



# SUSTAINABLE MANAGEMENT OF RESOURCES

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## **Sustainable Development**

*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs ( Our Common Future )*

## **Sustainable Management**

*The resources on the earth are limited. When we are planning and implementing programs, we should give considerations to both the current development and the potential for future development, ecologically, socially as well as economically. The resources should be managed as such that they could satisfy the needs of both the present generation and the coming generations ( Sino—Dutch Cooperation—Forest Conservation and Community Development Project, Yunnan, P. R. China ).*

## **Participation**

*Participation will be defined as voluntary and democratic involvement of people in decision - making with regard to*

- setting goals, formulating policies, planning, implementing and evaluating economic and social development programs;*
- contributing to development efforts; and*
- sharing the benefits therefrom ( Manfred Poppe ).*

## **Participatory Management of Resources**

*Participatory Management of Resources is a pattern of management to achieve the double goals of protection of resources and the improvement of the local communities' life by combining the goals and activities of resources management with the development goals of the surrounding communities. It will encourage the local communities to participate in the management and policy—making process ( Sino—Dutch Cooperation - Forest Conservation and Community Development Project, Yunnan, P. R. China ).*

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# EXECUTIVE SUMMARY

## Introduction

*Amphoe* Pakchong, located in the northeastern region of Thailand, has an area of 1600km<sup>2</sup> and a population of 149000. Pakchong belongs to the 3<sup>rd</sup> industrial zone but due to its proximity to Bangkok, it enjoys the facilities and benefits of the 1<sup>st</sup> zone, it is also closer to large provincial cities, like Khorat and Saraburi, and to the Eastern Sea - board and Indo - China region, thereby enhancing the prospects of industrial development and the Khao Yai national park and Lamtakhong Reservoir made Pakchong a center for tourist attraction.

Based on these factors the overall objective of the study is to prepare a sustainable management of resources Pakchong. Specifically the objectives are:

- a) to analyze the existing situation;
- b) to identify the problems, needs and demands of the people;
- c) to explore the potentials for development; and
- d) to recommend development programs reflecting the needs and aspirations of the people for the sustainable devel-



opment of the district.

Field surveys were carried out using rapid rural appraisal (RRA) method. Also unstructured interviews were carried out among various interest groups, like district and provincial officials, small and large farmers, entrepreneurs and women groups. Secondary data were collected from various agencies and institutions operating at the district as well as provincial level. Eventually, problems, potentials and interest groups were analyzed, leading to objective formulation, identification and evaluation of alternative development programs.

## **Sectoral Analysis**

### ***Natural Resources and Environment***

The topography of Pakchong District is generally mountainous with elevation ranging from 200 m in the northeast to 1152 m in the southwest. The climate is largely influenced by northeast and southwest monsoons. The northeast monsoon brings dry and cold air from China between November and February. Whereas, southwest monsoon carries rain from the Indian Ocean during May to September. The mean monthly maximum temperature varies from 31.3°C in February to 29.9°C in the October and mean monthly minimum temperature varies from 21.8°C in June to 16.9°C in Jan-

uary. Rainfall varies considerably from year to year, the average total annual precipitation amounted to 1, 305 mm

Based on the use, land can be classified into 3 groups, namely, agricultural, forest and grassland. Over 62% of the land is under agricultural use. Of this upland crop occupies 90% of the area. Forests are found primarily in the mountainous areas of the southern parts which form a part of Khao Yai national park. Grassland occupies 5% of the land area of Pakchong.

The major problem related to the natural resources and the environment is deforestation which is attributed to inappropriate farming practices, poaching, encroachment of Khao Yai national park, settlements within the forest areas and inappropriate forest management. Deforestation again leads to soil erosion, low agricultural productivity and increased social costs which ultimately leads to poverty in the rural areas.

In terms of potentials the district has natural forests, wild animals, and Lamtakhong River which forms the basis for tourism development. It also has agriculturally suitable soil and receives fairly large amount of rainfall for agricultural development.

