

Chapter One

INTRODUCTION

Chapter 1.0 Introduction

1.1 Background

Cameron Highlands (CH) is located in the mountain area of tropical forest within the main range of Peninsular Malaysia. It was developed in the early 20th century due to its relatively flat plateau, although it is small, in the high mountain range of Peninsular Malaysia. Its year long mild temperature makes it a popular tourist destination, and also suitable for tea and vegetable farming. Moreover, due to its suitable terrain and abundant water resources, CH has also been developed for hydroelectric power generation.

In the second half of the 20th century, development activities have been intensified and anthropogenic interventions into this mountain region have become significant. Among the reasons for the rapid development are expansions of infrastructure facilities, in particular access road networks, along side with the hydroelectric scheme as well as the government's policies of encouraging tourism development and agricultural activities. These developments have necessitated significant deforestation. Diminishing forest cover, expanding cultivated land and buildup areas are expected to affect the abiotic and biotic environment. Among the consequences are loss of biodiversity, severe soil erosion, changes in surface air temperature and rainfall, changes in hydrological regimes and degraded water quality.

The changes of environmental quality thus far have affected human activities such as agricultural productivity, hydroelectric power generation, human lives and properties. For example, the agricultural sector is confronted with loss of topsoil, reducing fertility in soil and increasing production costs. On the other hand, degrading landscape

aesthetic has affected tourism development and sedimentation of the waterway and reservoir has posed operational difficulties to the hydroelectric scheme.

The question posed is then whether the development problems and the associated degradation of environmental quality have been clearly identified, quantified and understood? Based on the current trend and practices, can this mountain ecosystem be sustained as a life support system under the stress of current development? What are the threats to the sustainable development in CH and what are the management approaches that are required in order to be sustainable?

This research is aimed at presenting the case of the conflict in land use development and the resulting impact to the environment in CH. By establishing quantitatively as well as qualitatively, the development activities, its socioeconomic impacts and the environmental scenarios and their interrelationships, evaluation on the sustainability will be discussed and sustainable management approaches will be proposed.

1.2 Research Statement

1.2.1 Objectives

The main objective of the study is "To investigate the sustainability of the development in Cameron Highlands".

In order to achieve the objective, 3 main tasks are defined as the following:

- 1) To quantify the development activities in CH.
- 2) To assess the environmental quality changes in CH.
- 3) To discuss sustainability in CH and to propose management approaches that enable sustainable development.

1.2.2 Significance

Environmental Management can be defined as the art that seeks to balance human demands upon the Earth's natural resources, with the natural environment's ability to meet those demands on a maintainable basis. As the demands on the natural resources in CH increases substantially in recent years and also expected to increase at higher rates in the future, the response of the natural environment to these changes needs to be properly addressed.

This study will emphasize on the interconnectedness of development and environment in a holistic perspective and to investigate if there is any threat to sustainable development. With both qualitative and quantitative assessments on the environmental qualities and the social economic activities, the context of the situation can be viewed holistically and thus proper management approaches can be derived. This is needed to avoid the disintegration of the ecosystem with the consequential loss of economic opportunity and human livelihood. Moreover, as accessibility increases in this mountain regions of the main range of Peninsular Malaysia after the end of communist insurgency, the experience in CH will become very important to ensure sound management of other fragile mountain ecosystems that are subjected to the encroachment of similar development activities.

1.2.3 Delimitation

This research is performed in parallel with a collaboration project between the University of Malaya (UM) with TNB Research (TNBR) over the period of 1998-2001. The title of the project is "Development of Cameron Highlands Hydroelectric Catchment Information Management System" (UM and TNBR, 2001).

The UM/TNBR project is a detailed scientific study into the processes of the catchment with the perspective in the interest of the hydroelectric scheme. The main objective of the project is to develop a hydroelectric catchment information management system, which includes detailed spatial database of the physical, hydrological and landuse data of the catchment area. The system also integrates these spatial and non-spatial databases with various simulation models such as hydrological models, soil erosion model, hydroelectric power generation optimization model and reservoir sedimentation model. This collaborative project also includes assessment of the impacts of land use changes on the power generation as well as the catchment environment. Mitigation measures and management plans are also recommended.

