

CHAPTER I

INTRODUCTION

1.1 Overviews of the Study

Over the past several decades, government agencies and citizen groups have recognized that efforts to reverse the trends of environmental degradation must be undertaken in a basin-wide context. It is necessary to address the whole spectrum of activity and resource use throughout the watershed, from the headwater to the estuary. Traditional environmental protection activities do not consider the entire drainage area, which cannot successfully restore or protect downstream aquatic ecosystems from the impacts of human activities. The ecological approach is an understanding of the interconnectedness of the ecological processes and environment. The changes caused by humans may have ecological effects beyond those intended or foreseen. From this perspective, it is in humanity's own-interest to protect the basic ecological processes that are related to the foundation of all life in terms of energy transfer and nutrient cycle (Strange et al., 1999). Humans can reconsider to protect these processes by being conscious of environmental impacts and by avoiding and minimizing adverse impacts. Freshwater ecosystems in Asia are under threat. According to increased human populations growth rapid development has also led to increased consumption caused by the natural environmental degradation throughout the region (Dudgeon, 2000). Limnologists and water resource managers must change in focus and the urgently adopt a of conservation agenda for freshwater science in Asia (Dudgeon, 2000; and Reynolds, 2000).

In this case study, Phetchaburi Watershed is one of twenty-five main watersheds in Thailand, which covers the area of 5,092 sq. km. It is an important watershed because it covers most of the area of Phetchaburi Province and some parts of Samut Songkram Province and Ratchaburi Province. As the special geographical and geopolitical characteristics, the Phetchaburi watershed is an adequate small watershed system for studying on sustainable watershed management. By geographical characteristics, only the main channel of the watershed called Phetchaburi River is 210 km. in distance

from the headwater to the estuary which Kaeng Krachan Dam is located in upstream. Since Kaeng Krachan Reservoir was constructed in 1965, the watershed has supplied water for such specific purposes as electricity generation, fisheries, transportation, tourism and recreation, as well as receiving wastewater discharges as receptor from human activities in surrounding areas of upstream. There are many human activities occurring in this watershed area such as agriculture, communities, industry, etc, which decrease the quantity and quality of the water itself and natural resources not only for human uses but also for other life uses. Apparently, there are many pilot projects developed for solving these problems in the watershed such as the wastewater treatment system at Laem Phak Bia Project, and the study of some physical and chemical changes of watershed from Phetchaburi Municipality through the wastewater treatment system. However, most projects are pilot projects and aim to reduce water pollution problems in municipal areas instead of solving the environmental problems of the whole watershed. The study of the Economic Analysis of Wastewater Treatment System of Phetchaburi Municipality showed that this wastewater treatment system is not worthwhile to invest in (Songrit, 1999). On the contrary, this project is continuing and is expected to reduce the socio-economic and environmental problems in the municipality.

All the above is an example of environmental problem solving at different levels of concern which is focused on specific purposes. It is likely that the problems of watershed systems have been solved without any holistic concerns, which is so difficult to be successful in environmental solving and environmental management. Therefore, watershed management is an important tool to be explored and implemented by the concept of a holistic approach with the integration of the major concerns of ecological and socio-economic approaches for sustainable watershed ecosystem.

1. 2 Objectives of the Study

According to the various evidence of watershed mismanagement in Thailand, the objectives of this study would like to search for potential ecological indicators and socio-economic indicators that are able to integrate for the new conceptual plan for

sustainable watershed management. Therefore, the Phetchaburi watershed is selected to become the case of study in regard to the following objectives:

- 1.2.1 To identify the existing conditions of ecological indicators in a watershed ecosystem.
- 1.2.2 To explore the interrelationships between ecological indicators and socio-economic indicators in relation to land use activities.
- 1.2.3 To develop the conceptual plan based on the integration of ecological indicators and socio-economic indicators as land use patterns for sustainable watershed management, Phetchaburi Watershed.

1.3 Hypothesis of the Study

This study will initiate the conceptual plan for sustainable watershed management of Phetchaburi watershed based on the integration of an ecological and socio-economic approach. Hypothetically, there are the following:

- 1). Each subsystem has different ecological conditions
- 2). Integrating ecological and socio-economic indicators in relation to land use patterns can improve the conceptual plan for sustainable management in each subsystem.

