



ENVIRONMENTAL VALUE OF RIVER BANK

N. Pertiwi

Universitas Negeri Makassar

[nurlita.pertiwi@unm.ac.id](mailto:nurlita.pertiwi@unm.ac.id)

ABSTRACT

*This article describes about the environmental value of riverbank. The area of the left and right borders of the river, riverbank has many values to the river quality. Based on the results obtained literature study, there are four environmental values of riverbanks. The first value as a buffer zone to maintain a stable function of the river. Functions related to the river flow velocity, erosion and sedimentation. Vegetation on riverbanks affect the position of silt are carried by runoff. Riverbanks with cover crops that can capture the mud and prevent drainage of mud to the bottom of the river. Furthermore, vegetation will prevent sedimentation in riverbed. The second value is riverbank has benefit to prevent of flooding. Water absorption of land in riverbank can prevent the increasing of velocity of river flow. The impact of high velocity of flow effects the incidence of flooding in downstream area. The third value is conservation area and biodiversity. The area along the river with sediment soil conditions has high nutrient, it facilitates the growth of various vegetation or biodiversity. The fourth value as environmental education tools for the community.*

**Keywords :** riverbank, environmental, community

INTRODUCTION

The river is a main source to fulfill the basic needs of drinking water and irrigation. Due to multifarious anthropogenic activities has created havoc to the river health (Yadav, Kumar, & Sharma, 2014). The function of river ecosystem must always ensure both on quality and flow. The poor quality the flow marked with excessive flooding or the overflowing of tributary to land around. Discharge flow on the rainy season excessive and can not be accommodated by the body of river or exceeds the capacity of the river. The flow of water excessive also can cause landslide and caused enlarge transportation sediment (Pertiwi, 2011).

Riverbank as part of floodplain has many function of river ecology. Vegetation in the area were into splints sustainability the function of river by holding out or capture mud that eroded and other elements of chemicals including pesticide and fertilizer carried away and prevent

them entering to river body (Pertiwi, 2011).

Riverbanks or riparian area has a variety value for river stream quality. Characteristic of river are associated with aquatic river system with the condition of the soil, vegetation and other factors that affect the interaction of aquatic and terrestrial. Specifically, riparian drainage can accommodate pesticides and fertilizers into water bodies and as the habitat of plants and animals. (Svejar, 1997)

Control of riverbank using is set to the Minister of Public Works and Housing of the Republic of Indonesia Number 28/PRT/M/2015 about Determination Line Border for Rivers And Lakes.

The policy outlined that riverbank is the space between the edge of the riverbed and foot embankment in located on the left and or right of the riverbed. The next line of riparian is invisible line on the left and right of the riverbed is set as the limit of the river protection

Based on the information above, it appears that riverbank is very important for human life, meanwhile it have

substantial environmental benefits in the protection of the river. Therefore, this article describes about information from literature review and conclude the environmental value of riverbank.

**DISCUSSION**

**Environmental Value of Riverbank**

**a. Maintaining the stability of the river function of the river.**

River functions can generally be divided into two parts, namely the maintenance of water quality and flow stability. The water quality of the river indicated by physical characteristics, chemical and biological. Physical characteristics are marked with turbidity, color and temperature. Chemical characteristics marked by the level of acidity (pH) and the amount of oxygen in the water (CO, BOD and DO). Biological characteristics marked with the content of waterplant and pathogenic microorganisms.

Flow stability of river indicates stable flow or state discharge. The large flow rate cause a large impact on the incidence rate of erosion, landslides and floods. Rivers has five natural function, namely: 1) The function of the transport stream that is the flow of rain water along with sediment transport, 2) The function of surface water resources, 3) Function catchment on industrial waste, agriculture and settlements, 4) The function of habitat for aquatic biota and 5) the natural function of the natural protective barrier. (Men & Liu, 2009).

As the element in hydrological cycle, the river becomes the accumulated three types of runoff that surface runoff, interflow and groundwater runoff. (Suyono & Takeda, 1999) Rainwater that falls to the ground partially infiltrated and partly fill the contours of the ground, and then flows into a lower area and into a river. The flow of water is surface runoff. The

flow of intra based on absorbed by the soil and exit back to the river. Groundwater runoff came out slowly in the long term low to the ground (Pertwi, Astika, Sapei, & Purwanto, 2011).

