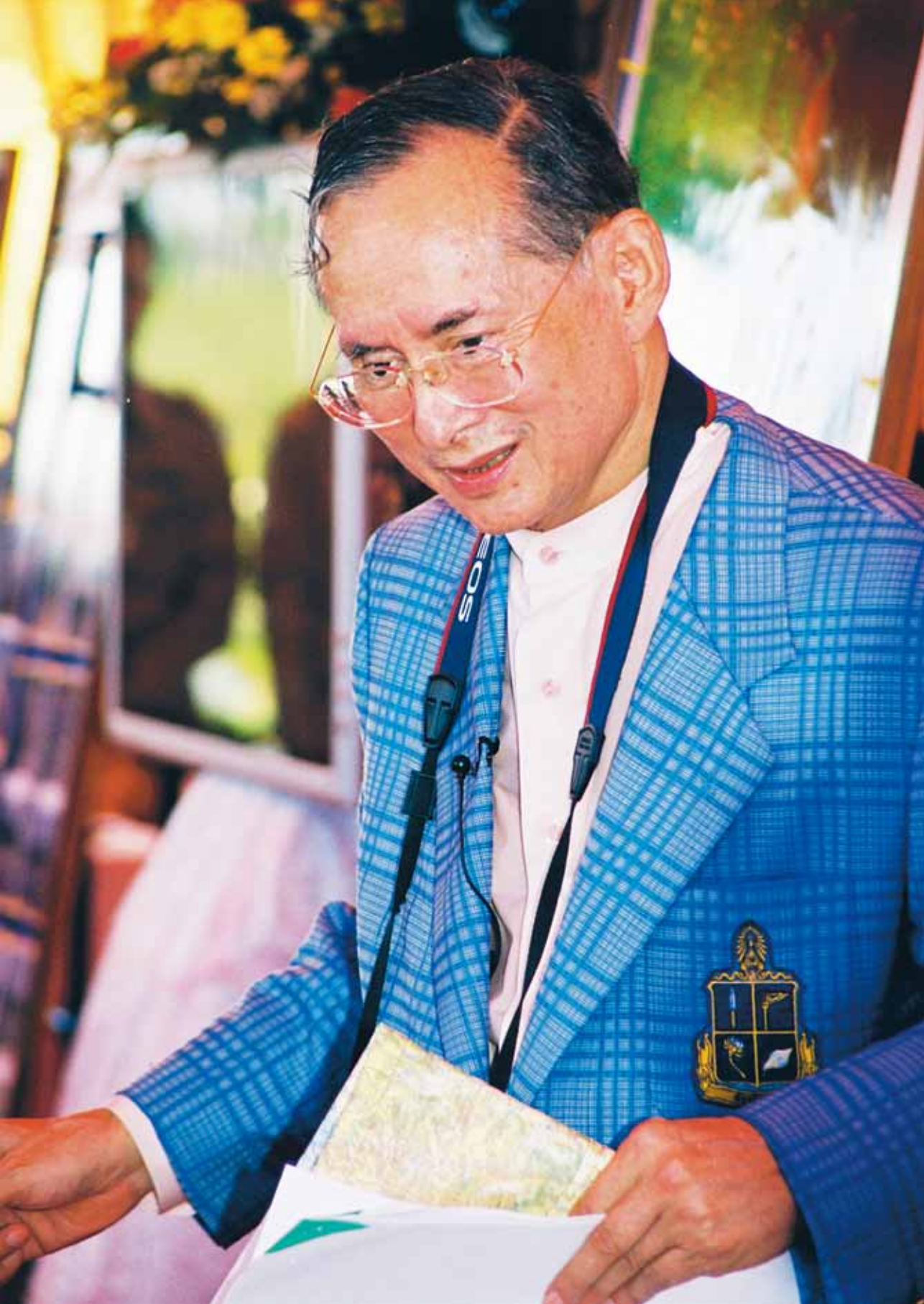


Royal Development Study Centres





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Foreword

As one of the major goals for rural development in Thailand is to search for ways to uplift the people's well-being, His Majesty the King of Thailand initiated not only the royal development projects but also the establishment of the six royal development study centres in all regions of the country. The aim is to solve problems for people in the rural areas so that they can have a better quality of life and free from hardship while enabling them to become strong and self-reliant. For the past 30 years, the royal development study centres have promoted among the people the knowledge and technology which conform with the conservation and development of the environment and the natural resources. The know-how and methods are also simple, applicable and useful for the people to make a living according to their lifestyles in a sustainable manner.

On the auspicious occasion of His Majesty the King's Seventh Cycle Birthday Anniversary on 5th December 2011, the Office of the Royal Development Projects Board, as the coordinator of the royal development projects, has published this book with the most updated information to make the public learn more about the implementations and the achievements of these six royal development study centres (RDSCs) which have greatly contributed to the Thai society throughout the past three decades.

Office of the Royal Development Projects Board
(ORDPB)



Royal Development Study Centres



Introduction

Since his accession to the Throne in 1946, His Majesty King Bhumibol Adulyadej, the Ninth King of the Royal House of Chakri Dynasty, has dedicated both time and efforts to the development work for the betterment of Thai people. Through constantly visiting every region of the country, often accompanied by Her Majesty Queen Sirikit and members of the Royal Family, His Majesty has become familiar with the problems and real conditions of the people. Consequently, His Majesty has realized the need to initiate development projects that would directly benefit the people at the grass-roots' level and at the same time be consistent with the local physical, climatic and sociological conditions.

One of the central principles of His Majesty's approach to development has been His Majesty's wish for the people to become self-reliant. Therefore, His Majesty has stressed the need for the dissemination of knowledge to villagers with regards to occupational and agricultural techniques.





The Royal Initiative: Museum for Life

“...It provides a demonstration of integrated development work, covering everything and every aspect to help people earn a living in their environs. They will be able to observe the models of modern knowledge and technology, and an effective course for making a living...”

“...On one aspect, the Royal Development Study Centre serves as a venue for carrying out study and research of different areas, because each area differs considerably in terms of precipitation, climate, and the people themselves...”

“...Various departments and divisions which concern every different aspect of the people’s life can exchange ideas, work together and coordinate to have the work done. Normally, there should be a centre which gathers in one place officials and experts from all departments and divisions 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 places. One is the officials who work together in one place. The other is the general public who acquire benefits...”

The Royal Speech of His Majesty the King



One of the major goals for rural development in Thailand is to search for ways to uplift the people's well-being. This entails developing the community 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 the King graciously granted an initiative 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**” from where farmers can explore and apply the knowledge as well as methods of occupation gained from the fields on their land.

Objectives

1) To conduct study, research and experiment in search of modern agricultural techniques consistent with the topographical and social conditions of each particular area. Apart from general knowledge on agriculture such as the development of water sources, forest, crop cultivation, livestock, fishery and occupations, each centre has a focus which deals with the specific problems of the areas and provides alternative means to solve such problems. Each centre which represents the region's local characteristics intends to be the "model of success" for the people in the surrounding villages and other areas as well.





2) To serve as a centre for exchange of experiences among academics, development workers and the people and serve as the source of knowledge for the people. The centre integrates theory with practice. The centre gathers successful results from the study, research and experiments. In this connection, His Majesty insists that the technology should be simple and inexpensive.

3) To serve as a centre of integrated development patterns - a good example of a multi-disciplinary concept which produces maximum benefits for a specific area.

The line of development focuses on integration of a variety of development activities which complement one another. Moreover, the integration includes not only the knowledge but also the systematic operation and demonstration undertaken by many agencies involved.





4) To build and reinforce close coordination in project planning, implementation and management among different government agencies within an inter-sectoral framework in order to render the works effective. This means that the officials of various government agencies are mobilized to work together under the name of the centre and based on the centre's Master Plan. This also includes close cooperation among the farmers by encouraging them to form groups for the effective management of certain activities.



5) To provide a comprehensive or one-stop service that shows research, experiments and demonstration of many fields of agricultural knowledge in the form of a 'living natural museum'. Since various agencies are working together at the centre, people can come to see the living demonstrations in one place at one time or obtain training on specific topics to attain the maximum benefits possible. Evidently, the centre supports the farmers in two ways -- providing academic knowledge and giving production inputs such as plant seedlings, or in certain cases, lending the inputs e.g. the parent stocks of animals such as cattle.



Each centre represents the region's local characteristics and addresses the problems particular to the areas. The centre conducts studies and researches 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 proved to be successful, the centre then disseminates the knowledge to farmers living in the surrounding villages to apply on their own land. The centre promotes all fields of knowledge related to agriculture, such as cultivation techniques, propagation of crop varieties, animal husbandry, fishery etc. Farmers can come to participate in the training, take a study tour to observe the activities around the centre or ask for advice and technical assistance. In some cases, the centre's extension officers are dispatched to offer assistance to farmers in the surrounding villages right at their own farms. The farmers who successfully apply the knowledge learned from the centre become the centre's model farmers and their farms become the learning centres where other people can visit and learn from.

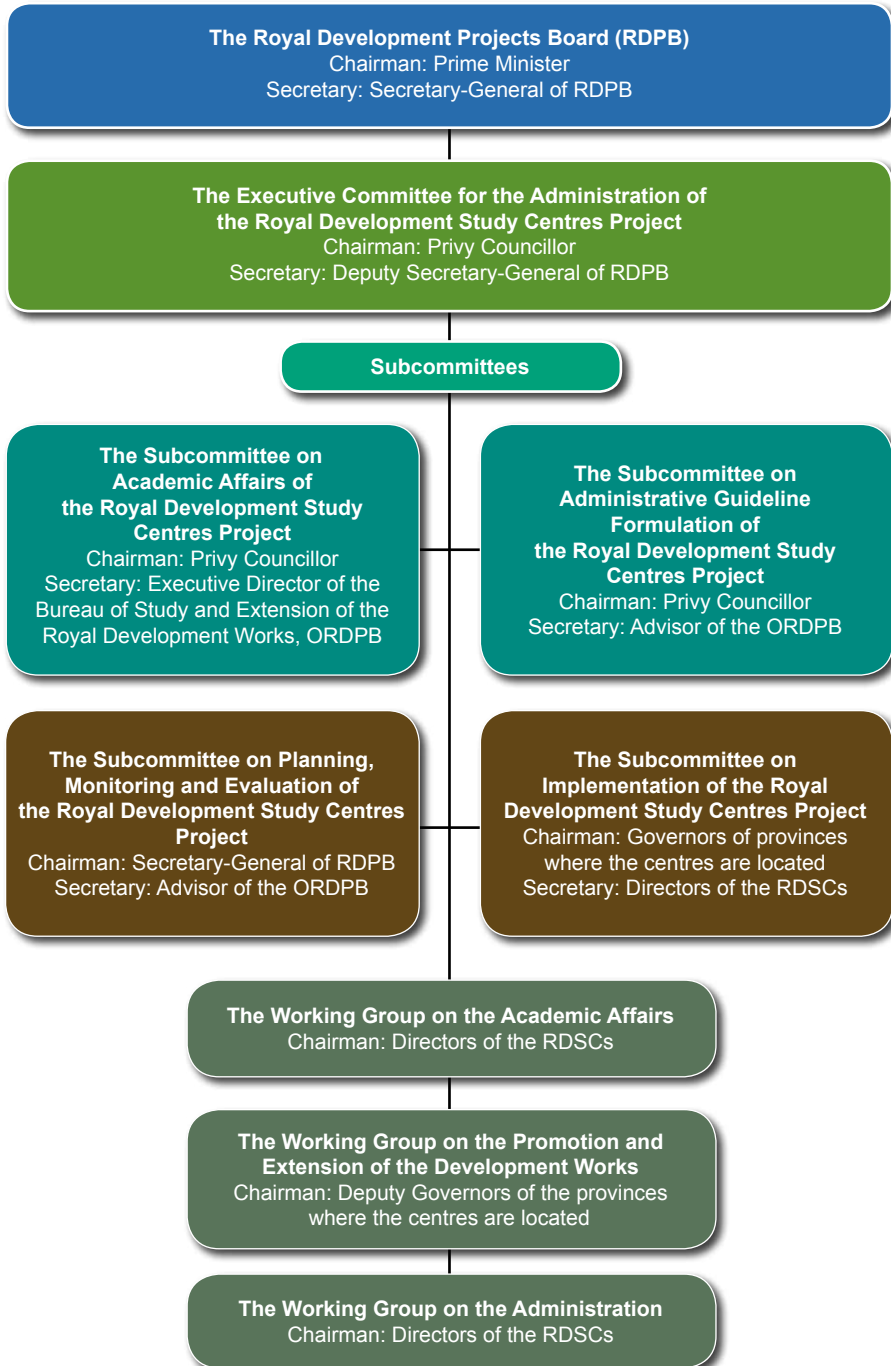
After the knowledge has successfully been promoted to farmers in the surrounding villages, the extension work is then aimed at farmers in other areas. This gives rise to the setting up of the centre branches for carrying out studies on specific issues relevant to the problems of the area. The objectives of the centre branch are similar to those of the RDSCs in conducting studies and experiments to support the local occupation by which farmers can put the results to practice and become successful in their occupations.