1.4 Scopes of the Study

Phetchaburi watershed is selected as the case of study which has specific characteristics as a small watershed in the Southwest of Thailand along the border of Myanmar and Thailand (Figure 1.1 and 1.2). It covers an area of 5,092 sq.km in three provincial areas of Phetchaburi Province and some parts of Samut Songkram Province and Rachaburi Province. The watershed itself is composed of lotic and lentic system which is useful for assessing the various types of land use activities. Nevertheless, the ecological indicators or parameters as physical, chemical and biological indicators needed to be measured for estimating the existing condition of the whole watershed,

the socio-economic indicators also needed to assess the existing land use pattern and attitudes of local people.

The study planned to systematically divide the watershed into three subsystems, which were as follows:

- Subsystem 1 covered the upstream area of the watershed above the Kaeng Krachan reservoir
- Subsystem 2 covered the area of Kaeng Krachan reservoir
- Subsystem 3 covered the downstream area throughout the river mouths

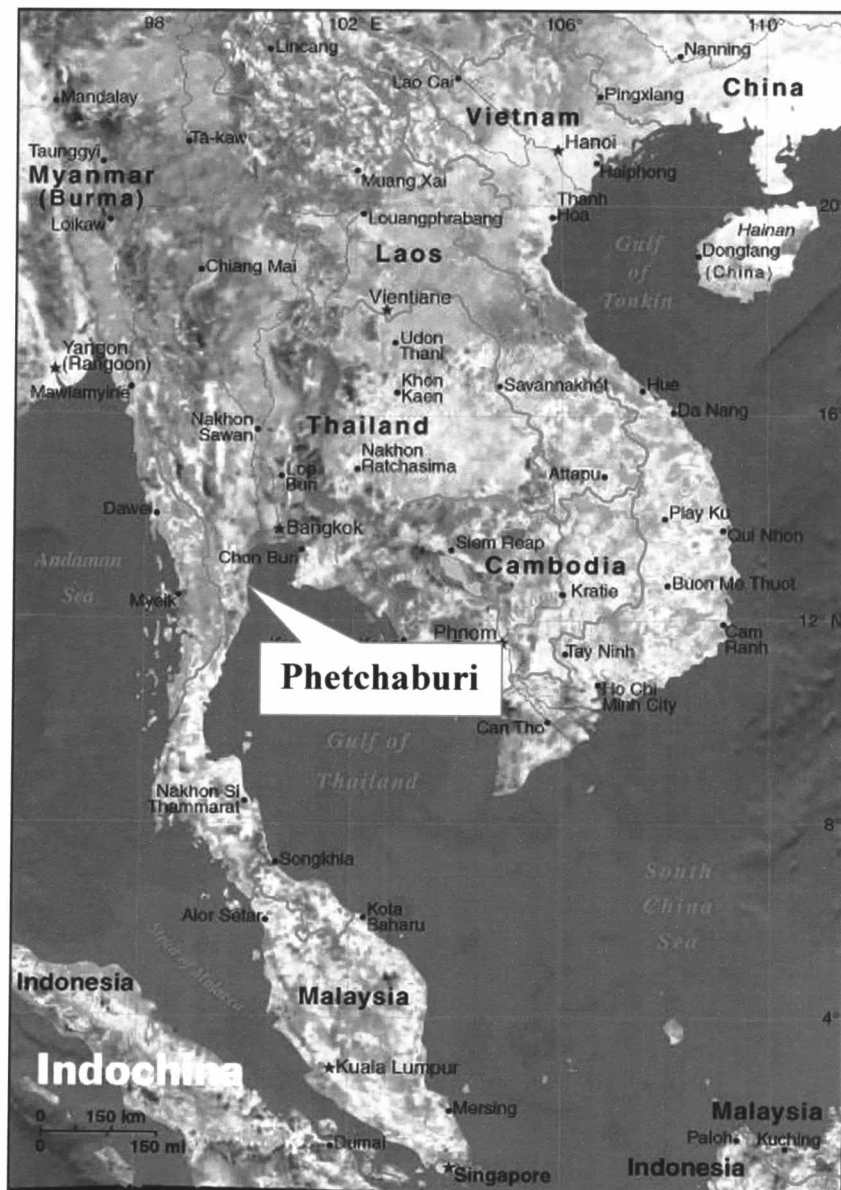


Figure 1.1 Map of Thailand and the study area

(Source: http://www.mekongexpress.com/laos/general/maps/map_indo_thai.html)