Riverbanks or areas on the left and right edges of the river is an area that is considered in the improvement of ecological functions of aquatic and terrestrial, water quality, hydraulic and morphological river. Three benefits riverbanks namely conservation, water quality protection and maintain meandering. As conservation areas, riverbanks overgrown with a variety of vegetation, both crops low and annual plant. Protection of water quality of the river by the vegetation is grass growing on the banks withstand the influx of chemicals or agricultural waste and settlements entered the water bodies (A Maryono, 2005) , Large trees as annual crops can cool river water and protect the surrounding region. The water temperature of the river affect aquatic life. High river water temperatures are not good for the life of fish and other biota. the optimal temperature range for fish life is 28°C-32°C (Siahaan, Indrawan, Soedharma, & Prasad, 2011). In addition, the strong roots of the vegetation, will protect riverbanks from erosion. Hence, the ecology along the river is very influential on the quality of the river. Good physical condition, as well as chemistry and biology of the quality of the stream. (Figure 1)

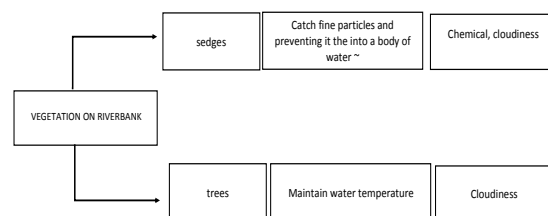


Figure 1. Values as a buffer zone along the river

**b. As the area of flood prevention**

Excessive flooding or overflow in river caused by the open dynamics of streams. Stream pressure of water from the surface of a large area is the accumulation of the flow of water catchment areas. If catchment area able to reduce the surface flow or low absorption of water, the river flow greater. Catchment areas with low infiltration caused by settlement or land use on marginal lands. The ideal conditions of water catchment areas that sustain the hydrological condition of the forest ecosystem. However, it is difficult to maintain due to the use of natural resources excessively.

Conversion of forests can affect hydrological processes and water balance, especially in the river as a natural drainage system. (Lipu, 2012). Therefore, river management should be integrated with watershed management. (Figure 2)

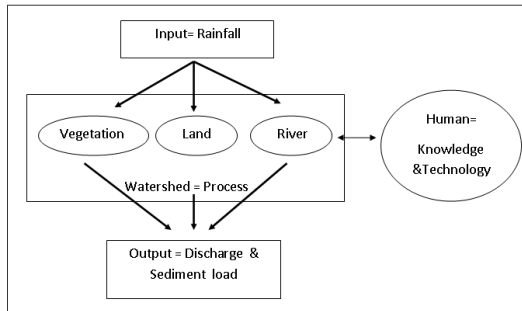


Figure 2. Watershed Ecosystem (Pertiwi, Astika, Sapei, et al., 2011)

Watershed management aims to maintain the environmental services that it provides in terms of balance hydroorology systems in nature. The balance shown by water quantity, water quality, the ratio of maximum and minimum discharge and ground water level. Indicators watershed ecosystem balance is strongly influenced by the condition of vegetation, soil quality and the condition of the river (Pertiwi, Astika, Sapei, et al., 2011)

The riverbank is a small part of the watershed must also be managed properly. Various publications illustrates that the

width of the river banks can be a media flood prevention (Table 1)

Table 1. Function of Riverbank as Flooding retention

Publication/Author	The wide border river relate to the delivery of room for flood meandering	
	Width of Riverbed <sup>⊕</sup>	Width of Riverbed function
Swardon & Felleman, 1996	The width is twice of canopy trees in the river side	To give space for meandering
Verry, 1992 in Divilbiss, 1994	150 ft = 45 m	Flooding protection
Bertulli, 1981 and Castelle et al, 1994	(50-90) m	Flood Protection for over 100 years In forest areas can reduce the increase in flow rate fluctuations
Lynch & Corbett, 1990	115 ft = 30 m	Maintaining the aquatic systems of river stability
Lewis, 1998	120 ft = 36 m (2 x 18m = 36 m)	protect from meandering movement & Flooding
Resume	(5-90) m	

(Agus Maryono, 2009)

Based on the table 1. It appears that the riverbanks should be protected is at least 90 meters. Furthermore, based on analysis of hydrology and hydraulics of the river, also can be calculated reduction of river flow.

