CHAPTER 1

INTRODUCTION

The freshwater fish under study *Channa striata*, or in other words the striped snakehead is a native species of Malaysia and South-East Asia (Grzimek, 2003; Jais, 2007). Other species of the same family also do exist in Africa. Some have been introduced in North and South America (Courtenay W. J, et. al., 2004), even though they consider it a territorial invader and has even been eradicated in some parts of the region (Huslin, 2002).

The interest in the species has been going on for centuries in the eastern part of the world, since some countries believe in the fish's "spirituality" and have been accustomed to indulging in all it has to offer nutritionally and religiously. Although not all tribes and populations would have the same interests when it comes to the species, however natives seem to have one common interest in the fish, which lies in its wound healing quality when its flesh is consumed (Gam, Leow, & Baie, 2006).

The species is better known as Haruan in the Malaysian region and is just one of six species in the area, all with distinguishing characteristics. Its elongated body and its peculiar head that is shaped like a snake's, make it highly recognizable. Its body is covered with a mucus substance which keeps its outer layer from drying. The diagonal stripes on its trunk are also an eminent part of its morphological traits (Phen, et al., 2005).

Haruan was domesticated for industrial reasons; as the demands on its meat and other pharmaceutical products rose. This is a probable result of desperate measures to fulfill consumer demands; as wild stock species have been over fished throughout the years; which basically lead to the declination of stocks. This does not come as a

surprise given that the inland fishing industry increases by about 7% a year in Asia, since 1992 (World Resources Institute, 2000).

But an interesting finding was that the wound healing property would diminish in those fishes that were domesticated, leaving freshwater fish farmers puzzled as to why this happens.

The project is aimed at studying the diversity of *Channa striata* through its genetic content. Thereafter culture techniques and breeding programs will be developed. This might benefit in increasing the production rates, with the least decrease in the quality of fish protein.

The subject of maintaining biodiversity of a species is not new to human kind. In fact in Islam, it is believed that God commanded his prophet Noah; to save the animals of the earth from extinction. An ark was built and animals were paired for mating purposes; as God was about to send in the great flood, that would eradicate all living creatures (Surat Hud, verse 40-41; Babjee, 2010).

In the late 20th century, definitions of the term "diversity" became more increasingly scientific and very much associated to genetics. One that stands out the most would be: "Biological diversity is the variety of life forms, the ecological roles they perform and the genetic diversity they contain" (Wilcox & B.A., 1984; Babjee, 2010). This definition itself has taken many forms over the years and many have taken the initiative to maintaining its true purpose.

In Malaysia, the act of conservation first initiated back in 1884, with the launch of the Penang Botanical Garden (Babjee, 2010). Then it cascaded later on with the

boom of many establishments, such as the World Wide Fund for Nature-Malaysia (WWF-Malaysia) that started in 1972 (WWF-Malaysia). This does not come as a surprise since Malaysia is one of the top 12 richest countries in animal and plant biodiversity. Having said that, statistics show that 14% of Malaysian mammals are endangered (WWF-Malaysia).

History goes way back when it comes to freshwater regions. Some might even think that the greatest civilizations have started there, the Egyptians on the longest river in the world the Nile, Babylon on the fertile land between the Tigris and Euphrates rivers, *etc.* These waterways were their source of food, drink, agriculture and hygiene. To this day they house creatures of all kinds; however the difference between the past and the present is that most of these creatures we once knew are endangered. World surveys have shown that 20% of freshwater fish were also wiped out across the planet (World Resources Institute, 2000) and in Malaysia alone it is said that almost half of the original 266 living beings are now extinct. Examples include: Asian Arowana (*Scleropages formosus*) and the Silver Shark (*Balantiocheilos melanopterus*), just to name a few (World Resources Institute). This is mainly due to the stress mankind has put on these systems and very quickly these resources are diminishing.

Awareness in Malaysia is spreading and on the fast track, several habitats and freshwater systems are under watch. A good example of that would be the Tasik Bera (Lake Bera), a wetland that is supposedly the first to be protected in the region. This put the area on the world map and is currently cofounded by the Government of Denmark (Baker, 2002)

This goes to show that species that are not endangered such as *Channa striata* are not to be ignored. Their decrease in number is merely just one of the indications that recent ecological effects and human activities are taking their toll on the wild stock population of the fish. Therefore it would be wise to conduct a population study on the genetic structure of the fish, to give us a comparative insight as to what is going on with the natural stocks in different parts of the peninsular.

Molecular markers have been around for decades, yet they were scarce back then and did not withhold much differentiation power to effectively measure parameters such effective population sizes and gene flow. One of the earlier markers was allozymes, a marker that is not frequently used in aquaculture; since it does not produce as many loci and therefore variability as statistical analysis would like (Liu & Cordes, 2004; Hauser & Seeb, 2008). Microsatellites on the other hand have played an eminent part in conservation genetics and diversity studies. As it shows the crosses of different species within populations and emphasizes on the recent changes in their gene flow. It alerts scientists and ecologists alike if there is excessive inbreeding or outbreeding depression among individuals of a species, forcing authorities to take immediate action. Microsatellites' fast spread was due to its abundance and ease of isolation, not to mention its codominance and its powerful differentiation capabilities.

Later on the information obtained will be directed towards delineating management stocks and applying effective breeding programs. Brood stocks can also be rebuilt and restocked without the fear of abnormal genetic crosses arising. Therefore we maintain the species in the wild, while culturing others for farming and industrial purposes.

The objectives of this research project are:

- Isolation and development of microsatellites markers for *Channa striata.*
- Population structure and genetic diversity study on individuals from seven different locations (states) in Malaysia.

The hypothesis:

- The genetic distance calculated for the individuals from the seven different locations of the Malaysian peninsula, should in a way correlate to the geographical distance between these regions.
- Genetic differences are expected to be observed on either side of the peninsular; since there is a geographical barricade between both the East and West coast of peninsular Malaysia.