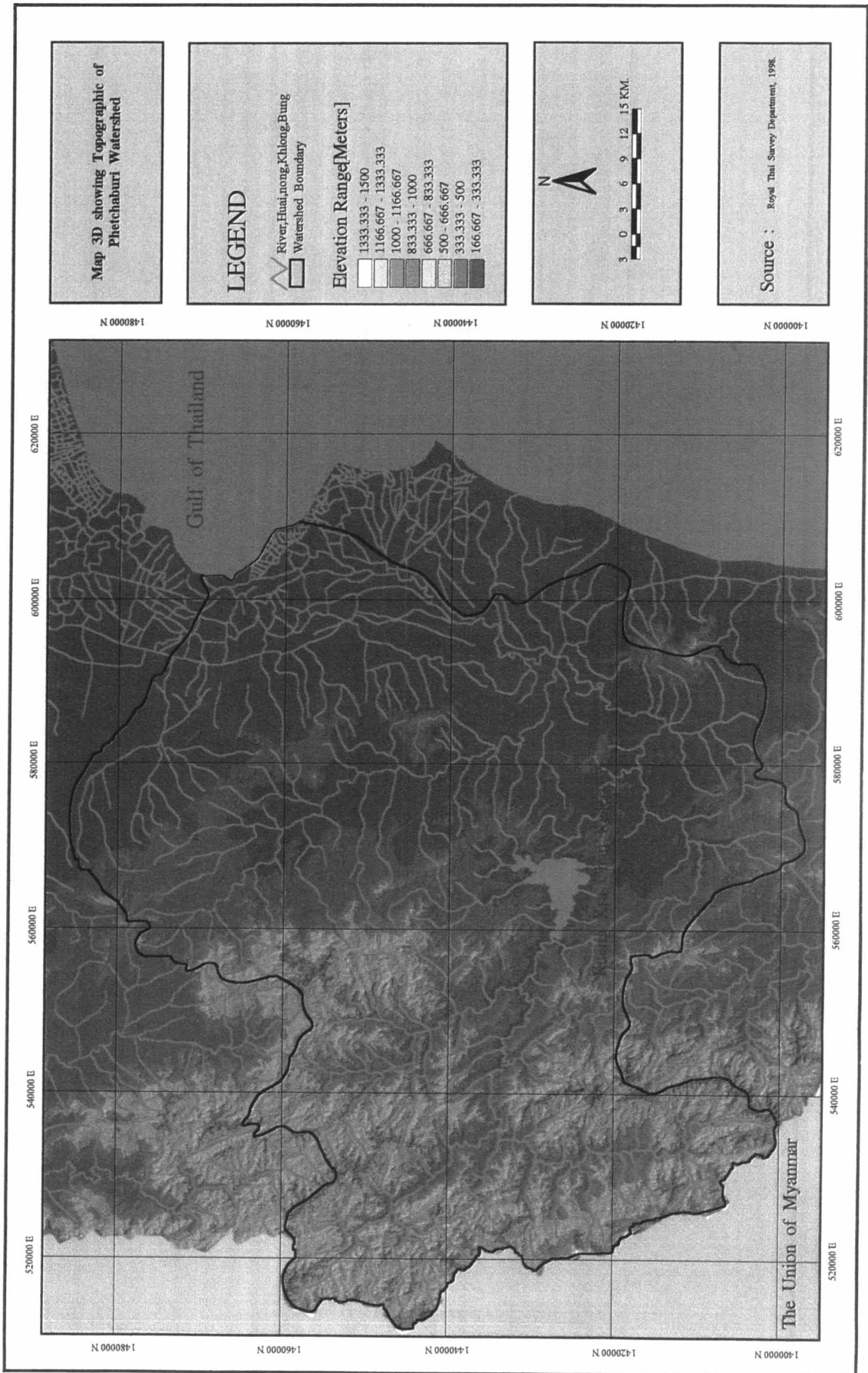


Figure 1.2 Topographic Map of Petchaburi Watershed

The study considered to collect primary data on the basis of seasonal variation which started from December 2001 to October 2002. The information of socio-economic existing conditions was collected during March 2002 to July 2002 for the purposes of the degree of land use and attitudes on water resource use and conservation. The process of study is presented in Figure 1.3 as a conceptual framework and the details are shown in Chapter 3 and 4.

