

Short Communications

Fish Biodiversity Survey (2009) of Streams in the Ayer Hitam Forest Reserve, Puchong, Selangor

Yu Abit, L., I. S. Kamaruddin*, Z. Mohd-Rozhan, M. Y. Ina-Salwany and A. S. Mustafa- Kamal.

*Department of Aquaculture,
Faculty of Agriculture, Universiti Putra Malaysia,
43400 Serdang, Selangor, Malaysia
E-mail: hmelintang@hotmail.com

ABSTRACT

A study was carried out to determine the different fish species inhabiting the streams of Ayer Hitam Forest Reserve (AHFR) in Puchong, Selangor. The study was carried for a period of days (from 13 to 16 April 2009) during the Scientific Expedition of AHFR, Puchong, organized by the Faculty of Forestry, Universiti Putra Malaysia (UPM). The samples were collected using a variety of methods at three stations that were designated as Station A, Station B and Station C within the AHFR riverine system. These samples were then preserved in 90% ethanol solution and sent to the laboratory for identification. From the sampling, eleven indigenous fish species (namely, *Puntius binotatus*, *Luciocephalus pulcher*, *Clupeithys sp.*, *Rasbora einthoveni*, *Hemiramphodon pogognathus*, *Rasbora heteromorpha*, *Sphaerichtys osphronemoides*, *Rasbora sumatrana*, *Beta pugnax*, *Glossogobous giuris* and *Clarias macrocephalus*) were identified to inhabit the AHFR riverine system.

Keywords: Fish biodiversity, Stream, Ayer Hitam Forest Reserve, Puchong

INTRODUCTION

The freshwaters of Peninsular Malaysia can be broadly categorised into 2 groups of environment (Mohsin & Ambak, 1983). The two environments are lentic water bodies which are essentially standing water bodies, such as lakes and reservoirs, whereas the second freshwater environment comprises of lotic water bodies which consist of flowing water bodies such as rivers and streams. Both rivers and streams can subsequently be subdivided into upper, middle and lower stream sections.

The river system found in the Ayer Hitam Forest Reserve (henceforth designated as AHFR), Puchong, can be classified as an

upstream section, where the gradients are very steep, with fast flowing water and it consists of a network of interconnecting rapids and waterfalls. These characteristics of the aquatic environment often result in a limited species diversity of fish and only species that can adept sufficiently to these river conditions can survive. In large tropical rivers, sections of rapids often support specialized fishes, such as tiny blind catfishes in the Amazon River (Lundberg, 2001). In high-gradient headwater streams, among typical fishes are streamlined cyprinids (Africa and Asia), highly specialized hillstream fishes (Balitoridae; Asia), and specialized catfishes (South America) (Moyle & Cech, 2004). Fish communities

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*Corresponding Author

in small rivers are actually a reflection of the environment they inhabit, while suitable environments influence the distribution and abundance of different species. Thus, the species is considered as the indicator of the habitat or ecosystem (Hellawel, 1986). The gradient and order of streams factors are usually and strongly interrelated in their effects on fish distribution, and they seem to have the same general effects on the tropical as they do on temperate fishes (Moyle & Cech, 2004).

In the recent years, the areas comprising AHFR have been shrinking, and this is mainly due to regazetting of land for development purposes. This forest reserve has become an island in a sea of urban development. According to Awang Noor *et al.* (2007), the Forestry Department has recorded that the area comprising AHFR has decreased by some 70.4 % from 1965 to 1997, i.e. from 4266.23 ha to 1262.33 ha. Currently, only 1248 ha remain in this forest reserve, comprising six compartments, compartments 1, 2, 12, 13, 14 and 15. In terms of its river system, the AHFR is dissected by two major rivers, i.e. Rasau River on the southern half and Bohol River on the northern side (Ahmad *et al.*, 2007). Among the development projects that have been completed in the vicinity include an agriculture project, a world-class sports complex, a multi-million dollar housing project, an incineration plant and waste disposal area, and an equine park (Awang *et al.*, 2007). These situations are likely to have affected the fish stock and the fish population inhabiting the AHFR. In addition, over-exploitation and habitat degradation not only deplete wildstock, but also reduce the replacement rate in the population (Khan *et al.*, 1996).

