CHAPTER 1

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1.1 General Introduction

During the last two decades, the multiple functions and values of wetlands have been recognised by the scientists, managers working with wetlands and also the public (Brix, 1994a). The ability of wetlands to transform and store organic matter has been exploited in constructed wetlands for water quality improvement and is often being described as "the kidneys of the landscape" (Mitsch and Gosselink, 1993).

Constructed wetlands play an important role in wastewater management and control in many countries of the world today (Haberl, 1998). For the last ten years in Australia, there has been an increasing use of constructed wetlands within the field of stormwater management or urban drainage. This similar trend has been experienced in United States (White *et al.,* 1996). Constructed wetlands offer several advantages as compared to natural systems including greater flexibility in sizing and site selection, greater operational control for scientific testing, environmentally sound alternative while preserving aesthetic values and providing for enhancement of wildlife (Gersberg *et al.*, 1984). In Malaysia, a wetland was constructed in Putrajaya. It is the first constructed wetlands in Malaysia. The functions of the constructed wetlands are to trap sediments and sequester nutrients and pollutants from inflowing water, to prevent the process of

sedimentation and pollution from adversely affecting water quality. The use of constructed wetlands for these functions has never been attempted in Malaysia. It is therefore the first attempt at using constructed wetlands to cleanse water in a riverine system in Malaysia. It is believed to be one of the largest constructed wetlands in the world, comprising a lake of 650 hectares and a series of constructed wetlands totaling 130 hectares.

1.2 Constructed Wetlands in Putrajaya

The Putrajaya Wetlands which is incorporated in Putrajaya, the new Federal Government Administration Centre for Malaysia, is one of the biggest constructed wetlands in the world and is the first man-made wetlands in the tropics. The Putrajaya Wetlands covers an area of 197 hectares. Construction works of the wetlands started in March 1997 and was completed in April 1998. The constructed wetlands straddle the water courses of Sungai (Sg) Chuau, Sg Bisa and three tributaries and guard the entry of all river water into Putrajaya (PP and PJH, 1999).

The wetland systems consist of the Upper North (UN), Upper West (UW), Upper East (UE), Lower East (LE), Upper Bisa (UB) and Central Wetlands (CW).

1.3 Objectives of the Putrajaya Wetlands

Wetlands both natural and constructed in developed countries are being used to treat effluent, polluted water – rivers and storm water in urban areas. The Putrajaya Wetlands have been designed to achieve a high level of stormwater retention and removal of a range of non-point source pollutants from the upper catchment and pollutants generated from the new government administration centre (PP and PJH, 1999).

The main goals of the constructed wetlands are as follows:

- Create a self-sustaining and balanced lake ecosystem in the Garden City of Putrajaya;
- Create a lake and wetlands ecosystem that is unique in the world;
- Achieve the water quality objective of the lake by meeting Class IIB Interim National Water Quality Standards for Malaysia so that its water is suitable for body contact recreation;
- Provide opportunities for research and development of wetlands for water quality management;
- Create a habitat that is conducive for native floral and fauna conservation that can be promoted as another destination for eco-tourism in the country and;
- To be a centre for community education.

1.4 Location

The constructed wetlands at Putrajaya, is located approximately 25 km south of the federal capital of Kuala Lumpur and 20 km north of the new Kuala Lumpur International Airport (KLIA) at Sepang. Putrajaya is bounded by the Puchong to Kajang road on its northern boundary and the Puchong to Dengkil road on its western boundary. Figure 1 shows the location of the constructed wetlands.

