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Fish Assemblages, Growth Pattern and Environmental Factors in Upper Baleh River, Kapit, Sarawak

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ABSTRACT

A survey of the freshwater fish composition in the upper Baleh River, Sarawak was conducted in 2015. A total of 1,538 specimens, comprising 45 species from nine families were collected using electrofishing devices and cast nets. The family Cyprinidae was the most dominant (62.9%) as well as diverse (42.2%) family, followed by the Balitoridae (31.0%; 31.1%) in the river. The three most dominant species were *Tor tambra* (18.1%), *Lobocheilos ovalis* (12.9%), and *Parhomaloptera microstoma* (11.3%). Shannon's diversity index, Margalef's richness index, and Pielou's evenness index were 2.9, 6.0, and 0.8, respectively, an indication of moderate species diversity. Canonical Correspondence Analysis demonstrate that elevation, stream order and sedimentation were the most significant factors related to fish assemblages in the river, particularly for members of the families Cyprinidae and Balitoridae. The coefficient 'n' value in length-weight relationship for *T. tambra*, *L. ovalis*, and *P. microstoma* were determined as 2.92, 2.72, and 3.15, respectively. *T. tambra* and *L. ovalis* exhibited a negative allometric growth pattern which could be due to food competition whereas *P. microstoma* exhibited a positive allometric growth pattern as mountainous forest stream habitat offers favourable environmental conditions. The Fulton's condition factor of each species indicates that *T. tambra* and *L. ovalis* were in poor condition, whereas *P. microstoma* was in extremely poor condition. It is hypothesized that environmental degradation caused by logging activities have affected the health of the most dominant fish species in the upper Baleh River. Further study should be conducted to determine the underlying factors that are affecting the fish diversity.

Keywords: biological indices, Canonical Correspondence Analysis, condition factor, Cyprinidae, length-weight relationship,

INTRODUCTION

Since the pioneering work of Lelek (1987), the documentation of freshwater fishes in Sarawak has been undertaken continuously (Nyanti *et al*., 1999; Inger & Chin, 2002; Parenti & Lim 2005; Jeffrine *et al*., 2009; Khairul Adha *et al.*, 2009; Nasarudin *et al*., 2010). There are over 600 species of freshwater fish in Malaysia (Froese & Pauly, 2016), and approximately 254 freshwater fish species have been recorded in Sarawak (Kottelat & Lim, 1995; Atack, 2006). However, knowledge on fish assemblages in Sarawak's river is still patchy, as the surveys have been mostly restricted to major rivers in Sarawak (Parenti & Lim, 2005). Due to the difficulties in conducting research in rural areas of Sarawak, studies on the fish assemblages in the upper part of forest streams remain scarce.

A recent study has shown that forest streams in Sarawak are subjected to sedimentation problem, due to logging activities (Ling *et al*., 2016). Fish fauna composition is greatly affected by environmental change caused by natural or anthropogenic factors (Dudgeon, 2000). Teresa *et al*. (2015) demonstrated that changes in habitat, food resources, and physicochemical conditions affect fish community structure in the deforested areas. Freshwater fishes are also facing major extinction risk due to those uncontrolled developments (Kottelate & Whitten