Detailed studies on fish species inhabiting the lotic system of this area are still severely lacking. Thus, this study was conducted to determine and identify the different fish species constituting the fish populations within the riverine system of the AHFR. The findings of this study are expected to benefit the planning and management of sustainable fisheries and conservation of the natural resources in this area. As such, the objective of the study was to

determine as many fish species and the number of species of fish inhabiting the riverine system in the AHFR Puchong, Selangor within the study period.

MATERIALS AND METHODS

This study site is located in the AHFR Puchong, Selangor, which is a secondary disturbed forest, as it has been logged a few times since the 1930s. The altitudes of the AHFR range between 15 and 233 m above sea level, while the slopes of the forest range between 10 to 20 %. The forest is a production forest categorized as a Lowland Dipterocarp Forest (Awang *et al.*, 2007). The AHFR is under the management of the Central Selangor District Forest Office and the Selangor state government leased the forest to Universiti Putra Malaysia (UPM) for 80 years through a memorandum of understanding (MoU) signed in 1996, with the purpose of being a research and educational forest. With an area of 1248 ha, the forest also provides recreation and eco-tourism activities for urban dwellers.

The main data for this study consist of the type of fish species and the number of fish species inhabiting streams in the AHFR. The study was conducted for four days, i.e. from 13 to 16 April 2009, during the Scientific Expedition of the AHFR Puchong, organized by the Faculty of Forestry, UPM.

The sampling stations were located in a section of the AHFR stream/river in compartments 13, 14 and 15. Fish were sampled at three stations that were designated as Station A, Station B and Station C. Station A is located in the rapids in compartment 13, whereas Station B is in compartment 14, i.e. at the pools near a waterfall and Station C is at a small tributary of the river in compartment 15. The sampling gear used included gill nets, cast nets and baited line with hooks. The mesh size of the nets ranged between 0.5 to 2.0 inches. The gill nets were set at dusk, maintained in the position of the stream water and hauled in the next morning. Meanwhile, the cast nets and baited line with hooks were used at each station during the day time. Fish caught were photographed and

preserved in 90% ethanol for further observation. All the fish caught were identified for their species data using standard taxonomic keys, according to Mohsin and Ambak (1983) and Hua (2002).

RESULTS AND DISCUSSION

The AHFR in Puchong is rich in flora and fauna, and it is also home to 10 species of reptiles, 18 species of amphibians and 10 species of fish (Ahmad *et al.*, 2007). Norini and Ahmad (2007) listed the fish species of economic importance in the AHFR in 2004, as given in Table 1.

TABLE 1
The fish species that are valuable to the Temuan Ethnic group in AHFR

Type of fish	Species
Ikan tengalan	<i>Puntius Bulu</i>
Hampala barb	<i>Hampala macrolepidota</i>
Giant snakehead	<i>Ophicephalus laevis</i>
Ikan belisik	<i>Rasbora sumatrana</i>
Broadhead catfish	<i>Clarias macrocephalus</i>
Spotted barb	<i>Puntius binotatus</i>
Black snakehead	<i>Channa melasoma</i>

Although some previous studies have attempted to list the indigenous fish species found in AHFR, some of the species that were found in those studies differ from the ones found in this study. In this study, eleven species of fish from seven families were recorded during the sampling period. All the eleven species that were recorded are indigenous to Malaysia. The species that were caught in the present study are as shown in Table 2.

In their study, Mohsin and Ambak (1983) caught specimens of *Sphaerichthys osphronemoides* (biji durian) from a clear and flowing stream in Puchong. This chocolate brown to faint red brown colour fish is a beautiful aquarium fish and very attractive to aquarists. This study found that it was difficult to detect this particular species due to its exceptional camouflage ability which closely resembles its surroundings of fallen leaves. Many fish that live close to the substrate, or among floating or

rooted plants, to some degree, are camouflaged by the similarity in the colour between them and their background (Keenleyside, 1979).

