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CISADANE RIVER-WEST JAVA FOR HUMAN WELFARE AND AQUATIC ORGANISMS

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Abstract

Cisadane River is an important river in West Java. This river has many ecological functions and values for human and wildlife. This research was aimed to identify and to analyze its functions and values for human and wildlife. The exploration method was applied to get data. People along Cisadane River used water for many purposes such as water source for agriculture irrigation and industrial sectors. People always also used the water for domestic purposes i.e. drinking, bathing, cooking and cleaning. Some leisure and sports activities could do in this river. People also captured fishes for food. Two species of Oligochaeta, *Branchiura* sp. and *Lumbriculus* sp., were easily collected for feeding Arowana fish (Osteoglossidae). For their lives, people mined sand from water body and riparia. Unfortunately, lack of awareness of people along the river can threaten its sustainability. Several actions must be applied to conserve this river.

Keywords: Cisadane river, water quality, river conservation

INTRODUCTION

River has multi-functions and benefits for all life forms including human. River plays important roles but pollutants have decreased quality of the water. The pollutants came from mainly human activities. Cisadane River is a main river of Cisadane Watershed. Cisadane River crosses two provinces i.e. West Java and Banten. All activities along Cisadane River have potential contributions to decrease the quality of the water. The sources of pollutants are domestic, industrial, dan agricultural activities. This important river needs to be managed well not just for human but also for aquatic organisms. This research purposed to identify and to analyze its functions and values for human and wildlife.

Study Areas

The study was located in nine (9) points along the Cisadane crosses West Java and Banten (Figure 1). The study was conducted in June 2010 to November 2011. All locations were selected randomly using purposive random sampling method. Three locations for each segment i.e upper, middle and down of Cisadane River. All points in the upper and middle parts were located in West Java Province. Three locations in the river downstream were in Banten Province.

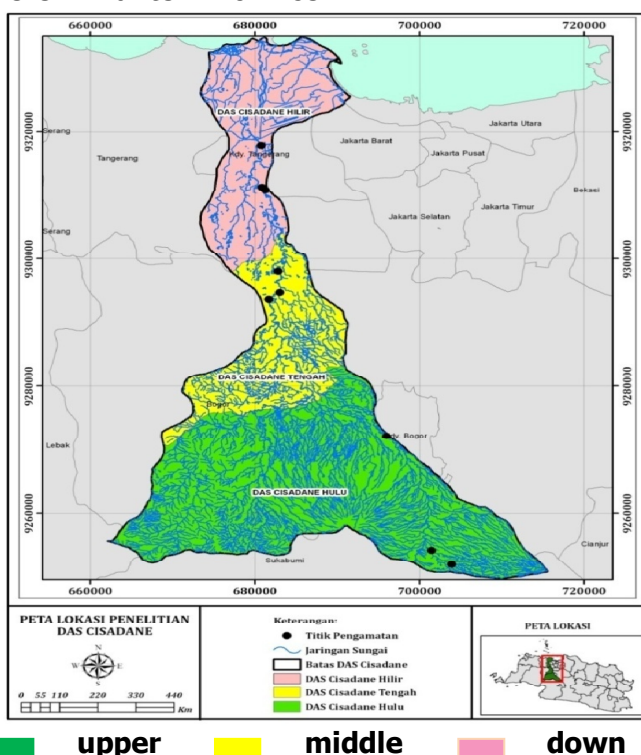


Figure 1. Research locations

RESULTS AND DISCUSSIONS

Cisadane River is a major river of Cisadane Watershed. This river is an important river for the people along the river. People use water as clean water for various domestic needs such as drinking, bathing and washing (Figure 2).

Utilization of river water could be source of pollutants i.e. inorganic, organic and biological pollutants which decreased water quality. Latrines activities caused pathogens organisms such as bacteria, viruses, protozoa and parasitic worms came into the water stream (Abel 1989; Mason 1991; Mara & Cairncross 1994). Thus, the usage of river water for bathing and washing can damage the health of the people due to those pathogens (CPCD 2006). This diseases were transmitted from water, which called the water-borne disease (Mason 1991; Effendi 2003) such as leptospirosis, typhoid fever, cholera (Nemerow 1974; Abel 1989), diarrhea,

worm infections, dysentery, gastroenteritis (Effendi, 2003), poliomyelitis and hepatitis A (Abel 1989). Besides degradation of water quality for human health, lactrine activities also reduced the aesthetic value of the river.



Figure 2. Domestic activities in upstream of Cisadane River

People who applied detergent for washing would pollute the river. Foam detergent may inhibit the diffusion of oxygen from the air into the water. If this happens, the concentration of dissolved oxygen in the river water will decrease. This condition will give negative impacts to biological activity of organisms in the river (CPCD 2006). Organisms in the water need dissolved oxygen for their metabolism activities. Detergents also contain elements phosphorus (P) so that the detergent is a root cause of the increasing P in river (Abel 1989; Effendi 2003).

