



# **CHAPTER 1**

## **INTRODUCTION**

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### **1.1 Location of Tasek Bera**

Tasek Bera is located 3°5' N, 102°38' E in Bera district, southwest of Pahang (Figure 1). It is 34.62 km at its longest and 25.28 km at its broadest point, with an area of 61.50 km<sup>2</sup> in a watershed measuring 613.83 km<sup>2</sup> (Lim *et al.*, 1982).

### **1.2 Background of Tasek Bera.**

Tasek Bera, which consists of an inundated freshwater “rassau” river and riparian swamp system, is a relic ecosystem that has been preserved by the Semelai aborigines and their predecessors through their extensive practice of shifting agriculture as well as inter-tribal hostilities. According to Lim *et al.* (1982), the Semelai have adapted to Tasek Bera only over the past 600 years although Tasek Bera is about 4,500 years old. This adaptation consists of shifting agriculture in the catchment area and hunting and gathering in the swamp system.

In Peninsular Malaysia, natural freshwater lake systems cover only 10,000 hectares and are represented by only two sites, namely Tasek Bera and Tasek Chini, both in the state of Pahang (Department of Wildlife and National Parks, 1987). Tasek Bera is Malaysia’s largest freshwater swamp and lake system in addition to being one of the remaining examples of a lowland alluvial riparian swamp system. The ecosystem in Tasek Bera represents a climax phase of lowland freshwater riparian systems. Therefore, it has rich diversity in aquatic fauna and flora.

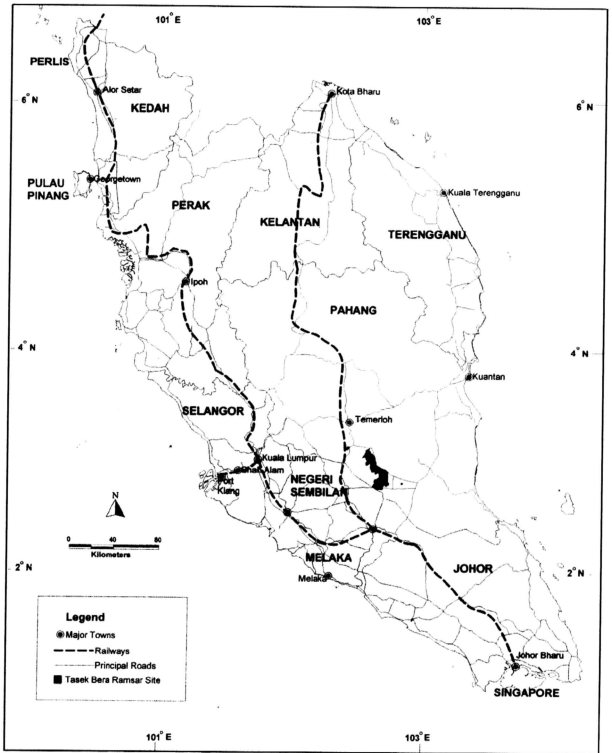


Figure 2. Location of Tasek Bera

### **1.3 Tasek Bera as a Ramsar Site**

Tasek Bera was designated as Malaysia's first "Wetlands of International Importance" under the Ramsar Convention in November 1994. Being a Contracting Party to the Convention, Malaysia is responsible for maintaining the ecological character of Tasek Bera and its buffer zone, and to make wise use of its wetlands resources.

Therefore, a technical assistance project was prepared to establish the basis for the management of Tasek Bera Ramsar Site. Government of Denmark provided funding under the Danish Cooperation for Environment and Development (DANCED) scheme for a period of three years. A Government Project Agreement was signed between the Government of Denmark (Ministry of Environment and Energy, DANCED ) and the Government of Malaysia (Economic Planning Unit of the Prime Minister's Department ) on 4 December 1995. This was followed by a Consultancy Agreement between the State Government of Pahang (Economic Planning Unit) and Wetlands International - Asia Pacific on 30 May 1996 to enable the latter to undertake the project "Integrated Management of Tasek Bera, Support for the Implementation of Obligations under the Ramsar Convention."