It is interesting to note that Mohsin and Ambak (1983) mentioned that *Glossogobius giurisis* is not a common fish species in Malaysia, whereby in their study, they managed to capture just one specimen of this particular species from a small stream in Puchong. In this study, the researchers managed to capture one specimen of *G. giurisis* under a rock in the rapids of Station A which is located in compartment 13. Keenleyside (1979) mentioned that the most common hiding species are small, benthic forms such as many of the gobies (Gobiidae). For instance, some gobies occupy burrows excavated by shrimps (Karplus *et al.*, 1972). The capture of this particular specimen is indicative that this species is still available in the streams of the AHFR although its population density is unknown.

The fish species in the streams also specialize in their feeding habits and depend on the food availability in the streams of which they inhabit. Mohsin and Ambak (1983) noted that the stomach contents for cyprinids, such as *Rasbora einthoveni*, *Rasbora heteromorpha* and *Rasbora sumatrana*, consist mostly insects or parts of insects. Most of the time, the food source in upstream section is from allochthonous sources. In the headwater streams, most fishes feed on either terrestrial invertebrates or detritus (Moyle & Cech, 2004).

Meanwhile, *Hemiramphodon pogonognathus* (ikan jolong) are found in a large number in the stream of AHFR and they always remain on the surface of the water unless disturbed. These fish tend to approach nearby objects that fall into the water. The main diet of this species consists of insects, especially ants that fall from the terrestrial canopy cover. Major stomach contents consisted of red ants and other hemipteran and dipteran larvae (Mohsin & Ambak, 1983).

Dorichthys martensii (ikan paip) was mentioned by Mohsin and Ambak (1983) as one of the most abundant fish collected from Sungai Rasau in the AHFR in Pucong. As per this study,

TABLE 2
Fish species inhabiting the streams of AHFR in Puchong, Selangor

No	Species	Common name	Family
1	<i>Puntius binotatus</i>	Putih, Tebal Sisek	Cyprinidae
2	<i>Luciocephalus pulcher</i>	Pikehead, Ikan Jumo	Luciocephalidae
3	<i>Clupeichthys sp.</i>	Bilis	Clupeidae
4	<i>Rasbora einthoveni</i>	Bada, Seluang, Susur Batang	Cyprinidae
5	<i>Hemiramphodon pogonognathus</i>	Jolong	Hemiramphidae
6	<i>Rasbora heteromorpha</i>	Seluang, Bada	Cyprinidae
7	<i>Sphaerichthys osphronemoides</i>	Biji Durian	Anabantoidei
8	<i>Rasbora sumatrana</i>	Seluang	Cyprinidae
9	<i>Betta pugnax</i>	Sepilai	Anabantoidei
10	<i>Glossogobius giuris</i>	Ubi	Gobiidae
11	<i>Clarias macrocephalus</i>	Keli Kayu	Clarias

however, there were no samples caught or sight observations during the study period. This might be due to the species extinction within the streams of the AHFR or a great reduction in the population size. The results of this study in the AHFR, however, were found to vary from the previous fish biodiversity studies carried out at the same area. Data comparisons by Norini and Ahmad (2007) with the work carried out by Rusli *et al.* (1997) in AHFR revealed that the number of species collected had declined.

The importance of the AHFR, including the forest fish production for the Temuan Ethnic group (subgroup of Orang Asli), was studied by Norini and Ahmad (2007). Based on the findings of their study, it concluded that fishing was not as economically viable as hunting animals (Norini & Ahmad, 2007). As of 2007, the yearly income from fishing in this area was approximately only RM1,200.00, with a total production 51.9 kg of fish sold. Considering the species composition in the AHFR, the disturbed forest is categorized as a commercially poor forest (Isaiah & Ahmad, 2007), but with a rich biodiversity of fish species (Mohsin & Ambak, 1983).