Administration and Operation of the Royal Development Study Centres

In order to enable the administration and operation of the royal development study centres to comprehensively and effectively serve the royal initiatives in a unified and consistent manner, the Royal Development Projects Board (RDPB) agreed to establish “**the Executive Committee for the Administration of the Royal Development Study Centres Project**”. The committee is chaired by a Privy Councillor while the Secretary-General of RDPB, representatives from 19 agencies involved and governors of 6 provinces where the centres are located become the members of the committee, and the Deputy Secretary-General of RDPB serves as both a committee member and a secretary.

The Administrative Structure of the Royal Development Study Centres







The six Royal Development Study Centres are as follows:

- 1) Khao Hin Sorn Royal Development Study Centre in Chachoengsao Province (founded in 1979)
- 2) Kung Krabaen Bay Royal Development Study Centre in Chanthaburi Province (founded in 1981)
- 3) Pikun Thong Royal Development Study Centre in Narathiwat Province (founded in 1982)
- 4) Puparn Royal Development Study Centre in Sakon Nakhon Province (founded in 1982)
- 5) Huai Hong Khrai Royal Development Study Centre in Chiang Mai Province (founded in 1982)
- 6) Huai Sai Royal Development Study Centre in Phetchaburi Province (founded in 1983)





Khao Hin Sorn

**Royal Development
Study Centre**







Former Conditions of the Area

“Central Region : Land of Eroded Soil Surface”

Thailand's Central Region has faced with several problems such as soil degradation due to the sandy soil that was easily washed away and the sloppy condition of the areas. Moreover, Thai farmers lacked the knowledge and understanding of the importance of soil and water conservation, correct cultivation methods as well as proper care and maintenance of the soil. Mono-cropping was implemented on a continual basis and without soil nourishment, resulting in rapid decrease of soil fertility. This was coupled with the lack of water sources and the condition of the soil which did not absorb water, leading to severe water shortage situation.





Royal Initiatives

Realizing the problem of soil degradation affecting the region, His Majesty the King came up with an idea of setting up the first royal development study centre, the Khao Hin Sorn Royal Development Study Centre, on 8 August 1979 in Phanom Sarakham District, Chachoengsao Province. This has set the idea for establishing other royal development study centres. It can be said that the history of the royal development study centres began at Khao Hin Sorn.



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

The royal initiatives for establishing the centre include the development of sandy soil caused by the repetitive mono-cropping of corn and cassava, the development of water sources in the centre area starting with the construction of Huai Chek Reservoir and others in nearby areas to supply water for agricultural activities, the development of field crops plantation suitable for the local area conditions, the promotion of fish and animal raising, and the restoration of the area to its former fertility.

The Khao Hin Sorn Royal Development Study Centre covers an implementation area of 303.2 hectares. It has two branches which are the Cha-ngok Mountain Area Development Project in Nakhon Nayok Province covering 3,705 hectares and the Ban Sang Development Service Centre in Prachin Buri Province covering 23 hectares. At present, the Khao Hin Sorn RDSC has extended its services to 33 surrounding villages which comprise a total area of 29,280 hectares.

The operation of the centre is undertaken on an inter-sectoral basis involving the cooperation of 12 relevant government agencies. The overall management of the implementation of its activities is under the supervision of the Land Development Department which commissions a representative to act as director of the centre.





Activities

1. Development of Water Sources

1.1 Providing water for household consumption and agricultural uses of the villagers around the Jon River Basin

1.2 Constructing 9 reservoirs with a water storage capacity of 5.76 million cubic meters and irrigation canals for distributing water into the farmers' fields

1.3 Dredging natural streams

1.4 Building water storage sources for agricultural fields together with promotion of planting vetiver grass around the pond to prevent soil erosion





2. Development of Soil

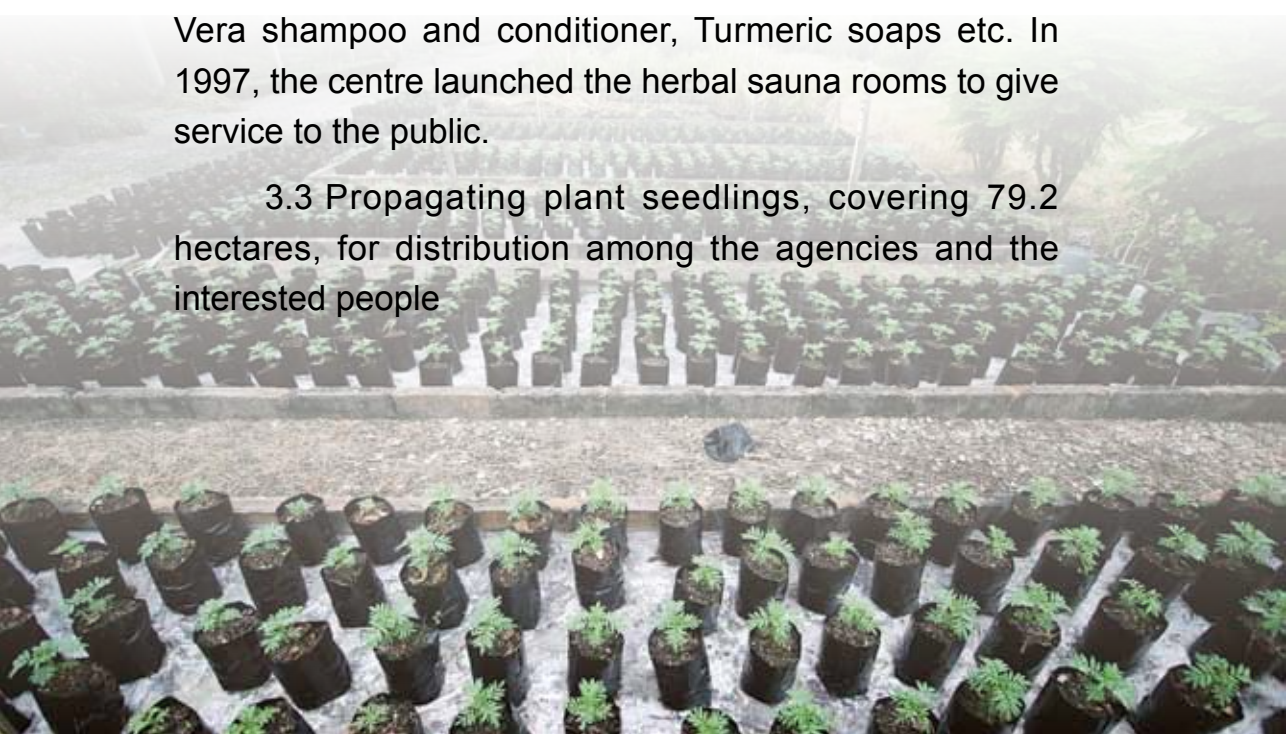
- 2.1 Conducting surveys for land use planning
- 2.2 Setting up a system for conserving soil and water to prevent erosion of soil surface
- 2.3 Improving sandy soil for growing plants
- 2.4 Demonstrating integrated farming and the New Theory farming
- 2.5 Building check dams and embankments
- 2.6 Promoting the use of vetiver grass for soil and water conservation while propagating vetiver grass for distributing sufficiently
- 2.7 Promoting the making and use of compost, manure, green manure and bio-fertilizer from fresh garbage and lefts-over in the household
- 2.8 Promoting the practice of the New Theory farming on the plots of the model farmers and developing the water sources for agricultural purposes to enable the farmers to have the income all year round

3. Development of Forestry

3.1 Setting up Somdet Phra Pinklao Arboretum, covering 32 hectares, to deal with the maintenance and conservation of indigenous trees, fast-growing trees, rare trees, and economic trees while serving as a recreational place for the public

3.2 Setting up a botanic garden, covering 64 hectares, with a focus on the maintenance of the existing forest while expanding the forest area by growing various species of trees which include forest trees and fast-growing trees. In this section, the centre established an herbal garden in 1980 to collect the herbal plants, rare species of wild trees and mushroom, and also to process the herbal products such as the butterfly pea shampoo and conditioner, Aloe Vera shampoo and conditioner, Turmeric soaps etc. In 1997, the centre launched the herbal sauna rooms to give service to the public.

3.3 Propagating plant seedlings, covering 79.2 hectares, for distribution among the agencies and the interested people





4. Development of Crop Cultivation

4.1 Conducting studies and experiments on diversified farming systems such as plant cultivation and the integrated farming

4.2 Planting field crops and horticultural crops

4.3 Planting para rubber and paper mulberry, silkworm culture and processing mulberry tea

4.4 Growing herbal plants

4.5 Growing organic vegetables and fruit crops

4.6 Growing plants in the hydroponic system

4.7 Mushroom culture

4.8 Implementing sustainable agriculture farming







5. Development of Animal Husbandry

5.1 Promoting animals raising such as cattle, native chickens, muscovy ducks, and swine to raise the people's income

5.2 Promoting the cultivation of fodder grass for feeding the animals as well as providing health care services

5.3 Setting up a cattle bank from which the farmers can borrow the parent stocks for propagating purpose





6. Development of Fishery

6.1 Promoting fish breeding and distributing fish breeds in order to promote fish culture to be both the principal and supplementary occupations of farmers

6.2 Releasing the fish breeds into the public water sources

6.3 Demonstrating the raising of freshwater and marine fish, rugose frogs and ornamental fish





7. Development of Community

7.1 Promoting supplementary occupations such as handicraft making, basketry, weaving, blacksmiths and processing of herbal products through demonstration and training

7.2 Encouraging the farmers to form groups to strengthen the community particularly the farmers' cooperatives and the farmers' occupational groups such as the organic vegetables group, the duck raising group, the frog raising group etc.

