



## CHAPTER 1

### INTRODUCTION

#### 1.1 General Statement

Volcanic rocks in Thailand are previously grouped into two simple rock units namely, andesite to rhyolite and their associated tuff and basalt. Andesite, rhyolite and their associated tuff are simple dated as pre-Triassic and basalt as Tertiary (Bunopas, 1976).

In the central part particularly in Changwat U-Thai Thani and Nakhon Sawan, the volcanic rocks are distributed in several separate N-S trending hills and mountains across the Chao Phraya river plain. These volcanic rocks, in addition, are associated locally with the equivalent plutonic and tuff. Therefore this area is chosen for this study

#### Objectives

The objectives of this study are: (1) To study the petrography and geochemistry of major oxides and some trace elements of the volcanic rocks. (2) To study the distribution and relation among volcanic and related rocks. (3) To analyse collective data from the aforementioned aspects and to relate among them in order to construct the model for explaining trend of the volcanic rock series and its origin. These investigations will help to enhance directly to the knowledge of geology and geochemistry of the volcanic rocks of Thailand and - indirectly to general geology of the area.

## 1.2 Location and Accessibility

The area selected for present study is located within Changwat Uthai Thani and Changwat Nakhon Sawan. The location and accessibility is shown in Figure 1.1. It is on the army topographic map scale 1:50,000, series L 7017, sheets 4840 III, 4840 II, 5040 III, 5039 IV, 5040 II, 5140 III, and 5140 II, and on the geologic map scale 1:250,000 sheets ND 47-3 (Changwat Nakhon Sawan) and ND 47-4 (Amphoe Ban Mi), between latitudes  $16^{\circ}15'$ - $16^{\circ}45'$  N and longitudes  $99^{\circ}30'57''$ - $100^{\circ}45'$  E. The study area covers approximately 11,800 sq.km.

The area is accessible by

Route no. 1, from Bangkok heading north approximately 240 km. to Changwat Nakhon Sawan along the Highway 605 and then further east 40 km. to Amphoe Tha Tako and 60 km. to Amphoe Phai Sali.

Route no. 2, from Bangkok heading north approximately 150 km. to Changwat Chainat along the Highway 32 and then further west to Changwat Uthai Thani along the Highway 1. From Changwat Uthai Thani heading northwest 15 km. to Amphoe Thap Than then further north 15 km. to Amphoe Sawang Arom and 35 km. to Amphoe Lat Yao.

## 1.3 Physiographic Description

The study area covers large parts of middle Chao Phraya plain and the western mountain range. The elevation of the plain is about 18 to 80 meters above mean sea level where series of low hills stand above the plain from east to west. The western mountain range is as high as a few hundred meters to the maximum height of 1,800 meters.