1.5 Organization of the Dissertation

There are five chapters in this dissertation, organized as follows:

- *Chapter one*: it illustrates overviews of the study, objectives of the study, hypothesis of the study, scope of the study and organization of the dissertation which include the conceptual framework in order to make it more understandable to the reader.
- *Chapter two*: it is the results of literature reviews including the overview ecological concepts on watershed, river, lake or reservoir; watershed management; overviews of Phetchaburi watershed in terms of ecological and socio-economic conditions; and the reviews of related topics.
- *Chapter three*: it defines the study area; study site; methodology and data analysis that imply in this study.
- *Chapter four*: it indicates the results of study in systematic subsystem of watershed in relation to ecological parameters; socio-economic parameters with regard to land use pattern and the last part attempts to integrate ecological parameters and socio-economic parameters for a conceptual plan of sustainable watershed management.
- *Chapter five*: it finally explores the conclusion of the study and also the recommendation for better watershed management in terms of potential implementation.

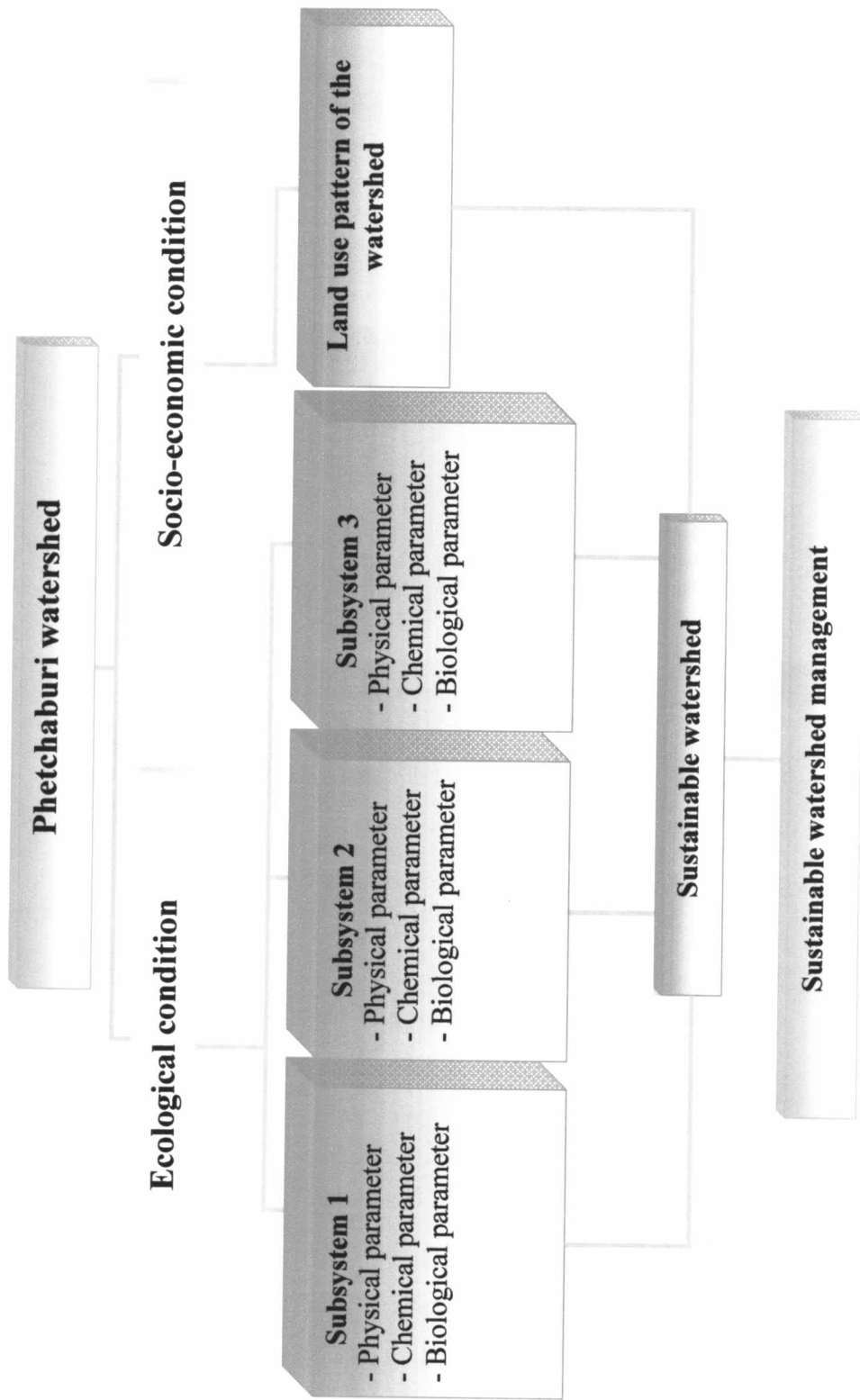


Figure 1.3 A conceptual framework of the study