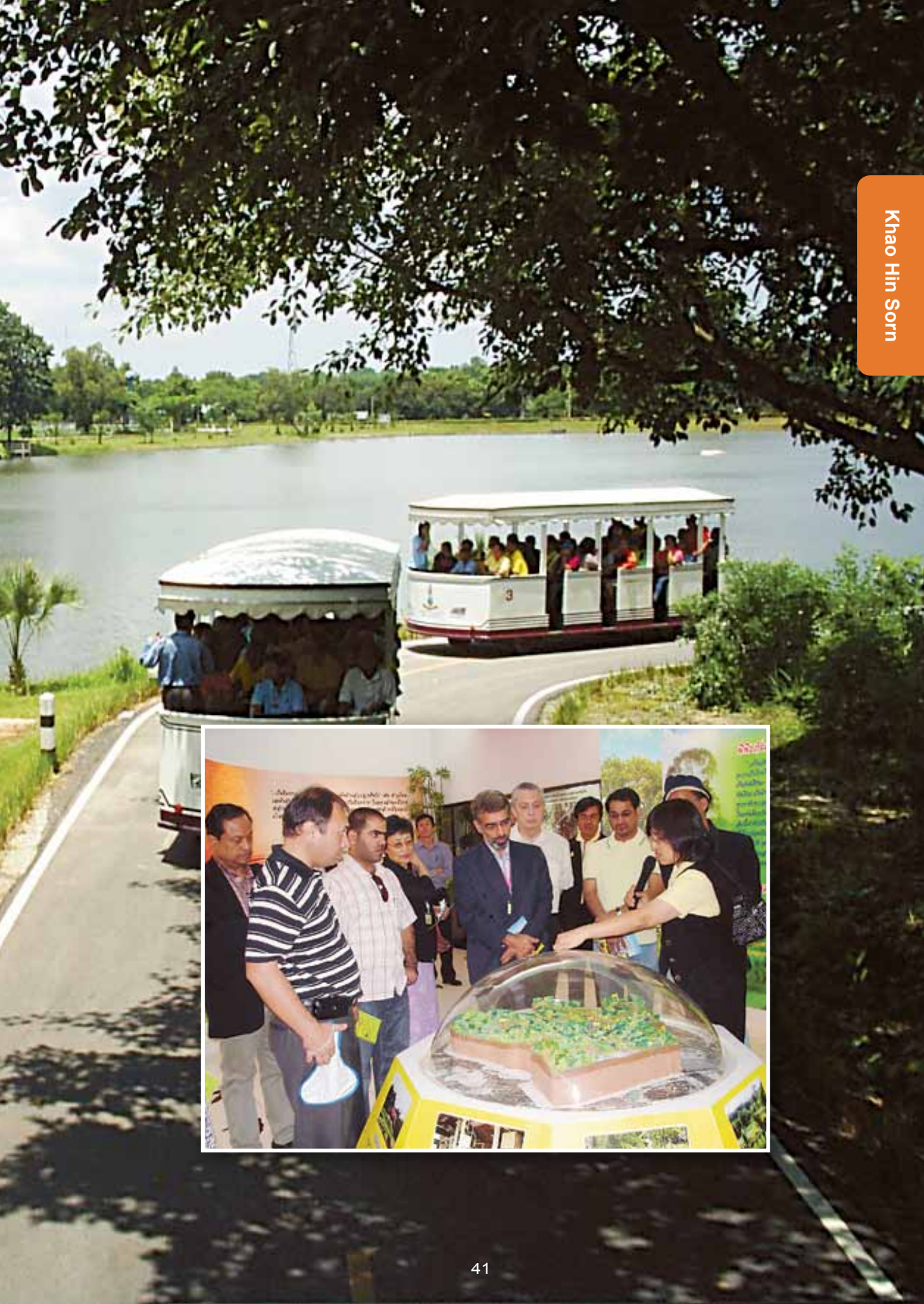
7.3 Establishing a child care centre in the centre area to support family development





Achievements

Since the establishment of the centre in 1979, the natural resources have been rehabilitated continually from “the empty forests, dry stream, bad land” to “fertile land” as can be seen from the number of forest areas which increased from 5.4 % in 1979 to 42.7% in 2007. Several water sources were built to support the agricultural activities. Indigenous plant species were selected to grow and distributed to the farmers to grow on their own farms to raise the income. Appropriate technology on agriculture is also introduced to the farmers in the form of training courses to help advance the productivity. Moreover, 101 studies and researches on the development of soil, forest,





plants, livestock, and fishery have been done since 1979-2007 to find out the successful results that can be applied in the local area before disseminating to the farmers.

The farmers increasingly turned to rely on multi-cropping by implementing the New Theory farming practice and the integrated farming practice. This replaced the former practice of mono-cropping of cassava and rice. The farmers have learned about the benefits and advantages of the use of bio-fertilizer in place of chemical fertilizer since it helps reduce the cost of production and gives good quality yields without harming the environment or the people's health. All this together, the economic conditions of the farmers have improved; the average annual income per household of the farmers living in the surrounding villages has augmented from about 430 US dollars in 1981, to 700 US dollars in 1986, then 1,894 US dollars in 1997, 1,472 US dollars in 2003, and 571.43 - 2,285.71 US dollars between 2003 - 2005. Apart from that, the centre has fulfilled the royal initiatives on serving as a recreation place for nearly 4,000 tourists during 2005 - 2007.



The agricultural extension programme has developed the occupations of the farmers and uplift the quality of life of the people in the villages surrounding the centre while improving the quality of the environment. The implementations include the rehabilitation of the natural resources, the construction of more than 1,000 ponds for storing water, the promotion of planting fruit trees, perennial trees and forest park, the establishment of the system for soil and water conservation, the provision of basic infrastructure, the extension of knowledge through the organization of training courses for more than 3,000 participants including the farmers, the students, and the interested people, the arrangement of the study visits to the plots of the model farmers of the centre, and the promotion of the setting up of cooperative/occupational groups among the farmers.

In the year 2012, it has benefited over 58,000 people and currently supervises 16 model farmers and learning centres and 38 farmers' groups. Moreover, 3,814 people attended the training courses organized by the centre and more than 113,000 people visited the centre.





Kung Krabaen Bay

**Royal Development
Study Centre**



Former Conditions of the Area

“Eastern Coast: The Coast of Diversity”

Thailand's Eastern Central Region covers 36,502 square kilometers and constitutes 7.11% of the total area of the country. Its geography comprises lowland, highland, mountainous areas, coastal areas and islands. In the past, the sea in the coastal area was blessed with a variety of natural resources and fishing ground. The area around the coast was designated for agricultural activities. The rapid growth of population and technological progress resulted in the destruction of natural resources, especially on the eastern coast of the country where excessive fishery was conducted, causing a decreased amount of aquatic animals. The agricultural sector was also affected by intrusion of sea water. In addition, a number of reserved areas was encroached upon and turned into a deteriorated land.



**“Manage and Rehabilitate
the Coastal Resources :
From Hilltop to Sea Base”**



Royal Initiatives

His Majesty the King gave initiatives concerning the study and development of the area along the coastline as follow:

“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.”

His Majesty the King’s Address on 28 December 1981

“Please consider locating a degraded forest in a national preserve to be the site of a Development Study Centre, like that at Khao Hin Sorn, where coastal development can be studied.”

His Majesty the King’s Address on 30 December 1981

His Majesty the King expressed his wish that different government agencies jointly conducted study and experimentation on development of coastal areas in

Chanthaburi Province. The purpose is to be guidelines and to instill in Thai people the knowledge and awareness of the importance of the use and conservation of the natural resources. In response to this initiative, the Kung Krabaen Bay Royal Development Study Centre was established on 28 December 1981 at Tha Mai District, Chanthaburi Province. It intends to implement His Majesty's wish by developing methods suitable for the development needs in the coastal zone of Chanthaburi Province, where mangrove destruction, decline of coastal fish stocks and saline water intrusion into agricultural lands have caused environmental deterioration and adversely affected the way of life of the local fishermen and farmers. Therefore, the main focus of the centre's activities is studying the pattern of sustainable coastal resources management, and developing the fishery and aquaculture activities along with development of other activities to increase the country's production and to conserve the environment and the natural balance for maintaining the specific characteristics of the area.

At present, the total area of the Kung Krabaen Bay Royal Development Study Centre covers 13,039 hectares. The operational boundaries of the centre comprise the areas along the coastline and the areas of 33 surrounding villages, covering 13,637 hectares.

The centre's activities involved the works of 15 government agencies with the representative of the Department of Fisheries which oversees the centre's main activities acts as director of the centre.

Activities

The centre applies *the Integrated Development Approach from Hilltop to Sea Base* to preserve the ecological balance and promote the villagers' occupations in a sustainable manner. Important activities at the centre include:

1. Development of Fishery and Aquaculture along the Coast

1.1 Conserving and rehabilitating aquatic animals and the environment by conserving the sea grass, providing shelter for aquatic animals and releasing fish breeds as well as other aquatic animals into the water sources including the Kung Krabaen Bay





1.2 Studying and promoting the use of appropriate fishery methods and fishing tools

1.3 Studying and developing aquaculture along the coastal area which includes culture of seawater prawns in earthen ponds and in the seawater irrigation system, culture of oysters, and raising of fish in floating baskets. The objectives are to promote and develop the villagers' occupations in a sustainable way, and to upgrade the standard of aquaculture by adopting the Code of Conduct (CoC), the Good Aquaculture Practice (GAP), and the Food Safety. These standards help to preserve the environment and natural resources as well as ensure the increase of clean aquatic products for the domestic consumers.

The prawn farming in the seawater irrigation system is implemented together with the conservation of mangrove forest. The centre has developed the patterns of seawater prawn farming by constructing the irrigation system to pump the water from the open sea, directed into the farming areas in the Kung Krabaen Bay. The wastewater from the prawn farms is then collected and treated by the physical and biological means. In addition, the "Irrigated Seawater Prawn Raising Group" was set up to supervise the system with the technical support from the centre.

1.4 Setting up a clinic for aquatic animals. This includes services in checking water quality and detecting of viruses as well as providing technical knowledge for shrimp farmers.



1.5 Raising mussels in the floating baskets in the mangrove forest treatment ponds. The purpose is to promote mussel raising among the farmers.

1.6 Promoting fish raising in schools to support the Agriculture for Lunch Project at schools

1.7 Establishing the Sixth Cycle Birthday Anniversary Celebration Aquarium to promote the awareness of the value of the coastal resources

2. Development of Forestry (Mangrove Forest)

2.1 Preserving natural fertility of the mangrove forest around the Kung Krabaen Bay totaling 97.6 hectares as well as promoting mangrove reforestation of 81.92 hectares to increase the abundance of the coastal ecological system and to serve as the breeding ground and nursery for marine life, and the place for treating the wastewater from aquaculture along the coast

2.2 Rehabilitating the forest resources by various means e.g. growing rattan, creating check dams. The aims are to restore the soil moisture, increase the number of wild animals and reduce the chance of soil erosion which will eventually lead to the natural abundance and ecological diversity.