The author of this dissertation is the research assistant responsible for the compilation and analyses of socioeconomic data as well as the analyses of environmental impacts. This dissertation adopts a holistic approach taking into perspective the sustainability of the ecosystem. This is somehow different from the collaborative project, which is biased mainly to the interest of power generation. However, all the results of the collaborative project are crucial as they provide better understanding of the study area. Thus, some parts of this dissertation formed a few sections in the collaborative project, while this dissertation also draws references to some of the analyses and conclusions derived in the collaborative project.

Accordingly, appropriate credits are acknowledged to the collaborative project. Herein, data compilation, analyses or conclusions derived by other researchers in the collaborative project will be acknowledged and referenced to accordingly in this dissertation. On the other hand, data collected, analyses carried out or conclusions made

by the author of this dissertation will not be referenced, even if it is also presented in the collaborative project.

As this dissertation constitutes only a partial fulfillment of the Master of Technology (Environmental Management), the research is designed to work under certain appropriate delimitation. The scope of the study is defined in the following:

- 1) Due to limited data availability, the scope of this study is confined to the hydroelectric catchments within the political boundary of CH district. The hydroelectric catchments are defined as the watershed areas for the hydroelectric power generation scheme, which includes a few adjacent catchments where rivers are diverted to the main catchment. However, general population and economic statistic are based on various state reports, which are district based. These district-based records are utilized because the economic activities, population, and other developments are concentrated in the hydroelectric catchments.

- 2) The study includes utilization of the derived scientific findings of other researchers. This study is designed to concentrate on assessing the state of the environment and its driving force of the anthropogenic activities. It will synthesize existing scientific data of the response of the environment to the pressure of development, and the interdependence of major anthropogenic activities. However, only a few important environmental parameters will be scrutinized. The selection of the parameters is based on local perspectives.

- 3) This short-term dissertation is not designed for extensive fieldwork. Analyses of data such as climatological data, land use and topography will be performed without field survey and checking. The field checking and other reliability issues are assumed to be taken care of by the sources of these data. Thus, all the analyses will be based on existing available data. Although data gaps are identified, no work has been carried out to obtain these missing primary data.

- 4) The evaluation of sustainability will be based on existing data. This is a preliminary assessment and the identification of missing data is important for the formulation of future research plans. The proposal of sustainable management approaches is conceptual and does not elaborate into the details of sustainability plan for any specific anthropogenic activities.

1.3 Content of Dissertation

This dissertation begins with the research statement in Chapter 1, where the objectives, scope and delimitation of this research are defined.

Chapter 2 presents a literature review. This chapter begins a review of the concepts of sustainable development and specifically on mountain ecosystem. A brief account on the mountain ecosystem is given with an example of Malaysia's mountain ecosystem. Chapter 2 also investigates the Malaysian perspective on sustainable development and the existing legislation pertaining to sustainable mountain development. The last part of this literature review examines the scientific works carried out in CH. These include agriculture, tourism and environmental quality research.

In Chapter 3, the research methodology of this study is defined. This chapter describes the approach of this study and discusses briefly the sources of data and the methods of analyses for the data.

A detailed description of the research area is presented in Chapter 4. This chapter covers the historical development, physical characteristics and socio-economics of CH.

The investigation into various anthropogenic activities is conducted in Chapter 5. Major anthropogenic activities such as agriculture, tourism and hydroelectric power generation are investigated by assessing their socioeconomic and environmental impacts on this mountain ecosystem.

Chapter 6 presents the results of the assessment of environmental quality changes in CH including deforestation, temperature, rainfall, streamflow, water quality and soil erosion. The implications of these changes will also be discussed.

In accordance to the basic concepts and principles of sustainable development, the discussion of sustainability is presented in Chapter 7. This discussion is based on results of the assessment of the anthropogenic activities as well as the analysis of the environmental quality changes in Chapter 5 and Chapter 6 respectively. Lastly, the dissertation recommends some management approaches that are critical to ensure the sustainable development of CH.