

# Bioaccumulation of Heavy Metals in Fish (*Barbodes sp.*) Tissues in the Brantas River, Indonesia

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## ABSTRACT

This study aims to determine the content of heavy metals and their effects on fish (*Barbodes*) tissues in the Brantasriver. Sampling was performed three times, namely in March, June, and September 2016. The samples of fish in this research that the upstream (Reservoir Karangates) and downstream of the Brantas river (Kali Surabaya and Kali Jagir). Fish tissues (liver, gonads, and gills) were collected, analyzed the heavy metal and tissues histopathology, stained with Haematoxylin-Eosin. The results showed that all the tissues of fish that live in the upstream and downstream of the Brantas River contain highheavy metals (Pb and Cr). The highest levels of heavy metals found in succession in the tissues liver, gonads, and gills. Hight levels of heavy metals that damage the structure of cells and tissues of all tissues of the fish. The most damage found in tissues containing the highest levels of heavy metals. Hight of heavy metals in the cells and tissue caused damage and necrosis cells.

**KEYWORDS:** Brantasriver, heavy metal, liver, gonads, gills.

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## 1. INTRODUCTION

Brantas River is located in East Java, is the second longest river in Java after the Bengawan Solo. Brantas River is a very important densely populated area in East Java, Indonesia for agriculture [1]. Theriver plays a role in irrigation along the stream and is habitat for a survival of aquatic biota, including fish [2]. Determination of contamination level of heavy metals throughout the river is important and has a major role in controlling the ecological conditions of its environment [3,4]. Clean up of the contaminations caused by heavy metals based on the natural methods including use of plants such as beech leaves will result in a healthy surrounding life while leaving no negative effects [4]. Biota water that serves as a provider of nutrition for the community and as biological indicators of the health of the fish that ecosystem waters [5]. In the river contaminated by heavy metals may lead to biomagnificationand bioaccumulationin the food chain of an water environment. Such contaminants transported from its sources through river system and deposited downstream. Since most of the pollutants could be mixed and became suspended in bottom sediment [6]. The presence of heavy metals in the river can lead to greater environmental problem when the contaminated sediments resuspended and such metals are uptaken by fish. Hence, consumption of such kind of fish may form a significant pathway to metals contamination in the human being and eventually poses greater health risk.

Brantasriver has detected heavy metals (Pb, Cu, Cr, and Cd). Some heavy metals in waters that enter the body organism is able to bind to receptors on the cellular level. Heavy metals are able to bind to estrogen receptors (metalloestrogens)have to be estrogenic, so it will disrupt and inhibit the function of the endocrine system [7]. In the reproductive system, the presence of heavy metals that are estrogenic can lower the reproductive capacity of the organism, if persists may lead to the extinction of an organism [8, 9, 10].

The existence of this precipitation causes the concentration of heavy metals in sediment is higher than the water above it. Presence of heavy metals in the water when it enters the body of fish can accumulate to all the tissues and tissues of fish [11, 12]. Gills and digestive tract is the first organ that is directly relatedto the heavy metal waters [13]. Furthermore, the flow of blood into the cells and tissues of the body, include the reproductive tissues [12]. Heavy metals are toxic and estrogenic can reduce the ability and the survival of fish [12]. Fish populations decline as many fish that heavy metal poisoning, if this was left unchecked can lead to extinct aquatic organisms.

The problem in this study are different levels of heavy metals (Pb and Cr) on the tissues of fish in the upstream and downstream Brantasriver, difference in levels of heavy metals can damage cells of fish in the upstream and

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