2.3 Constructing a boardwalk or a trail to study the nature of the mangrove forest without destroying the living things on the soil surface. This is in order to raise the people's awareness of the value of the mangrove on all living things and induce them to participate in the conservation of the mangrove forest. This also serves as a recreational place of the centre.

2.4 Propagating seedlings of mangrove trees, perennial trees and ornamental plants

2.5 Maintaining the plant genetics of the mangrove forests, coastal forests and local herbal plants



2.6 Conducting surveys of sea animals living on the soil surface of the mangrove forests and sources of sea grass in the Kung Krabaen Bay

2.7 Enhancing the efficiency in preserving and protecting the mangrove forests. This involves patrol and public relations works to prevent encroachment on the mangrove forests.

3. Development of Soil

3.1 Studying and developing soil improvement methods suitable for farming, especially the improvement of acidic soil for agricultural uses. This includes making and using of green manure, organic fertilizer, compost and bio-fertilizer in order to reduce the use of chemical fertilizers and insecticides which results in safety agricultural products for consumers.

3.2 Promoting the growing of vetiver grass for soil and water conservation e.g. in the sloping areas to prevent soil erosion, especially during the rainy season, and in the agricultural areas particularly in the orchards to preserve soil moisture



4. Development of Crop Cultivation

4.1 Studying and developing varieties of cash crops which are adaptable to the sandy soil of the coastal area namely groundnuts, cashew nuts, rubber trees, vegetables and herbs

4.2 Promoting organic farming to obtain chemical-free agricultural produce such as non-toxic rice, string beans and sweet corns, which are safe for the consumers

4.3 Organizing integrated farming demonstration plots as a place for agricultural technology transfer from which the farmers can apply in accordance with the condition and size of the farm as well as the capacity of the farmers in order to increase the yields. This includes experiments on producing cucumber, string beans and sweet corn without using chemicals, producing and using biodiesel from used plant-extracted oils, making bio-fertilizer and mushroom culture.

4.4 Producing seedlings of good varieties of field crops such as nuts

4.5 Producing wood vinegar to be used as pest repellent substances

4.6 Growing physic nuts to serve as an alternative energy source

4.7 Promoting the establishment of botanic gardens in schools

4.8 Encouraging the setting up of Sufficiency Economy integrated farming groups



Kung Kraabaen Bay



5. Development of Animal Husbandry

5.1 Promoting animal husbandry according to the farmers' needs with the objectives to increase their protein food source and income. The animal breeds that the centre promotes among the farmers include indigenous chickens, muscovy ducks, swine and meat goat which are easy to raise and require low investment.

5.2 Growing fodder plants for livestock

5.3 Conserving Thai buffalos

5.4 Providing services for vaccination, supplementary food and health care services for animals



6. Development of Community

The work is conducted to strengthen agricultural institutions, business, and community at the grass-root's level on the basis of the middle path or moderation while enabling the farmers to link and keep up with the outside economy. In addition, the centre encourages a systematic production with an emphasis on people participation integrated with the use of the local wisdom.

6.1 Promoting good health for the people especially by means of the use of local herbal plants. In this regards, an herbal plant demonstration plot is created and health care services are provided e.g. consultation on the use of herbal plants and creation of sauna rooms. Besides, the Thai traditional therapy committees are formed at the village level.

6.2 Promoting and disseminating the technology regarding the processing of agricultural and fishery products to the farmers' housewives groups. This emphasizes the use of local agricultural produce and aquatic animals in order to increase the value of the produce as well as the income of the groups.



7. Promotion of Development-oriented Tourism

The activity concerns the development of tourism that is related to the local culture, the way of life, the natural resources as well as the occupations of the farmers. It is aimed at promoting touristic activities e.g. kayaking in the Kung Krabaen Bay and organizing learning camps to instill the awareness of the value and the need to conserve the coastal resources. The purpose is to provide the visitors with the knowledge on the conservation and management of the coastal resources as well as the people's occupations while relaxing.



Achievements

Since the establishment of the Kung Krabaen Bay Royal Development Study Centre in 1981, the study, research and development activities have contributed towards improving the well-being and standard of living of the villagers and farmers in the Kung Krabaen Bay area as well as serve as a “successful demonstration model” for effective coastal resources and environmental management. The centre has played an important role towards restoring previously degraded mangrove forest and to restore the ecological balance of the coastal zone which is vital for the survival of the coastal natural resource base. It has succeeded in conserving 1,819.20 hectares of natural forest on mountains while 208 hectares of mangrove forest around the Kung Krabaen Bay have been preserved through the participation of the local people.





For aquaculture, the clinic for aquatic animals has helped to reduce damage from viruses affecting shrimp farms due to regular surveillance. The agricultural development concerning both cultivation of crops and fresh water aquaculture has been successfully guided towards sustainability. The mixed farming and farming pattern according to the New Theory, the activity which promotes maximum land use and enables continuous year round production, have been applied on the farmers' land leading to an increase of the farmers' income to a range between 2,333 to 4,000 US dollars per year.

The centre not only encourages the farmers in the surrounding villages on the development of intensive shrimp farming which is environmentally friendly, but also allocates 116.48 hectares of shrimp farms in the deteriorated area



within the project for 113 households of poor farmers to make a living. This has had a satisfactory level of success. The centre has also succeeded in disseminating the knowledge and benefits of group forming as well as encouraging the farmers to establish a shrimp farming cooperative which received the nation's outstanding fishery cooperative award in 1995.

The quality of life and income of the farmers, especially those engaged in shrimp farming, have improved. In 1995, shrimp farmers obtained an average of 4,285 US dollars per household per year, about three folds of that in 1994. Generally, the economic condition of the farmers has been raised above the poverty line. In 2009, the farmers in the surrounding villages gained approximately 42,000 US dollars per household per year.



The development-oriented tourism has provided the visitors with both the technical knowledge and occupational development techniques while enjoying the visits especially to the Sixth Cycle Birthday Anniversary Celebration Aquarium which displays four groups of fish in the Eastern Region including commercial fish, ornamental fish, coral reef fish and exotic fish. Consequently, the centre won the “Excellence” Tourism Award 2000 and “Distinguished” Tourism Award 2002 from the Tourism Authority of Thailand.



Lastly, the geographical information system (GIS) has effectively assists in the management of coastal resources in this region, contributing to mutual benefits for all parties concerned.

In 2012, the centre received over 700,000 visitors. Moreover, 1,645 people attended training courses organized by the centre and about 3,000 people benefited from the centre through various channels and methods. Currently, the centre has 15 occupational groups and 22 learning centres where other people can learn from.





Pikun Thong

**Royal Development
Study Centre**



Former Conditions of the Area

“Southern Region: Land of Seashore and Peat Swamp Forest”

The Southern Region covers the total area of 70,715 square kilometres or 13.78% of the country. Most areas are constituted of old “*Phru*” or peat swamp forests which contain soil composed of thick layers of organic matters or decomposed plant residues underlain by the high content of pyrite. When the soil is exposed to the air, the soil oxidizes. Whenever water is drained from the soil, pyrite which is the combination of iron (Fe) and sulfur (S₂) releases sulfuric acid.

Formerly, the region was also affected by the problem of poverty which was concentrated in the provinces along the border line: Narathiwat, Pattani and Yala where 60% of poor people of the region live. Moreover, there was a low number of students who pursued secondary education in the provinces along the border comparing to other provinces in the region. In addition, 49.3% of the households, mostly in the border provinces, were not self-reliant economically.

The major problem which seriously affects the South is the existence of large areas of water-logged peat soil which consists of partly decomposed vegetation forming a layer over marine clay: a bluish-grey mud with a high content of pyrite, which when exposed to oxygen becomes highly acidic. Such land in the South has caused an obstacle to the use of land for agricultural purposes.





Royal Initiatives

With the concern over the Thai people living in the southern part of Thailand, His Majesty the King came up with an idea to establish the Pikun Thong Royal Development Study Centre in Muang District, Narathiwat Province, during a royal visit between August and October 1981. The primary objective is to conduct studies and experimentations on ways to improve the peat soil condition which can be applied to develop other peat soil areas as well as development methods and technology which particularly suit the development needs of the southern region of Thailand.

“...Large areas of Narathiwat Province are lowland areas of poor soil quality, facing water-logged condition

“Deteriorated Swamp Forest, Accumulated Peat Soil, Managed by ‘Klaeng Din’”

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 sulphuric acid, and would turn further acidic when dried. Therefore, it would be necessary for various agencies concerned to come together, and jointly study and find ways to improve this Phru land, in a common harmonized approach. Afterwards, the project success may be applied to develop other Phru land areas further elsewhere....”

His Majesty the King then initiated the establishment of the Pikun Thong Royal Development Study Centre on 6 January 1982 to serve as a central office to conduct research and experimentation on methods to improve the deteriorated conditions of the swamp area and enable it to become arable.

The Pikun Thong RDSC covers the total area of 278.40 hectares of which 32.32 hectares are for the building, training centre and demonstration site of agricultural technology,

49.28 hectares form a swampy area for conducting agricultural research and experimentation, 32 hectares constitute a hillside area at Khao Sumnak for growing para rubber, orchard and flowers, and 164.80 hectares become the site for a reservoir with a storage capacity of 2 million cubic metres which distributes water to the plots of land used for research and experimentation by the centre. The centre is also responsible for managing the “*Phru*” area in Narathiwat Province which covers 41,897 hectares and divided into three target zones: Development Zone (15,202.40 hectares), Conservation Zone (17,590.08 hectares) and Preservation Zone (9,105.12 hectares). In addition, the centre is in charge of undertaking projects in the different parts of the province and the nearby provinces covering an area of over 3,200 hectares. At present, the centre has 4 branches covering an area of 5,076 hectares in Narathiwat Province, namely the Para Rubber Plantation Project in the Area of Daksin Palace, the Pi-nae-mudor Village Development Project, the Munoh Agricultural Livestock and Agricultural Village Project, and the Khok-It Khok-Nai and Yuyo Villages Area Development Project. It also has 13 surrounding villages with an area of approximately 4,607 hectares.

The activities of the Pikun Thong Royal Development Study Centre are undertaken on an inter-sectoral basis involving 31 government agencies working together within the framework of the master or action plan of the centre with the representative of the Land Development Department which oversees the centre’s main activities acting as director of the centre.

Activities

1. Development of Water Sources

This involves the construction of reservoirs with distribution systems to provide water to the experimentation plots within the vicinity of the centre and to the extension areas to develop paddy, field crops and varieties of rubber trees alongside other crops.



2. Development of Soil

2.1 Studying and promoting the *Klaeng Din* or Soil Acidity Acceleration and Amelioration technique according to the royal initiatives to deal with the problem of peat soil. The concept deals with the drying and wetting of the land alternately to accelerate the soil's chemical reaction and raise acidity to the maximum. The soil is then de-acidified through one of the three methods which include using water to remove soil acidity, de-acidifying soil with the use of lime mixed with topsoil, and using lime in combination with water.