### ***Population and Settlement Pattern***

In Pakchong, 29% of the population live in urban ar-

areas, while the rest in scattered rural settlements. The average population density is 65 persons/km<sup>2</sup>, as compared to 2765 persons in the urban areas.

There are 101 females per 100 males in the district. The annual birth rate, death rate and net migration is 1.485, 0.448 and 0.14% respectively for the entire province. Among the households in the district, 41.3% are agricultural. But in the rural areas, more than 60% of the households are agricultural.

In 1990's, there were 162 settlements in Pakchong district. Settlements, particularly in the urban areas are expanding rapidly into the hinterland, due to increasing economic activities. The settlements are isolated in the rural areas, which are influenced by topographic characteristics, road network and water resources. Population is high in urban areas and its hinterland but quite low in the rural areas. The average population size of a rural settlement is 552. But the smallest settlement has a population of only 197, whereas the largest settlement is the Pakchong municipality with a population of 42000. Most of the settlements are well linked to each other due to well developed transportation networks. Each settlement has at least one road link with another but more than 50% of the villages have two road links.

The major problems identified in this sector include settlements located in the military and reserved forest areas.

## ***Agricultural Sector***

Agricultural land comprises about 789, 314 *rai* in Pak-chong District. In general, farm sizes vary between 17 to 100 *rai*.

Two third of the agricultural land is devoted to field crop cultivation and about one third for orchards. Maize is grown in 55% of the total cultivated area. Other major crops include cassava, sugarcane and cotton. Fruit trees, such as custard apple, mango, tamarind, papaya, jack fruit and cashew are also common. Analysis of crop concentration reveals that maize is dominant in all the *tambons*. Cassava and sugarcane are concentrated in half the *tambons*.

A total of 673 farmers are engaged in dairy production with a total output of 92673 kg/day. The farmers sell their raw milk production to four private milk processors in the area.

There is a shortage of farm labor in the agricultural sector. As the young population migrate to Bangkok and other cities, to work in factories or construction sites. Hiring of seasonal labors from neighboring provinces is common during the harvest season. The various farm machinery includes spreading, plowing, spraying and harvesting.

Agriculture provides the main source of income and occupation for majority of the population.

Bank of Agriculture and Agricultural Cooperatives (BAAC) provides various types of assistance to farmers. It assists farmers to establish project groups, such as cotton and orchard groups. It provides assistance to rice farmers as well as to agricultural cooperatives. There are different types of lending operations, such as a) short term loan for agricultural production, and b) loan for postponement of sale of produce. About one fifth of the total amount of loan given to farmers and cooperatives comes from the BAAC.

Dairy Promotion Organization (DPO) provides extension and credit services to farmers for dairy production. There are 3 agricultural cooperatives, namely, Pakchong Agricultural Cooperative (PAC), Lamtakhong Agricultural Cooperative (LAC) and Pakchong Dairy Cooperative (PDC). The main activities of PAC and LAC include a) providing goods, such as agricultural equipment, chemical, seed and husked rice to members, b) mobilizing savings from the members, c) providing credit to the members and, d) act as credit guarantor for bank credit. Activities of PDC include a) collection and buying of milk from dairy cooperatives, b) providing animal feed and equipment to members, and c) extend services on artificial insemination.

About 25% of the farmers obtain credit from informal sources. Informal credit provided by middlemen are of 2 types, namely, a) monetary loan, where farmers borrow

money without collateral, and d) loan in kind, such as supply of inputs, The condition of this type of credit is that the farmers should sell the produce to that middlemen only. In some cases, the middlemen organize transportation from farms to the market.

