

LEAD AND CADMIUM CONCENTRATION IN CATFISH (*Pangasius polyuronodon*) OF THE LOWER PART OF SIAK RIVER

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ABSTRACT

Siak River is one of four big rivers in Riau Province suffered from anthropogenic substances deriving from various human activities. The substances not only degrade the water quality but also influence aquatic organisms such as fish. The effect of these substances not only directly such as sudden mass mortality of fish but also indirectly through bioaccumulation and biomagnification in fish body which could increase the exposure to public health risks. Study on two heavy metals (lead and cadmium) concentration in fish gill, liver and muscle was conducted in the lower part of Siak River starting from Pelita Pantai to Siak Indrapura. It can be concluded that concentration of cadmium in fish gill in four sampling sites, Pelita Pantai, Maredan, Perawang, and Buatan was exceeded of the acceptable limits by the National Drug and Food Standards of Indonesia, more than 0.2 mg/kg dry weight. The similar concentration was also recorded in the fish liver in Buatan site, and in fish muscle in Siak Indrapura site. To sustain the existence of some economical fish such as cat fish, broad study on heavy metal accumulation in fish organs and its effect on reproduction of the fish should be considered.

KEYWORDS: heavy metals, accumulation, catfish, Siak River

INTRODUCTION

Siak River, known as the deepest Indonesian river located in Riau Province, has been suffered from environmental degradation as a result of some economical activities such as land clearance for either palm oil plantation, agriculture or human settlement, chemical industries, water transportation, and domestic activities. Decreasing in and loss of natural habitat of aquatic organisms and living aquatic resources have been recorded along Siak River since 2003 (Anonymous, 2007). Mass mortality of fish was occurred frequently and it affected fish diversity and abundance. Decreasing in fish size and catch are also faced by the fishermen since 2003. The effect of anthropogenic substances resulted from such economical activities to fish not only occurred in the short term through a sudden mass fish mortality, but it may be delayed to the long term effect through bioaccumulation and biomagnification of certain heavy metals and complex organic compound.

Heavy metals in the environment are brought about primarily by anthropogenic sources although heavy metals are a natural part of the environment and provide numerous benefits to society (Su *et al.*, 2009). Most of the heavy metals that get deposited in most water bodies from urban waste waters, industrial discharges and agricultural runoff (Olojo *et al.*, 2005), oil combustion, internal combustion engines, local point sources, and in direct deposition from air pollution (Su *et al.*, 2009) which commonly found in Siak River.

Discharge of heavy metals into river or any aquatic environment can change both aquatic species diversity and ecosystems, due to their toxicity, and accumulative behavior (Weher, 2008), threat to the existence of organisms thriving in the area, to the ecological integrity of the habitat as these heavy metals may enter the food chains, persist in the environment, bioaccumulate and biomagnify and increase the exposure to public health risks (Su *et al.*, 2009). Aquatic organisms such as fish and shell fish accumulate metals to concentrations many times higher than present in water (Williams & Giesy, 1978; Jayakumar & Paul, 2006; Al-Kahtani, 2009) or sediment (Weher, 2008); they can take up metals concentrated at different levels in their different body organs (Staniskiene *et al.*, 2006; Weher, 2008) and its accumulation was dose, time, and species dependent (Olojo *et al.*, 2005; Weher, 2008).

Cadmium and lead have no known essential role in living organisms but they are toxic at even low concentrations and accumulate most in fish tissue such as gill and liver, kidney and muscle (Weher, 2008, Vinodhini & Narayanan, 2008; Naggari *et al.*, 2009; Akan *et al.*, 2009). These heavy metals are part of eight elements of heavy metals stated by the World Health Organization as well as the Food and Agriculture Organization of the United Nations state that obligatory to monitor in fish (Staniskiene *et al.*, 2006).

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