2.2 Growing vetiver grass for soil and water conservation

2.3 Promoting the use of green manure, compost and organic fertilizer





3. Development of Forestry

3.1 Conducting surveys and collection of peat swamp plant varieties, palm trees, rare plants, herbal plants, varieties of lotus and aromatic plants

3.2 Establishing an herbal plants garden

3.3 Promoting the utilization of forest trees and forest products in a sustainable manner

3.4 Managing botanic gardens in schools

3.5 Rehabilitating and developing the ecological system and habitats of teals

3.6 Propagating plant seedlings for distribution

3.7 Setting up the peat swamp forest protectors

4. Development of Crop Cultivation

4.1 Developing appropriate agricultural methods in areas with water-logged peat soil

4.2 Experimenting on varieties of crops that are resistant and adaptable to peat soil conditions including cultivation of fast-growing trees in peat soil

4.3 Growing para rubber and intercropping with other plants e.g. lipao, rattan etc. as well as utilizing areas in the para rubber plantation and enhancing its production

4.4 Cultivating rice, field crops, fruit crops and non-toxic vegetables

4.5 Growing flowering and ornamental plants including caladium

4.6 Promoting integrated farming

4.7 Promoting mushroom culture

4.8 Collecting indigenous orchids





5. Development of Animal Husbandry

5.1 Promoting animal husbandry in the surrounding villages such as poultry, cattle, sheep and goats

5.2 Improving crop varieties used for animal fodder especially in acidic soil conditions and organizing communal grasslands

5.3 Growing and providing animal fodder to various activities under the royal development projects

5.4 Providing technical advice regarding animal fodder



6. Promotion of Fishery

6.1 Experimenting on the reduction of acidic content in water in fish ponds using limestone dust so as to maintain fish farming; the demonstration of appropriate methods of aquaculture in water-logged areas

6.2 Promoting catfish raising in concrete ponds

6.3 Promoting *Nile Tilapia* raising in earth ponds and in floating baskets in acidic water

6.4 Rehabilitating coastal resources including release of aquatic animals in natural water sources

6.5 Distributing fresh water animals among the farmers

7. Promotion of Renewable Energy

Concerning over the potential of oil crisis and the over dependence on imported crude oil, His Majesty recommended the concerned agencies to implement the experiment on the use of plum oil in diesel machines at the Aow Luek Cooperative in Krabi Province and the Pikun Thong Royal Development Study Centre.



Pikun Thong



8. Development of Community

8.1 Promoting occupational development. The supplementary occupations are developed through the making of handicrafts from bulrush and the promotion of various occupational groups such as clothes making, Thai food cooking, etc.

8.2 Promoting public health care. The public health is promoted through the improvement of nutritional conditions of small children at the child development centre and the provision of knowledge on nutritional improvement to parents as well as child caretakers.

8.3 Demonstrating small scale palm oil refinery for promotion among small palm oil farmers to help reduce the costs such as transportation and to improve the quality of palm oil in order to enable Thai palm oil farmers to survive and compete in world markets





Pikun Thong



Achievements

In effect, since its establishment in 1982, the research and operations carried out by the Pikun Thong Royal Development Study Centre have improved the condition of the peat soil through using the soil acidity acceleration and amelioration technique which incorporate the use of limestone dust together with the application of irrigation techniques in maintaining the underground water at the appropriate level and the use of fresh water to leach acidity from the soil. This helps upgrade the soil fertility and enable the cultivation of many species of plants such as rice, fruit crops, palm oil, coconut, legumes and vegetables which leads to the increase of farmers' income.

Moreover, techniques to increase agricultural production have been developed; for example, rice can now



be cultivated two times a year and the yield has increased 3-4 folds per hectare. One success story is the increase of rice yield in an area of 117.92 hectares at Khok-It Khok-Nai Village from zero to 41 - 50 buckets per 0.16 hectare which is enough to eat and sell.

The inter-cropping system has also been studied. As a result, there has been a success in the cultivation of crops in the peat soil areas as well as planting of sweet zalacca, flowers and herbal plants. As of 2006, the inter-cropping of salacca with para rubber has increased the farmers' income to 145 US dollars per 0.16 hectare.

There is also improvement of the pH condition in ponds with peat soil by using limestone dust to reduce acidic content in order to enable freshwater fish breeding.





Generally, the annual income of the farmers in the surrounding villages has subsequently increased from 387.73 US dollars in 1982 to 2,345.24 US dollars in 1994 per household.

The experiment of the effectiveness of biodiesel produced from the centre's palm oil extraction plant in small fishing boats found that the engines are easy to start, produce less exhaust gas without smell, and accelerate faster but still run smooth. At present, the Pikun Thong Royal Development Study Centre can produce 350 litres of biodiesel each time (in a period of 7 days) and sell it at about 52 cents per litre.

In the year 2012, the centre received 40,090 visitors from different sectors and walks of life. Additionally, there were almost 2,000 trainees attending the training courses organized by the centre and around 4,200 people benefited from the centre's activities. Up to present, the centre has succeeded in establishing 25 model farmers and 29 farmer's groups.





Puparn

**Royal Development
Study Centre**





Former Conditions of the Area

“Northeastern Region: Land of Plateau”

Thailand’s Northeastern Region covers 33% of the whole area of the country which makes it the largest region with an area of about 17 millions hectares. The region has been well-known for its infertility. The natural forest was destroyed and the watershed was ruined because the people had cut the trees for firewood, and used the cleared land for agriculture. As a result, there was little water in the dry season and far too much in the rainy season. Moreover, the topsoil eroded and salt leached to the surface in clusters. The soil thus turned to be a laterite and a low-quality sandy saline soil unproductive for agriculture. These problems cause difficulties for the farmers in making their living, resulting in poverty and low standard of living.





**“Generate More Water,
Grow More Forest,
Harvest a Sufficient Life”**

Royal Initiatives

According to His Majesty the King's initiative on 25 November 1982, the Puparn Royal Development Study Centre was established at Huai Yang Subdistrict in Muang District, Sakon Nakhon Province to conduct studies and experimentations on various areas of agricultural development in search of appropriate methods for solving the problems of the Northeast. The centre covers an area of around 368 hectares with an adjacent natural forest area of about 1,760 hectares. At present, it has 3 branches which are the Royal-initiated Upper Bang Sai River Basin Area Development Project in Mukdahan Province, the Royal-initiated Kam River Basin Development Project, Sakon Nakhon and Nakhon Phanom Provinces, and the Royal-initiated Lam Payang Upper River Basin Area Development Project in Kalasin Province. It also has 22 surrounding villages with the total area of 17,600 hectares.

The centre's activities are carried out under the cooperation of 13 agencies involved with the representative of the Royal Irrigation Department which oversees the centre's main activities acting as director of the centre.



Activities

1. Development of Water Sources

1.1 Constructing and maintaining 15 reservoirs with a total storage capacity of about 19 million cubic metres, together with 27 water delivery canals and 8 pipe systems covering a distance of 75 kilometres and benefiting 5,092.80 hectares. All the 15 reservoirs are located within the areas of 22 surrounding villages and each is managed by the “water users group” consisting of farmers living in the nearby areas.

1.2 Making 25 check dams in intervals across the various streams to keep soil moisture

1.3 Digging the “New Theory” farm ponds and wells to support water for the development activities and agricultural experimentation areas in the centre

2. Development of Soil

2.1 Promoting the use of compost, use of green manure, cultivation of rotation crops and cultivation of vetiver grass to maintain soil surface

2.2 Developing techniques to improve the deteriorated soil and soils affected by specific problems such as acidic soil, saline soil and sandy soil

2.3 Promoting the application of organic fertilizer and green manure to increase microorganisms and nutrients in the soil as well as to fix nitrogen in the soil

2.4 Promoting the use of liquid fertilizer made from cow blood with cassava and animal fodder



3. Development of Forestry

3.1 Conserving and rehabilitating forests in watershed areas

3.2 Propagating forest trees

3.3 Promoting the planting of forests for multi-purpose uses and as food sources for the community

3.4 Conserving plant genetics covering 16 hectares

3.5 Collecting herbal plants for the benefits of the communities

3.6 Maximizing land use in agro-forestry patterns



3.7 Managing check dams and studying the role of check dams towards the flow of water, trapping of soil sediments as well as the forest resources

3.8 Conserving wildlife

3.9 Promoting the recognition of the value of forests, wildlife and environment and promoting people participation in forest protection activities. One of the highlights is the two-kilometre nature study trail built to promote eco-tourism within the centre.

3.10 Preventing forest fires by establishing forest patrol units and control policies

3.11 Promoting conservation-oriented tourism which involves arranging training courses on conservation-oriented tourism for state officials and local youth guides





4. Development of Crop Cultivation

4.1 Studying good rice varieties such as organic jasmine rice and Sakon Nakhon rice for further recommendation; experimenting with mixed cultivation of rice with other crops such as economic vegetables; demonstrating integrated rice cultivation e.g. raising ducks and fish in rice fields; comparing the use of liquid bio-fertilizer, bio-fertilizer and chemical fertilizer with rice; studying the making of organic fertilizer from local materials for use in rice fields; studying crop cultivation before and after rice harvest; managing the control of weeds as well as supporting the farmer's groups related with the processing of brown rice

4.2 Growing proper field crops suitable with the locality; experimenting the use of vetiver grass to prevent soil erosion in the field crops plot on the slopes; demonstrating crop rotation with field crops; promoting the cultivation of field crops after rice harvest and the cultivation of field crops with fruit crops; producing field crop seedlings for distribution among farmers as well as managing weed control by biological means



4.3 Experimenting on good varieties of horticultural crops including 15 fruit crops which produce high quality yields such as mango, guava, jackfruit, lychee, longan, papaya, santol and tamarind; demonstrating techniques of propagating fruit trees such as layering, inserted scion budding, and shield budding; producing organic vegetables



4.4 Promoting silkworm culture by establishing mulberry farms to experiment with and propagate high quality mulberry trees for distribution among farmers, and providing technical advice on proper methods of silkworm culture among the farmers



4.5 Promoting mushroom culture with the study on the culture of new kinds of mushroom; producing pure mushroom medium; studying the locally-available materials such as rice straw for use in producing mushroom medium to reduce the production costs; studying the right amount of materials to promote higher yield of mushroom; supporting technical advice on the maintenance of mushroom bags as well as harvesting the yields

4.6 Promoting para rubber plantation by studying products from good varieties of para rubber trees with high productivity; planting multi-purpose rubber trees intercropping with fruit trees such as mangoes, mangosteens and jackfruits, and herbal plants





4.7 Implementing integrated farming with the study of systematic agriculture with the management of farming patterns according to the conditions of each area. This includes crop cultivation with animal raising, poultry raising such as chickens and geese to control spread of weeds in orchards, frog raising in rice fields, cricket raising, control of insects and pest, making of bio-extracted liquid fertilizer, collection of indigenous vegetables, cultivation of chemical-free vegetables and production of liquid herbs for use as pest repellent.