CONCLUSION

The AHFR in Puchong is extremely susceptible to environmental degradation due to decreased water catchment size, which in turn affects the abundance and diversity of the fish species. As it stands, AHFR is still relevant in terms of acting as a shelter for indigenous fish species living within its confines but a coordinated plan between authorities is required in developing and managing AHFR in sustainable ways, particularly in terms of its river systems to negate any further degradation of the fish species. Any further succession of land from the AHFR for commercial use will surely have dire effects on the native population of fish. Degradation can clearly be seen in the downstream portion of the rivers that flow out of the AHFR and are not within the AHFR reserve, while the main fish species found within these areas are introduced species especially tilapia (*Oreochromis spp.*), African catfish (*Clarias gariepinus*) and mosquito fish (*Lebistes reticulatus*), and water quality is also poor due to the many drains adjoining the river that pump sewage into its waters; all these have contributed to the demise of the local fish species. Although only eleven indigenous fish species were found

during the study period, it is important to note that the study was only carried out within a short period of time and with limited resources. Further studies with a longer period should be carried out to identify all the indigenous species within the AHFR and to outline suitable steps to ensure that these fish populations are maintained for future generations.

REFERENCES

- Ahmad Ainuddin Nuruddin, C. N. Hjortso, Norini Haron, Khamurudin Mohd Nor, Awang Noor Abdul Ghani, & Ismariah Ahmad (2007). Introducing Stakeholder Analysis in Malaysian Forestry – The Case of Ayer Hitam Forest Reserve. *Pertanika J. Trop. Agric. Sci.*, 30(2), 131-139.
- Awang Noor, A. G., Norini, H., Khamurudin, M. N., Ahmad Ainuddin, N., & Thorsen, B.J. (2007). Economic Valuation of Timber Resources in Ayer Hitam Forest Reserve, Puchong, Selangor. *Pertanika J. Trop. Agric. Sci.*, 30(2), 83-96.
- Hellawel, J. M. (1986). *Biological indicators of Freshwater Pollution and Environmental Management*. London: Elsevier Applied Science.
- Hua, S. C. (2002). *A Field Guide to the Fish of Tasek Bera*. Malaysia: Wetland International Asia Pacific Publication.
- Ismariah, A., & Ahmad Fadli, S. (2007). Valuation of Carbon Stock Sequestration in Ayer Hitam Forest Reserve, Puchong. *Pertanika J. Trop. Agric. Sci.*, 30(2), 109-116.
- Karplus, I., Szlep, R., & Tsumamal, M. (1972). Associative behavior of the fish *Cryptocentrus cryptocentrus* (Gobiidae) and the pistol shrimp *Alpheus djiboutensis* (Alpheidae) in artificial burrows. *Marine Biology*, 15(2), 95-104.
- Keenleyside, M. H. A. (1979). *Diversity and Adaptation in Fish Behaviour*. New York: Springer-Verlag, Berlin Heidelberg.
- Khan, M. S., Lee, Patrick K. Y., Cramphorn, J., & Zakaria Ismail, Mohd. (1996) *Freshwater Fishes of the Pahang River Basin, Malaysia*. Malaysia: Wetland International Asia Pacific Publication No: 112.
- Lowe-McConnell, R. H. (1975). *Fish communities in tropical freshwaters*. London: Longman.
- Lundberg, J. G. (2001). Freshwater riches of the Amazon. *Natural History*, 110(7), 36-43.
- Mohsin, A. K. M., & M. A. Ambak (1983). *Freshwater Fishes of Peninsular Malaysia*. Malaysia: Penerbit Universiti Pertanian Malaysia.
- Moyle, P. B., & Cech, J. J. Jr. (2004). *An Introduction to Ichthyology*. Upper Saddle River, NJ: Prentice-Hall.
- Norini, H., & S. Ahmad Fadli (2007) The Importance of Ayer Hitam Forest Reserve (AHFR), Puchong, Selangor, to the Temuan Ethnic Subgroup. *Pertanika J. Trop. Agric. Sci.*, 30(2), 97-107.
- Rusli, M., Awang Noor, A. G., & Abdul Rahim, O. (1997, October 14-17). *Indigenous people Dependence on non-wood forest produced: A case study*. Paper presented at International Workshop on Non-wood Forest Products, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.