

## SHORT COMMUNICATION

# Distribution of Fish in the Upper Citarum River: an Adaptive Response to Physico-Chemical Properties

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Distribution of fish in river is controlled by physico-chemical properties of the water which is affected by land-use complexity and intensity of human intervention. A study on fish distribution was carried out in the upper Citarum River to map the effects of physio-chemical properties on habitat use. A survey was conducted to collect fish and to measure the water quality both on dry and rainy season. The result showed that distribution of the fish, in general, represented their adaptive response to physico-chemical properties. The river environment could be grouped into two categories: (i) clean and relatively unpolluted sites, which associated with high DO and water current, and (ii) polluted sites characterized by low DO, high COD, BOD, water temperature,  $\text{NO}_3$ ,  $\text{PO}_4$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ , and surfactant. Fish inhabiting the first sites were *Xiphophorus helleri*, *Punctius binotatus*, *Xiphophorus maculatus*, and *Oreochromis mossambicus*. Meanwhile, the latter sites were inhabited by *Liposarcus pardalis*, *Trichogaster trichopterus*, and *Poecilia reticulata*. Knowledge about fish distribution in association with the physico-chemical properties of water is crucial especially for the river management.

Key words: fish, distribution, physico-chemical properties, Citarum River

### INTRODUCTION

Habitat selection in fish community has been a big concern of fish ecologists. Knowledge on this matter is critical because of its significance, mainly in the efforts of riverine resource management and conservation. Research on habitat selection in fish, both in lentic and lotic ecosystems, is abundant. Fish ecologists have identified numerous determining factors which play important role in their distribution along the habitat, either horizontally or longitudinally. Habitat selection in fish can be a consequence of its bio-ecological characteristics, as internal factor, or a result of their interactions with environmental variables, as external factors. For the first factor, diversification in anatomy and morphology, physiology, and interspecific behavior have been considered as the initial step in development and evolution of resource polymorphism (Wimberger 1994; Skúlason & Smith 1995; McLaughlin *et al.* 1999), including habitat types. While for the second factor, presence of predator (Sunardi *et al.* 2005), limitation in resources (Menge & Sutherland 1987), and physico-chemical properties of water are considered to be important factors. Variation in habitat use, in turn expose the animals to diverse and selective environmental pressures which may facilitate changes in development and evolution in physiology and morphology.

Physico-chemical conditions of river have been reported to affect habitat use in fish (Whiteside & McNatt 1972; Hughes & Gammon 1987; Herbert & Gelwick 2003). Physico-chemical properties of water in lotic habitat and its influences on community are determined by a number of environmental variables, such as climate, landscape, and effluent of wastewater. In fact, the presence of fish in a space is a function of pressures of environmental factors, and this adaptation is as a function of, and a cause of, specific habitat preference. Therefore, fish distribution along a longitudinal gradient of a river can be considered as an adaptive response to physico-chemical properties of the water.

A river which flows through urban areas commonly experiences serious water pollution. Like the Citarum River, which is facing a decreased water quality caused by pollution (Parikesit *et al.* 2005), resulting an extreme difference between upstream and downstream, proportional to material input from the surrounding environment.

Study of spatial use in fish community is very useful mainly to understand the population dynamics and community processes. This study was carried out to map the distribution of fish species in the upper part of Citarum River, as well as to evaluate the corresponding environmental factors which is important for river management.

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