4.8 Establishing an herbal garden, improving the landscape; propagating herbal plant seedlings; studying the growing and processing of herbal plants into medicinal and other products such as herbal compress, herbal ointment, herbal powder and massage oil; providing massage and sauna services for health such as Thai traditional massage, foot massage and herbal sauna



5. Development of Animal Husbandry

5.1 Promoting the raising of animals suitable for the dry condition which include foreign meat cows namely the Japanese Tajima cow compared with native cows, milch cows, Puparn pigs, Meishan pigs which demand simple care but give many offsprings, indigenous chickens, black Puparn chickens, turkeys, geese, muscovy ducks and laying ducks as well as the *Ruza* deers

5.2 Raising hens in houses built over the farm ponds where plant-eating fish are released and feed on the waste from the hens

5.3 Developing varieties of animal fodder

5.4 Providing health care services for animals

5.5 Distributing good animal breeds among the farmers

5.6 Managing the cattle bank where the farmers can rent or borrow cows from for various uses including as labour and further breeding



6. Development of Fishery

6.1 Promoting fish raising in fresh water in the integrated system namely raising fish together with swine, muscovy ducks, and chickens in earth or cement ponds and in rice fields

6.2 Releasing fish fingerlings in reservoirs and the villages' water sources

6.3 Promoting aquaculture

6.4 Distributing fish breeds among the farmers

6.5 Promoting fish raising as part of the Agriculture for Lunch Project at various schools in the area





7. Development of Community

7.1 Promoting the occupational development such as processing of agricultural produce namely vermicelli, soybean sauce, corn milk, banana crackers, crackers made from tapioca, roasted peanuts, herbal drinks and food products made from rosella, wine made from mulberry, and snacks made from mung bean; cloth weaving with plant fiber; making of batik cloth; cloth dyeing; processing of products from plant fiber; making textile products from local cotton and local silk; making basketry products from pandan; making herbal products for household uses such as liquid soap, shampoo and dish washing detergents; making furniture from bamboo and making tools from steel etc.

7.2 Encouraging the villagers to form groups for engaging and supporting their occupational activities



Achievements

Since its establishment in 1982, the once dry forest area of 1,760 hectares has been revitalized into a sparse forest abundant with diverse natural resources. The formerly drought-stricken area of 368 hectares turns to be a fertile land with plenty of water all year round. The technology appropriate for the region enables the northeastern people to become self-reliant and enjoy a better standard of living through the sustainable management of land and water, the cultivation of good crops varieties and the raising of animal breeds suitable for the local conditions. The centre has achieved in finding good varieties of rice suitable for the conditions of the area and popular among farmers. In 2009, the work related with the development of water sources enabled the 1,327 hectares of rice cultivating areas to give a yield of 450 kilogrammes per 0.16 hectare.

The cultivation of para rubber has also been experimented to the point that it can provide as high yields as in the South which is well-known as the land of para rubber. Moreover, it has been successful in increasing production yields of various crops such as soybean, legume, maize and vegetables. The study and experiment on field crop cultivation enables the yield of certain crops to increase up to 100%. For example, the peanut yield increased from 72 to 151 kilogrammes per 0.16 hectare. Vetiver grass has shown satisfactory performance in preventing soil erosion and increasing topsoil.



Concerning the extension work, the centre has succeeded in disseminating the principles of the New Theory, which enable the small-scale farmers to have enough agricultural production for year-round consumption and eventually become self-reliant. The centre has organized several training courses for farmers to equip them with the basic knowledge necessary for making a livelihood. The household industry activity not only increases the farmers' income but also boosts their recognition of the maximum use of the materials already available in the locality. Currently, the centre has established 32 model farmers and learning centres with approximately 500 members to serve as the models of success for others to follow by giving technical support and promoting the forming of various occupational groups. Along with this, the centre has also helped form 33 farmers' groups.

In 2012, 3,914 people had attended training courses organized by the centre. Likewise, its successful results had been shown to 71,686 visitors from different walks of life including school and university students, government officials, farmers, media representatives and general public.





Huai Hong Khrai

**Royal Development
Study Centre**





Former Conditions of the Area

“Northern Region: Land of Mountains and Watersheds”

Thailand’s Northern Region, covering an area of 169,644 square kilometres, is mostly characterized by mountains, mountain gullies, and basins. Abundant with forests and natural resources such as minerals, wildlife, wild plants and various forest products, the region is recognized to be the area of great value and significance both in the ecological and economic aspects.

However, a large number of the forest areas had been destroyed due to the deterioration of the forests, the expansion of land for agricultural activities, and the occurrence of forest fires. Particularly, in the area of Khun Mae Kuang National Forest Reserve where the Huai Hong Khrai Royal Development Study Centre is presently located, there were several problems. Forests were deteriorated, ineffective in retaining water and with only 35 plant species found. The watersheds contained a little natural water. The area was arid and lack of humidity, inducing the occurrence of forest fires every year. The soil was acidic, inappropriate for agricultural activities.

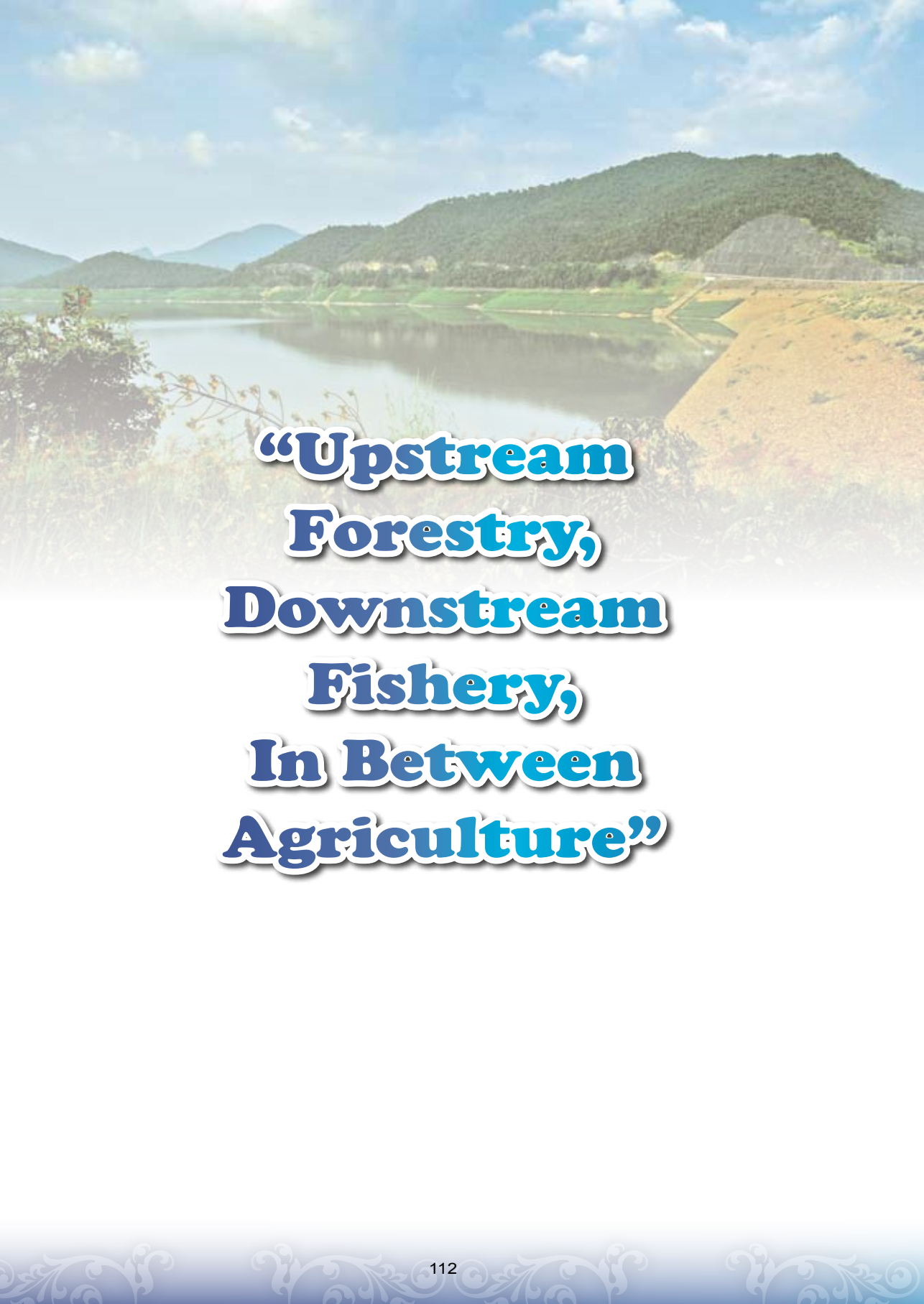


Royal Initiatives

Recognizing the impacts resulting from the loss of forests upon the watershed areas, His Majesty the King paid a keen attention to develop and conserve the forests since his initial royal visits to the Northern Region in 1962. Later on 11 December 1982, His Majesty the King initiated the establishment of the Huai Hong Khrai Royal Development Study Centre covering an area of about 1,360 hectares in the Huai Hong Khrai Basin, which is part of Khun Mae Kuang National Forest Reserve and situated in Doi Saket District of Chiang Mai Province. The aim was to conserve the watershed areas as well as to develop and rehabilitate the deteriorated and barren forests to recover their fertility.

“...On 11 December 1982, I asked for permission to set up the Huai Hong Khrai Royal Development Study Centre in the area of the Huai Hong Khrai Basin which covers a total area of about 1,360 hectares. At that time, the forestlands in this area were deteriorated due to the illegal forest encroachment and forest fires. The soil was washed out, remaining only laterite stones and pebbles...”

His Majesty's Speech
given at Klai Kangwol Palace
on 19 June 1997



**“Upstream
Forestry,
Downstream
Fishery,
In Between
Agriculture”**

The initial royal initiatives given to develop the area of the Huai Hong Khrai Basin from 1984 to 1989 concerned the plan of constructing a water irrigation system by building dikes and reservoirs in different altitudes and slopes to restore moisture to the land.

Up to present, the centre has 6 centre branches covering an area of 109,786 hectares, namely,

- 1) The Royal-initiated Fruit and Flower Propagation Development Service Centre Project at Rai Village, Hang Dong District, Chiang Mai Province
- 2) The Royal-initiated Ping Sub-River Basin Integrated Development Project, Hod and Chom Districts, Chiang Mai Province and Ban Hong District, Lamphun Province
- 3) The Royal-initiated Khun Mae Kuang Forest Area Development Project, Doi Saket District, Chiang Mai Province
- 4) The Royal-initiated Huai Larn Area Development Project, San Kamphaeng District, Chiang Mai Province
- 5) The Doi Tung (Implementation Site) Development Project, Mae Fa Luang District, Chiang Rai Province
- 6) The Royal-initiated Mae Ao River Basin Area Development Project, Pa Sang District, Lamphun Province



Its services have been extended to 18 surrounding villages with the total area of 4,237 hectares.

The centre's activities involved the works of 17 government agencies and the representative of the Royal Irrigation Department which oversees the centre's main activities acts as director of the centre.



Activities

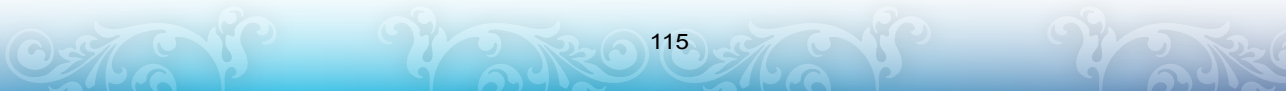
1. Development of Water Sources

1.1 Managing water sources, both natural and man-made, and both above and under the ground

1.2 Planning and developing the water delivery system and the distribution of water supply

1.3 Building the fish-bone system irrigation canals to disperse water to increase moisture in the soil which will also be useful for reforestation and the connecting of basins. This thus helps increase the quantity of water in the areas affected by water shortage while helping to release the excess water in the areas with too much water.