### **1.4 International Importance of Tasek Bera Ramsar Site**

Tasek Bera complies with several international scientific criteria which qualifies it as a "Wetland of International Importance" (Prentice, 1997). The following criteria contributed to its designation as a Ramsar Site :

i) it is an excellent example of South East Asian tropical freshwater lake/swamp system and represents a rare type of wetland in its biogeographical region.

- ii) it supports wildlife which is globally endangered including Asian Elephant (*Elephas maximus*), Tiger (*Panthera tigris*), Malayan False Gharial (*Tomistoma schlegelii*), threatened by over exploitation such as the Asian Arowana (*Scleropages formosus*) and also endemic species.
- iii) it is of special value for maintaining the genetic and biological diversity of the fauna and flora of the region
- iv) it is an important feeding, breeding and nursery area for fish and therefore contributes to global diversity by supporting a significant indigenous fish community.

### 1.5 Research by the International Biological Programme (IBP)

A joint scientific investigation lasting for four years was conducted in Tasek Bera, beginning from 1970, under the International Biological Programme involving Japanese and Malaysian scientists. Tasek Bera, being a lowland alluvial riparian swamp system and not a true lake, is rare in this region. Therefore, Tasek Bera was selected as it represents a typical and yet endangered natural ecosystem in Malaysia, and probably in the Southeast Asian humid tropics. Due to logistical problems, particularly accessibility, this study was limited to the open water channels, the *Lepironia-Pandanus* littoral region which is a successional phase of the swamp-forest and to the vicinity of Pos Iskandar. Among the areas of research were geological and sedimentary survey, physical and chemical properties of the water, studies of organic decomposition, primary production, secondary production including an ecological survey on fishes (Furtado and Mori, 1982).

### 1.6 Development and human activities in the water catchment area

Areas in the swamp forest had been cut in historical times and were replaced by *Lepironia* reedbeds and *Pandanus* stands. Dry season cutting and burning of the reeds and *Pandanus* clumps has been practised to keep the navigation routes open. However, this practice has the effect of encouraging the vegetative regeneration of both species and increased organic loading due to decaying vegetative parts.

An area of land measuring 25,000 hectares which includes the lake systems and its accompanying agricultural plot settlements and plantations was effectively isolated by recent road development. Only approximately 10,000 hectares remains forested, with the least disturbed areas lying to the east of Tasek Bera (Nather Khan *et al.*, 1991).

One of the major concerns affecting Tasek Bera's environment is non-point sources of water pollution due to fertiliser run-offs. Since 1980, the headwater of the catchment areas have been encroached upon by plantations, some even bordering the edge of the lake. Conversion of substantial forest areas to oil palm and rubber plantations by FELDA that has taken place within the catchment area thus threatened the hydrology and water resources of the area. Run-off of agricultural chemicals may occur in areas with intensive agricultural development. The increased nutrient input from fertilisers into the water bodies could lead to deterioration of water quality. Excess nitrogen and phosphate may cause eutrophication, which results in decrease in available oxygen and can lead to fish kills.

### **1.7 Objectives of the research**

This research aims to study the validity of biomonitoring systems based on correlation between measured environmental variables and biological attributes. Two main factors that emphasise the importance of biological monitoring are as follows :

- i) fluctuations in water quality, which may be missed by intermittent chemical analysis are recorded by organisms because they have an integrated response to their environment.
- ii) it is more appropriate to monitor the aquatic community rather than only the physico-chemical variables in order to maintain healthy, diverse biological communities.

Therefore, the objectives of this project are :

- i) to investigate the physical and chemical nature of the lake by measuring the pH, temperature, turbidity, conductivity, dissolved orthophosphate, nitrate, ammonical-N and dissolved oxygen at selected sites.
- ii) to correlate phytoplankton composition and production to the parameters measured, particularly to the concentration of ammonium-nitrogen, nitrate and dissolved orthophosphate.
- iii) to discuss biological parameters of phytoplankton which can be used to monitor water quality at Tasek Bera for any significant changes.