Feces contain ammonia in the form of ammonia (NH_3) and ammonium ion (NH_4^+). Ammonia (NH_3) is toxic to aquatic organisms. Fish are more sensitive if there is an increasing of ammonia concentration. This compound inhibits the binding of oxygen by the blood. This will result in suffocation (Effendi 2003) or the death of fish due to lack of oxygen in water.

Farmers who lived at the the edge of the Cisadane River, utilized water from the water to irrigate their "sawah", paddy fields. Farmers use fertilizers and pesticides for their farming. Water runoff will carry those contaminants to the river. Fertilizers contain elements Nitrogen (N) and P. Fertilizer into the river would increase the concentration of N and P. The increase of N and P can reduce the quality of river water. High nitrite concentrations are toxic to humans and aquatic organisms. Although nitrate is not toxic, but high nitrate concentrations in drinking water can cause blue baby syndrome. Nitrate in infants will reduce the capacity of blood to bind oxygen (Effendi 2003). Pesticides that enter to the river, were carried by water runoff from farms used pesticides or from industry.

Pesticides have sublethal and accumulative impacts to the individual in the food chain. The impacts of pesticides to different organisms are various. The impacts could be high toxic, intermediate or not important to others (Abel 1989).

Cisadane river has some economic uses. People can move to other places efficiently by using simple transportation mode such as raft, *rakit*. They also get animal protein such as fish and shrimp (*Macrobrachium* sp.) from the river. People used several fishing gears such as fishing line and nets (Figure 3a-b). Some kind of fishes are found in Cisadane watershed such as *Oxyeleotris marmorata* in Cisadane River (Warjono 1990) and *Mystus nemurus* in Cikaniki River, a tributary of Cisadane (Paryono 2005).



a Fishing with line gear at downstream



b Fishing with net at upstream

Figure 3 Fishing on Cisadane River

In the downstream, in Serpong area, the people caught silk worms to feed Arowana fish (Figure 4). The silk worm was found abundantly in the down part because the live in appropriate environment to support their life (Abel 1989). The slow current, high concentration of N and P and muddy substrate are good things to support the growth of benthic organisms such as *Branchiura* sp. and *Lumbriculus* sp.



Figure 4 Catching silk worms (*Oligochaeta*) in Serpong, down of Cisadane River

At some places i.e Sindur District, people did sand mining activities in the river Cisadane (Figure 5). The results of the sand mining will be greater in the rainy season than dry season when the river brings the sand from upstream. Erosion in the upstream will be bigger in the rainy than dry season. This sand mining was also carried out in riparian zone of Cisadane River. After mining activities were completed, people will change those areas into rice field or into the garden.



Figure 5 Sand mining in Sindur District, middle of Cisadane River

Mining activities in river or in riparian zone will increase sedimentation and turbidity of river, increase the temperature of the water and degrade riparian vegetation (Brown et al. 1998; DID 2009). Sand mining also impacts directly on the river substrate. Changing in river substrates will give negative impacts to stream organisms such as fish and macrozoobenthos (Brown et al. 1998). Fishes have different habitat needs in their life stages (Haslam 1990; Chovanec et al. 2003). The fishes rarely occupy the same habitat in each life history (FAO 1998). Fish serves as a sensitive indicator for changing of their spawn habitat (Chovanec et al.

2003). If there is a substrate changing the fish will not be able to lay eggs. This will cause the death of fish that needs substrates such as rock/sand to spawn. Organisms preferred to sand substrate will be replaced by other organisms that can live in muddy substrate (Brown et al. 1998). Not only fish, but also insects crawled on the surface of the sand substrate will be lost and will be replaced by organisms like muddy substrate such as leeches, Oligochaeta and Molluscs (Abel 1989). If the insects are gone, the fish will be lost due to the loss of the fish food (Haslam 1990; Brown et al. 1998).

Sand mining in the river provides benefits for the people because people can earn money from selling sand. However, the uncontrolled sand mining can reduce the diversity of organisms and fishery productivity of Cisadane River. This mining activities can threaten ecological functions of riparian vegetation which protect Cisadane River. Local government should give more pay attention to this activities.

CONCLUSION

This river is important for the river organisms such as fishes. This river has main role for people. River gives them clean water for many purposes i.e. agricultural irrigation, industrial sectors, and domestic activities. People also earn money from sand mining in the water body and in riparia. All these activities in fact could decreased the river quality. The pollutants from human activities will enter the water. The mining will change the substrat that threat organism in water and in riparia. The regulation should be applied properly to conserve this river. Sand mining and conservation in upperstream are the important issues that should be managed by governemnt.

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