1.4 Building and improving check dams to ensure efficient use





2. Development of Soil

2.1 Implementing the integrated management of soil and plants for sustainable agriculture

2.2 Growing organic vegetables

2.3 Growing various crops in eroded soil

2.4 Applying biological products with fruit crops

2.5 Studying land use systems in the slope areas and their impact on the ecology of the area at the Huai Hong Khrai basin

2.6 Studying the impact of the use of moisture systems in the forest areas which includes the demonstration of the use of water flow from the mountains

2.7 Adopting natural methods such as compost and liquid bio-fertilizer coupled with soil nourishment crops

2.8 Propagating vetiver grass for distribution among the farmers and collecting various vetiver ecotypes

2.9 Planting vetiver grass for soil and water conservation by different methods e.g. along the contour lines, across the gullies, in orchards to maintain soil moisture etc.



3. Development of Forestry

3.1 Developing 4 systems of forest which are the natural system, the check dam system, the irrigation system and the check dam system together with the construction of reservoirs. Check dams are constructed to retard the water flow, collect water to preserve the humidity in the area and trap soil sediments, leading to the existence of wet fire breaks. Besides, the control and prevention of forest fires is undertaken through various public relations media such as mobile public relations units, billboards, exhibitions, training of communities and youth, and setting up of fire volunteers.

3.2 Planting 3 types of forest trees which are cut for fruits, fire wood and timber for reforestation in irrigated areas, reforestation in valley areas with check dams to help maintain the moisture and reforestation in rain-fed areas. The principle for planting the various types of trees is to plant the trees from the top of the mountain using trees which have seeds to allow the natural dispersion of seeds from the top of the mountain to the low ground. This method will create thick and dense forests.

3.3 Preserving and propagating wildlife species such as barking deer, mouse deer, monkey, gibbon, peacock and various kinds of birds; studying the breeding of wildlife; studying the behaviours of wildlife in their natural habitats; and studying the increase of wildlife population

3.4 Promoting people participation and consciousness for forest and wildlife conservation so that people can live sustainably with the forest



4. Development of Crop Cultivation

4.1 Planting rice

4.2 Planting field crops e.g. sugar cane, para rubber, paper mulberry

4.3 Growing fruit crops e.g. mango, longan, lychee

4.4 Experimenting on organic crops e.g. rice, sticky rice, longan

4.5 Growing and collecting herbal plants and aromatic plants

4.6 Growing and collecting native vegetables and Arabica coffee

4.7 Producing nontoxic vegetables

4.8 Promoting mushroom culture and the use of mango branches for herbal mushroom culture

4.9 Breeding earth worm for compost making and agricultural uses

4.10 Experimenting the use of physic nuts and propagating them for further distribution to communities

5. Development of Intensive Farming

5.1 Demonstrating the different systems of intensive farming such as agro-industry type horticulture and horticulture integrated with livestock farming

5.2 Collecting various kinds of plants such as native vegetables, herbal plants, aromatic plants as well as fruit crops and ornamental plants

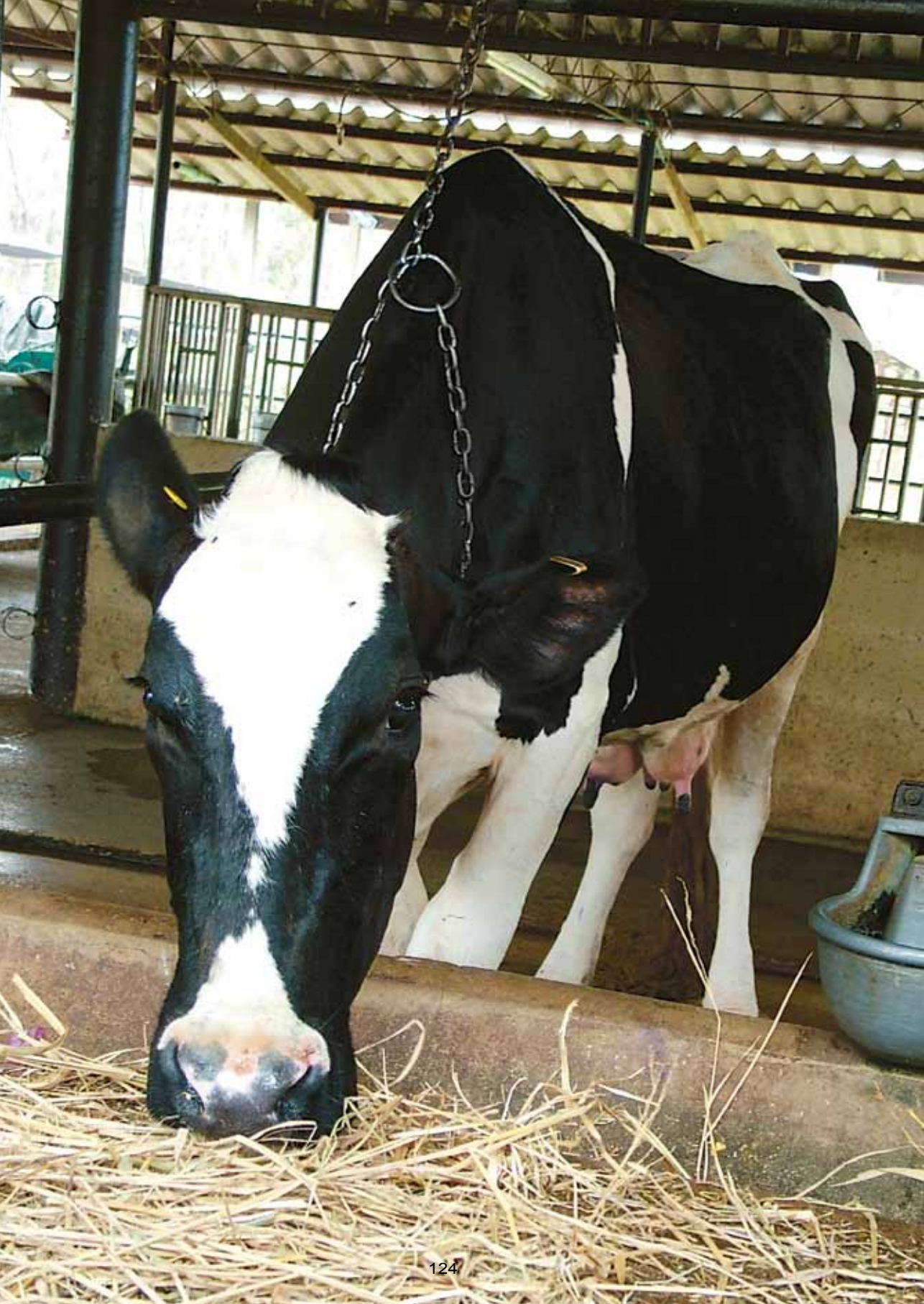
5.3 Improving varieties of plants with potentials for usages such as hemp

5.4 Collecting plant genetics such as wild mushroom, wild plants that have potentials for industrial use, wild orchids and local ecotypes of vetiver grass. The work also combines the planting of perennial trees for food, firewood and income with that of annual plants for food, medicine and income.

5.5 Promoting multi-cropping with emphasis on studying the species of plants which the farmers are already familiar with









6. Development of Animal Husbandry

6.1 Demonstrating the raising and breeding of cattle, milch cow, poultry, pigs and milch goats

6.2 Growing different varieties of animal fodder such as Guinea grass, Ruzi grass and Mulato grass to find the suitable ones for feeding the animals

7. Development of Fishery

7.1 Demonstrating the appropriate methods for aquaculture

7.2 Promoting fish raising in round cement ponds installed with the flowing water system, fish raising in the floating baskets and fish raising in the watercourses where there is natural water flow

7.3 Breeding fresh water animals for releasing in reservoirs, ponds and natural water sources in the villages as well as for distributing among farmers, schools and agencies

7.4 Providing fish breeds and food tablets to schools in the surrounding villages together with promoting the raising of fresh water fish such as catfish, *Nile Tilapia*

7.5 Encouraging the farmers to form groups and receive training on the management of fishery

7.6 Promoting frog raising with the use of natural materials; breeding and developing the frog species as well as studying the biodiversity and population of amphibians in the centre area



8. Development of Community

8.1 Promoting the creation of check dams for sustainable conservation and development and the planting of 3 forests for 4 benefits

8.2 Promoting the making and use of organic fertilizer for agricultural production

8.3 Promoting the culture of economic mushroom, growing of nontoxic vegetables, raising of milch goats, raising of fish and frogs, integrated farming, processing of agricultural produce and herbal products, weaving and clothes making as well as the establishment of a child care centre





9. Promotion of Development-oriented Tourism

9.1 Creating a route linking all 10 study sites which His Majesty the King has arduously worked on

9.2 Posting signs with names of the plant variety together with brief descriptions at each site. Other signs as well as trail maps that are environmentally-friendly and cost-effective are put up along the way to provide additional information for visitors.

9.3 Providing facilities and means of transportation for touring such as trolleys



Achievements

Since its establishment in 1982, one highly beneficial result of the studies conducted at the Huai Hong Khrai Royal Development Study Centre is that of the forestry study project which has served to improve the environment in the centre area, eliminate forest fires, and produce a moist climate particularly in the forest development areas. The study and experimentation on using the wet fire break system has been conducted. This involves the construction of check dams to store water and to spread the water throughout the area using a distribution system to provide moisture and fertility to the soil and the forest to improve the texture of the soil and to be capable of completely protecting against forest fires.





As a result, since 1995 forest fires have no longer occurred and the forest has remained moist and fertile while soil has changed from sandstone to black humus soil containing value in soil nutrition, thus improving the conditions of the plants and forest in the surrounding area. Moreover, 201.60 hectares of existing planted forest area and 576 hectares of natural forest are being maintained. Shorea forests have been changed to mixed deciduous forests. Plant species have increased from 46 to 80 and vegetation from 180 plants to 250 plants per 0.16 hectare which indicates a greater density. More indigenous orchids have appeared increasing from 24 species in 2002 to 51 species in 2006. In terms of agro-forestry, 20 types of plants



such as pepper and fruit trees in the forest are studied. All in all, the improved condition means that there is greater diversity of food plants for both consumption and sale to earn an extra income. On the animal side, wildlife returns to their habitats including 122 bird species with more than 80 Thai peasants.

The centre also provides services to the people in various fields, such as supporting animal husbandry activities and plants seeds, and giving advice and guidance on techniques which people in the surrounding villages and farmers in general can adopt and apply in their daily occupation.





The centre serves as a learning place and a model for watershed development for 10,025 people from 2,870 households residing in the 18 surrounding villages. It has 115 model farmers and learning centres with 44 farmers' groups. In 2012, 21 training courses were organized with 8,473 trainees from the surrounding villages and other villages within the project branches. However, apart from those received trainings, the total number of people who have benefited from the centre's services reached 8,174 and the centre received 71,258 visitors. As of 2006, after obtaining the knowledge and joining the training courses at the centre, the farmers' income increased from 1,070 US dollars to 1,556 US dollars per household.