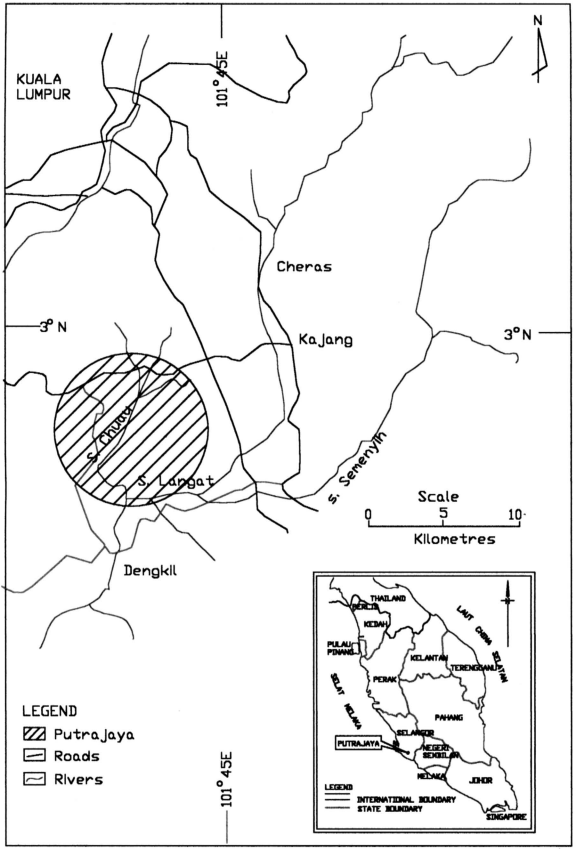

Figure 1. Location of the Constructed Wetlands of Putrajaya (Source : Perbadanan Putrajaya and Putrajaya Holdings Sdn. Bhd., 1999)

1.5 Topography

The topography of the study area is undulating interspersed with steep sided hills, with elevations ranging from 10 m to 144m. The valley floors are flat resulting in significant floodplain storage during floods.

1.6 Drainage

The major rivers are Sg. Chuau, Sg. Bisa and Sg. Limau Manis, all of which flow southward to join Sg. Langat. Sg. Chuau is a tributary of Sg. Langat and is located about 55 km downstream of the headwaters of Sg. Langat. It is a small, narrow river draining in a southerly direction over a distance of 14.8 km. Sg. Chuau catchment encompasses an area approximately 50.5 km^2. Figure 2 shows the main catchment of the Putrajaya Wetlands.

1.7 Existing Landuse

Eighty percent of the existing landuse of the study area was cultivated with oil palm and rubber. The remaining 20% of the area can be classified under landuse for institutional, residential or commercial purposes.

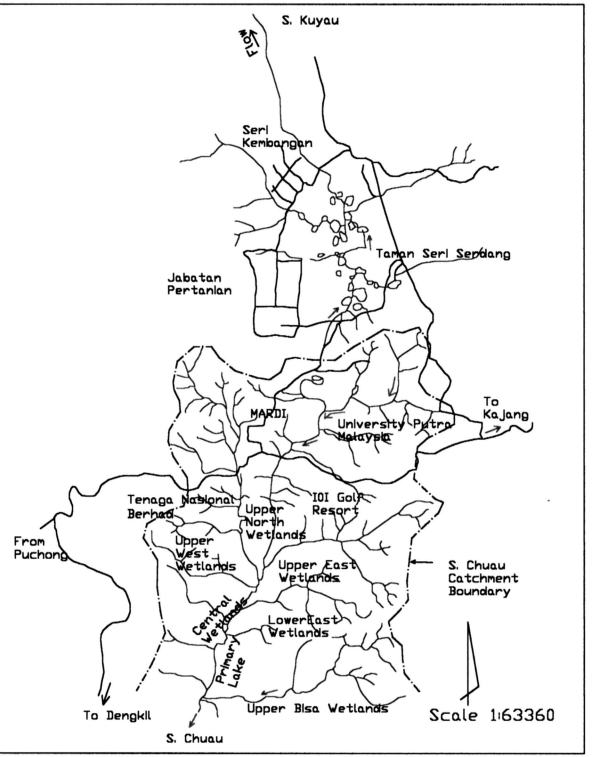

Figure 2. Main Catchment of the Constructed Wetlands at Putrajaya (Source : Perbadanan Putrajaya and Putrajaya Holdings Sdn. Bhd., 1999)

1.8 Importance and Aims of the Study

Collection of water quality data is important to understand the effects of construction activities on the neighbouring waterways and also the long term trends in water quality at the constructed wetlands. Since Putrajaya Constructed Wetlands is the first constructed wetland in Malaysia, it is important to study the great challenges of this wetland towards the changes of water quality after planting of wetland plants and also the controlling of stormwater pollution. A period of 41 months monitoring has been conducted which aims to:

(i) Assess the trend of water quality at Putrajaya constructed wetlands.

(ii) Monitor the water quality at Putrajaya constructed wetlands to determine whether it complies with the Class IIB Standard of Interim National Water Quality Standards for Malaysia.

(iii) Determine selected water quality parameters before and after construction of the wetlands at different wetlands cell.

(iv) Assess the effect of seasons on the water quality.