Transaction of agricultural products begins on the farm or in the village. Mostly, the farmers do not bring the produce to the market. rather the middlemen come to individual farmers and buy from them. The middlemen transport the product to Pakchong town or to provincial markets, where they sell to other middlemen or merchants or to the processing factories. There are also variation in the process. In the case of sugarcane, the sugarcane factories make contract directly with the farmers, who cultivate sugarcane according to the demands of the factories. At the time of harvesting, farmers bring the required amount to the factory. The price of sugarcane is fixed at the time of the agreement. In most cases, small farmers take loan from the factory to buy inputs. The marketing of fruits also start in the farm. At the time of harvesting, the middlemen visit the farm and estimate the value of each fruit tree. The transportation of the fruits are also provided by the middlemen. It is first transported to provincial markets, from where they are sent to wholesalers and retailers throughout the country.

Shortage of water is a major problem in the district.

The farmers mainly rely on natural streams for irrigation water which is inadequate in the dry season. Owing to its higher elevation the district cannot benefit from Lamtakhong dam. Shortage of labor during the harvesting season is also a major problem as the working age population migrates to bigger cities to work in factories or construction sites. It also inhibits the farmers from securing formal credit which normally requires collateral. The water and labor shortage, decline of soil fertility and increased price of HYV seeds contributes to high input cost for the farmers. Farmers have low motivation to participate in cooperatives which makes them vulnerable to the exploitation by the middlemen.

The inherent potentials of the district are a) natural potentials, such as natural canals and Lamtakhong River, moderately suitable soil for agriculture and Khao Yai national park, b) human potentials i. e., over 60% of the rural population are dependent on agriculture, c) economic potentials, such as regional center in Khorat, Pakchong District center, extensive fruit production, maize as a major crop, livestock and dairy production, and fruit market in Klangdong, and d) institutional potentials, such as Agricultural Research Center, Land Development Office, agricultural groups in every *tambon*, 1 dairy and 2 agricultural cooperatives, BAAC branch in the district, Dairy Promotion Organization and Agricultural Marketing Organization. These

basic potentials can be utilized to development of first level derived potentials, such as fruit processing industry, livestock feeds mill to utilize maize, cassava and other crops, meat processing, dairy products, such as candies from raw milk, vegetable extraction from oil crops, floriculture, commercialization of livestock and dairy production and fisheries in Lamtakhong Rive.

### ***Non Agricultural Sector***

Non agricultural activities consist of industry, trade and commerce, and service sectors. The development of industries started with the agro - industries when the export of cash crops increased rapidly during 1960 ~ 1972. During this period cassava was the main crop and warehouses were provided by the government to facilitate the farmers. Dairy procesing industries came afterwards due to increasing demand for milk and milk products, such as cheese, butter and curd in the country. This prompted the development of industrial infrastructure in the district. Moreover, Pakchong got access to special incentives of the BOI, being placed in the zone - 3, which initiated many other manufacturing, marble and construction industries in the district. Currently, there are a total of 247 industries, including agro - processing, mining and construction activities.

Analysis of gross provincial product (GPP) indicates



that the industrial sector contributes about 36% to the GPP but employs only 10% of the population. Whereas, service sector contributes 21% and employs 10% as well. Out of the total industries, the maximum are the repair and services (30%), followed by manufacturing (22%), construction and agro - processing (19% each) and mining (10%). In terms of investment mining has the highest (41%), followed by construction (23%), agro - processing (21%), manufacturing (9%) and repair and services (6%). Analysis of employment reveals that manufacturing employs the maximum with 57%, followed by mining (14%), construction (13%), agro - processing (10%) and repair and services (6%).

Agriculture has strong linkage with industries. For example, maize, cassava and sugarcane are essential commodities for processing industries such as, animal feed, flour and sugar industries. All the products of agro-based and livestock processing industries are vertically integrated from collection of raw materials to processing, warehousing and exporting. Industrial sector also provides agricultural mechanization. Many farmers are involved in cattle raising and provide milk to processing industries. Dairy farm also provides meat to processing industries. There are several service industries which provide services for agricultural machinery.