Huai Sai

**Royal Development
Study Centre**





Former Conditions of the Area

“Western Central Region: Land of Mountains, Plains, and Coasts”

Most lands in Thailand’s Western Central Region are mountains and deep narrow valleys. Thanon Thongchai and Tanao Sri mountain ranges, the origin of watersheds and various watercourses, stretch along the Thai-Myanmar border down to the South. In the past, this area was part of a once fertile and forested area designated by His Majesty King Vajiravudh (Rama VI) as a forest wildlife reserve in 1924, surrounding his Mrigadayavan Palace. However, deforestation had occurred from agricultural settlement in the area, while the predominantly pineapple cultivation which replaced the forest had caused a problem of soil erosion in the dry and sandy soils. The problems found in this region were the immediate floods in the steeply sloppy areas, the misuse of soil and the destruction of forests.



**“Revive the Soil,
Restore the Forest,
Retain the
Sufficiency
of Life”**

Royal Initiatives

The Huai Sai Royal Development Study Centre is located in the area that used to be abundant with a variety of wildlife species, especially “hog deer” (or *Nua Sai* in Thai) from which the name “Huai Sai” was derived. Until in 1983 when the forests were damaged, leading to drought and soil degradation, His Majesty the King graciously suggested the development of the area into a Royal Development Study Centre to conduct studies on the development of agriculture and the rehabilitation of forests to restore their former fertility. This thus led to the establishment of the Huai Sai Royal Development Study Centre in Cha-am District, Phetchaburi Province on 5 April 1983. The royal speech is as follows:

*“...At that time, the areas around the vicinity of Mrigadayavan Palace and the nearby areas used to be abundant. At the waterfalls and the streams, the water was flowing all year round. Unfortunately, at present, this area has been deteriorated. This causes rainfalls to reduce and become unseasonal. **If these conditions are allowed to continue, the place will become a desert.**”*

His Majesty’s Speech given on 5 April 1983

The centre's main objective is the study and research on development methods particularly concerning reforestation to rehabilitate the forests, prevent further degradation of forest land and prevent forest fires through the so-called "wet forest system". Another focus is cultivation of agricultural crops which suit the development needs of the southwestern section of Thailand's Central Region where the centre is located through promotion of multi-cropping systems and crop diversification to maximize productivity. Moreover, the centre aims to ensure the success of the resettlement programme which will lead to improvement of the socio-economic conditions and quality of life of the people.

At present, the Huai Sai Royal Development Study Centre covers an area of approximately 2,540.80 hectares and plus a branch known as the Royal-initiated Cha-ngum Mountain Deteriorated Soil Rehabilitation Project, Photharam District, Ratchaburi Province, covering an area of 139 hectares. It has extended the services to 29 surrounding villages with 4,719 households which constitute the total area of 27,767 hectares.

The activities of the Huai Sai Royal Development Study Centre are undertaken on an inter-sectoral basis involving 33 relevant agencies and the representative from the Border Patrol Police Bureau under the Royal Thai Police acts as director of the centre.

Activities

1. Development of Water Sources

1.1 Constructing 4 reservoirs with water distribution systems to provide adequate supply of water to support the reforestation areas, the centre's activities as well as the farmers' agricultural lands

1.2 Dredging water channels around the reservoirs to increase the water storage capacity and building check dams in order to enable the water stored to penetrate into the soil and provide moisture for the surrounding areas



2. Development of Soil

2.1 Studying the efficiency of vetiver grass for improving hardpan soil. Vetiver grass and plants that can grow in the area are grown by putting them in the holes filled with soil containing fertilizer and moisture. Moisture then breaks the structure of the hardpan soil which will naturally become fertile soil. The cultivation of vetiver grass is done in various patterns e.g. along the edges of the reservoirs to prevent soil erosion and to absorb chemical substances that can flow into the reservoirs, in gullies also to prevent soil erosion, in hardpan soil to nourish the soil, in forest areas for soil and water conservation and for protection against forest fires, as well as at the base of the trees in a semi-circle or a circle to increase moisture in the soil and trap sediments.

2.2 Demonstrating ways to improve soil with the use of green manure such as leguminous plants and Sunnhemp, organic fertilizer, bio-extracted liquid fertilizer, compost as well as the combined use of vetiver grass with leguminous plants

2.3 Demonstrating the soil and water conservation system in needed areas by digging soil trapping ponds, water drains and delivery channels

2.4 Providing soil analysis services



3. Development of Forestry

3.1 Planting 3 types of forests according to His Majesty's initiatives which consist of conservation forests, fast growing trees and fruit trees e.g. eucalyptus, paduak and sathon to enhance soil moisture

3.2 Implementing reforestation in the form of mountain forest to conserve the indigenous plant species such as *Sindora siamensis* Teijsm. Ex Miq., *Azelia xylocarpa* (Kurz) Craib, Yellow Flame, etc.

3.3 Growing new plant varieties in the original forest area to enhance biodiversity and planting plant species that are suitable with the region's topographical conditions such as rattan

3.4 Establishing a wet forest system not only to help provide moisture in the dry season but also to effectively serve as wet fire breaks

3.5 Building check dams to maintain soil moisture, especially during the dry season

3.6 Launching campaigns and programmes to build the understanding and recognition of the value and benefits of the forests among the local people. This includes arranging the trees planting activity as a session in a study visit programme for the interested groups.





4. Development of Crop Cultivation

4.1 Experimenting on the double-hybridization of good quality crops suitable with the environmental conditions by focusing on the indigenous species that have never been developed before such as chilies, eggplants, watermelons, musk melons and tomatoes

4.2 Setting up a plant species collection plot which comprises the indigenous plants and trees valuable for genetic conservation purpose such as rattan, marian plum and java plum

4.3 Propagating and distributing good crop seedlings

4.4 Growing various plant varieties suitable with the conditions of the areas to create the balance of nature

4.5 Promoting mushroom culture along with distributing mushroom medium among farmers and schools

4.6 Demonstrating the cultivation of economic crops such as cashew nuts for income generation

4.7 Promoting chemical-free farming

4.8 Promoting agro-forestry

4.9 Promoting integrated farming which comprises the growing of fruit trees, perennial trees, field crops and horticultural crops along with animal husbandry and fish raising

4.10 Establishing a herbal garden



5. Development of Animal Husbandry

5.1 Breeding and distributing animal breeds to be raised by farmers e.g. dairy cows, beef cattle, goats, sheep, swine, indigenous chickens, broilers, layers, ducks and rabbits

5.2 Growing animal fodder for cattle, goats and poultry. There are new experiments particularly on the growing of lead trees for feeding half-breed meat goats which are promoted to be the substitute for milch goats due to wider markets.

5.3 Organizing health care services, such as vaccination, sanitary practices and artificial insemination

5.4 Encouraging the forming of animal raising groups coupled with providing suggestions for livestock farm management





6. Propagation of Wildlife

6.1 Breeding and raising wildlife species that are not harmful, especially hog deer which is an indigenous animal for releasing back into the nature

6.2 Setting up and maintaining the irrigation system for the wildlife fodder plot

6.3 Supporting the parent stocks of wildlife such as hog deer, Eld's deer, peacocks and peasanats for further breeding

7. Development of Fishery

7.1 Breeding fish species such as barbs, *Nile tilapia* and Rohu for demonstrating, for distributing among the farmers and schools as well as for releasing in water sources in the centre area and in the public

7.2 Promoting the raising of catfish and giant gouramy in plastic ponds and earth ponds

7.3 Breeding and farming of various frog species such as *Rana tigerina* frog and Bull frog both in cement ponds and by nature

7.4 Supporting materials for building frog ponds and support of frog breeds for the Agriculture for Lunch Project at schools



8. Development of Alternative Energy

8.1 Growing physic nuts to be a source of alternative energy as well as experimenting on growing nuts that are radiated using neutron to improve the varieties

8.2 Cultivating oil palm trees along the edges of Huai Sai Reservoir in the plot experimenting on crops for occupational promotion

8.3 Experimenting on the production and use of oil from physic nuts and production of biodiesel from used vegetable oil

8.4 Pumping water by solar cells to support the centre's agricultural activities and consumption

8.5 Pumping water by windmill to support agricultural activities at the integrated farming system plot



9. Development of Community

9.1 Organizing resettlement programmes for residents of the Thai-Buddhist and the Thai-Muslim villages. The Thai-Muslim village resettled in the vicinity of Khao Kra Puk Reservoir while the Thai-Buddhist village resettled in the vicinity of the Huai Sai Reservoir. Each family is allocated with 0.16 hectare of land for living, 0.80 hectares for cultivating in irrigated areas, and 1.12 hectares for growing forests, thus making up a total of 2.08 hectares of land.

9.2 Encouraging the forming and supporting the operations of various groups in the community such as the Saving for Production Group, the Goat Raising Group and the Cattle Raising Group which enable the farmers to have a better living standard

9.3 Providing training on the integrated farming system, mushroom culture, management of the water system on farmlands, raising of milch cows and milch goats with the establishment of a milk collecting centre within the Thai-Muslim village, poultry raising, as well as fish raising to support household consumption and the Agriculture for Lunch Project at schools

9.4 Promoting cottage industry such as gemstone cutting, making of batik clothes, producing of homemade products for household uses e.g. dish detergents as well as processing of farm produce e.g. chilli paste, crispy fish crackers, crispy banana chips etc. to be a source of supplementary income





Achievements

In effect, since its establishment in 1983, the results of the researches and experiments carried out by the centre have been disseminated among the farmers. The topics that have been experimented on a continual basis during the recent years include the development of frog species, crop cultivation for alternative energy, production of biodiesel, herbal plants and development of double-hybrid crops. The centre has succeeded in creating new varieties of crops such as double-hybrid melons and tomatoes. This technology has been disseminated to the farmers and the cultivation of these crops has become their permanent occupation. Moreover, the demonstrations of the integrated farming system and



agro-forestry in the centre have been successfully applied by many farmers both living the surrounding villages and the nearby areas, and induced considerable attention from visitors both inside and outside the country.

Currently, the ecological balance has been restored principally through the reforestation programme, the construction of check dam system and the cultivation of vetiver grass. The forest areas become more fertile. There are approximately 640 hectares of dipterocarp forest covering about 35% of the centre area with approximately 800 hectares of mixed deciduous forest covering about 46% of the centre area. In this mixed deciduous forest, the predominant trees comprise those with economic value e.g. paduak, cananga etc.

Many wild animal species which previously were rarely found start to reappear including 11 species of mammals, 16 species of reptiles, 11 species of amphibians, 63 species of birds from 27 families and almost a hundred species of insects. Up to the present, the centre has propagated the total of 916 wildlife off-springs from 55 species such as brow-antlered deer, Eld's deer, peacocks, pheasants and gibbons. For hog deer alone, many of them have been propagated and a number of them have been released to live in the natural forests around Tao Poon Mountain since 1992.

In 2012, the centre has benefited 16,313 people, established 10 learning centres and supported 2 farmers' groups. Moreover, 2,591 people had attended training courses organized by the centre and 64,940 people visited the centre.



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