CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Surface water includes all water on surface of the earth that can be found in rivers, streams, canals, lakes, wetlands, coastal, ditches, marshes, ponds and marine waters and also appears as in ice and snow. The water of the sea and ocean are excluded to be considered in surface water due to its definition of fresh water. Generally, surface water is well aerated because it condition of water-atmosphere interface. The pollution of the surface runoff in particular mostly contains high level of heavy metals and other harming substances such as nitrogen and phosphorus that had increased the level of contaminants. If surface water pollution sources are derived from groundwater or runoff water from upland soil, the pollutants will directly enter the surface water body over a large area. This shows that the pollutant sources for the surface water diffuse either from the soil surface or groundwater. For the study area, Tunggak River at Gebeng Pahang, the pollutant probably may come from the effluent of industrial and municipal wastewater. The effluents will not only rich in pathogenic bacteria and viruses, organic matter and nutrients, but may also enriched with level of heavy metals.

Zinc, Lead and Copper are the examples of element for the group of heavy metal that always been related with the contamination and the potential toxicity toward environment especially to the surface water. Heavy metal either can be define as a metal with atomic mass that bigger than Sodium or as it have metal density with range of $3.5 - 6.0 \, \text{g cm}^{-3}$. Non-industrial human usually find the involvement of the heavy metals dissolved in water, sorbed
in the soil or contained in foods. Mostly, heavy metals present as cations in the environment and would occur naturally in the Earth’s crust impurities isomorphously substituted for various macro element constituents in the lattices of many primary and secondary minerals.

1.2 OBJECTIVES OF RESEARCH

There are two main objectives for these research:

a) To determine the pollution level of surface water quality in the Tunggak River, Gebeng, Pahang.

b) To assess the environment risk of heavy metal contaminations in surface water based on the Enrichment Factor.

1.3 PROBLEM STATEMENT

The diffusion of heavy metal into the surface sediment of the soil would directly affect the nearest surface water such as effluent from industrial site. This phenomenon which happened since long time ago probably had affected not only human’s health but also the ecosystem cycle.

a) The industrial discharge (anthropogenic sources of heavy metal) cause to pose further toxic towards the aquatic life.

b) The enrichment of heavy metal for a long time from the industrial effluent causing it to accumulated to the environment in various ways.

c) This studies is carried out to monitor the heavy metal contaminations in the surface water of the Tunggak River at Gebeng, Pahang based on the Enrichment Factor.

d) The research is carried out to evaluate the level of pollution of the Tunggak River at Gebeng, Pahang.
1.4 SCOPE OF RESEARCH

The study is conducted at Tunggak River, Pahang that near to Gebeng industrial area. Tunggak River is a class H stream (Hydrographic) in Malaysia with Asia Pacific region code. This stream located at Pahang with coordinate 3°57’0”N and 103°22’1”E or 3.95 and 103.367 in decimal degrees. The effluent discharges from numerous industrial sites either it’s been treated or untreated is flowing out to the river carrying together the wastewater that may be contains various of substances that probably will increase the contamination level such as organic compounds, phosphorus, nitrogen and heavy metal. This study will carried out by taking the samples from three points at the three different and nearest effluent by the industrial activities at the river. The samples will be test by several of parameters in order to achieve the objectives of this research.

![Figure 1.1: Location of Tunggak River.](image-url)