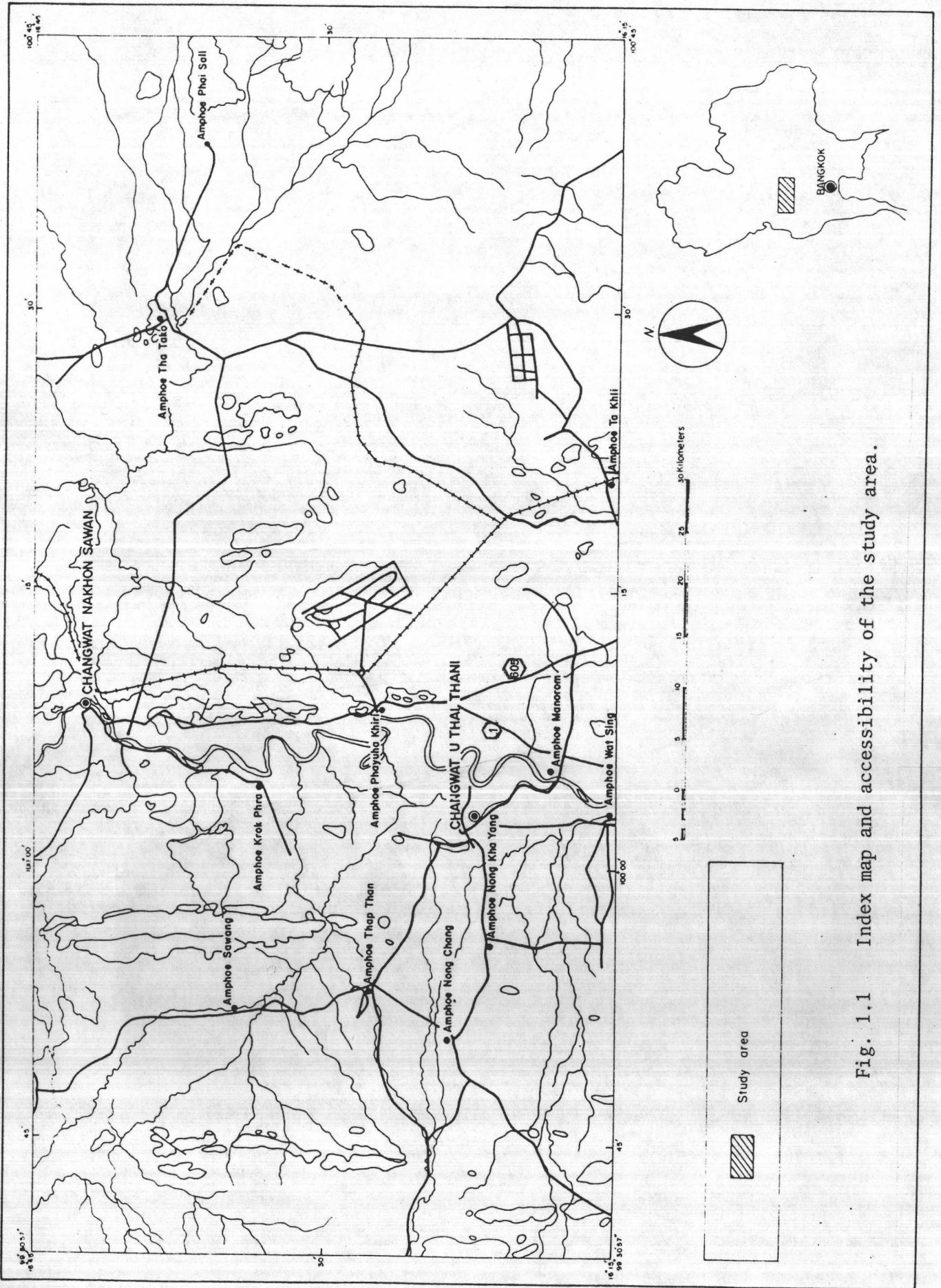


Fig. 1.1 Index map and accessibility of the study area.

Main rivers in this area are the Mae Ping River and the Yom River which flow from the north and later merge into the Chao Phraya River in Changwat Nakhon Sawan. The Chao Phraya River while running to the south meanders across the vast central plain.

#### 1.4 Climate and Vegetation

Changwat Uthai Thani and Nakhon Sawan are in the tropical zone and the climate can be divided into three seasons, namely summer, rainy, and winter. The summer (hot and humid) season commonly ranges from March to April and the mean temperature is 30° c. The rainy (wet) season usually starts in May and last till October under the influence of the southwest monsoon. The winter (dry) season ranges from November to February and the mean temperature is 23° c.

Most of the lands in this area are used for cultivation. The cultivated crops are rice, peanut, sugar-cane, corn, seasonal fruits etc. Among these rice is the main crop grown in the flood plain area of the Chao Phraya River.

#### 1.5 Previous Works

The geological data of Nakhon Sawan Quadangle is resulting from geological reconnaissance of the mineral deposit of Thailand by Gren F. Brown and S. Buravas (1953) that compiled the geology and mineral deposit of Thailand and published report geologic map at scale - 1:250,000.

Bunopas (1980) reported the geology and mineral resources of Changwat Nakhon Sawan and compiled the geologic map (ND 47-3) at scale

1:250,000 with the coverage area of approximately 18,000 sq.km. His investigations included details on type of rocks, age, stratigraphy and structure as well as some chemical analyses of various rocks in this area. The geology of Amphoe Ban Mi and the geologic map (ND 47-4) at scale 1:250,000 were reported by Nakornsri (1981). This report covers some areas of Changwat Nakhon Sawan, Phetchaboon, Nakhon Ratchasima, Chaiyapoom, and Lopburi. The details in this report are type of rocks, age, stratigraphy and structure in the area.

#### 1.6 Method of Investigation

Field study has been carried out during the summer of 1982 and 1983. The topographic maps scale 1:50,000 of Royal Thai Army have been used as a base map. Rock specimens especially those of plutonic, volcanic, and volcanoclastic were collected for petrographic and geochemical studies. However owing to the poor exposure and strong weathering of the rocks in the area, fresh samples for chemical analysis could only be obtained by means of blasting. Therefore, the number of rock samples has been limited to serve the main objective of the research. Each locality, two samples of approximately five kilograms were collected. One was used to make a thin section for petrographic study. The other was crushed and pulverized for chemical analysis.

The mineralogy and texture of rock samples were studied on standard thin sections by means of polarizing microscope. Plagioclase compositions were determined by the  $\alpha$ -normal sections. Furthermore, X-ray diffraction method was applied to clarify some ambiguous minerals.

All major element-oxides and trace elements were carried out by X-ray Fluorescence method, Phillips (PW. 1400) automatic x-ray spectrometer attached with computerized system. FeO was analyzed by the classical volumetric method.  $H_2O^+$  determination was carried out by modified Penfield method. These elements were analyzed by the staffs of Analytical Laboratory Section, Geological Survey Division, Department of Mineral Resources. Procedures of these techniques are described in Appendix.