In small rivers in Kabuopaten Soppeng obtained calculations, the optimal width of the banks which varies for each area is between 100 meters to 150 meters in diameter vegetation a minimum of 10 cm and 20 cm. By managing the riverbanks, the water level along the river does not exceed 2.5 meters and the flow rate can be reduced by up to 76% (Pertiwi, Astika, Sapei, et al., 2011).

**c. The Area Of Conservation And Biodiversity**

As the effort to preservation of natural resources and ecological balance, conservation must also be able to ensure the utilization of natural resources in a balanced way. In large cities, the river banks used as settlement so that the absorption of water into the ground is relatively small. This causes the riverbank does not function as a water conservation area or the flow of water stored inside the water bodies. In this condition, the

sustainability of the flow is difficult to maintain and drought occurs during the rainy season. Whereas the amount of surface flow causes the debt, the greater the flow of the river and caused a flood. If the system is ecological and hydrological river border is interrupted such as structural levees, normalization and structural weir changed the border area and disturb the ecological functions and hydrological vital will be damaged (Hidayat, 2009)

In the aspect of soil conservation, runoff large surface brings with sediment transport and flow in the water body. The flow of water with high sediment transport may increase the incidence of soil erosion or even mudslides on the riverbank. In the aspect of biodiversity, ecological function of vegetation along the river is a habitat for flora and fauna and as a store of soil nutrients (Pertiwi, Astika, & Sapei, 2011).

Naturally, the river vegetation component will provide the plant humus or manure from sedimentation process. Furthermore, the vegetation also serves provider of nutrients for the river fauna. Based on the description, the components of riverine vegetation should be preserved as conservation of water and soil. (Figure 2)

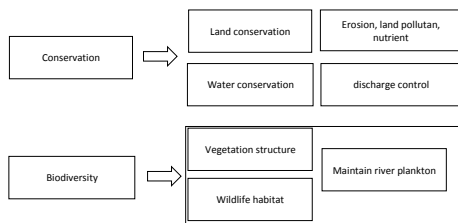


Figure 3. Konservation and biodiversity in Riverbank

**d. As area of environmental education for the community.**

In daily life, there is a close relationship between human and river. Humans need the river to support its water needs. Conversely where the river can also be affected by human activities. Thus, in

the management of the river, man becomes the main focus. The management of natural resources involving the community can be done with two approaches that structural and non structural approaches. Structural approach directed at well-organized structure and system of relationships between all the components and systems of human life as well as related supporting components, including components of social, economic and physical. By structuring approach, the community is expected to get wider chance to be able of using natural resources in a sustainable manner. Non-structural is an approach that involves human beings as subjects who have the ability to act according to his will. Such an approach assumes that the local people with the knowledge, skills and awareness can enhance its role in the protection of natural resources around them. Therefore, one of the efforts to enhance the role of local communities in the management of natural resources is to increase the knowledge, skills and awareness to do something to help protect natural resources (Nurmalasari, 2013).

For the development of community participation, the needed environmental education for the community. Environmental education is directed to develop knowledge and motivation and human skills for use and conservation of natural resources appropriately. Furthermore, environmental education is the process of recognizing values and clarifying concepts in the inter-relatedness among man, his culture, and his biophysical surroundings (Pertiwi, n.d.). Specifically, the area along the river which is a barrier between human life and the flow of the river is well understood by the public character. But with the demands of the human need for land led to the utilization of the river banks and protect the river can not be controlled. With their knowledge, the motivation of public wil increase to maintain river.

The fundamental reason for the willingness of the community in the management of land along the river is the protection of bank erosion and improving the quality of the harvest. In addition, the motivation to protect land and settlements around from flooding also be a driving force public participation (Pertiwi, Astika, Sapei, et al., 2011).

Based on the above, people who live on the riverbanks should be educated to involved in river protection. Furthermore riverbank can be using as educational media environment. With an understanding of the impact of human activity on the sustainability of the river as well as the motivation of maintaining the land assets, then the public will participate in the management of the riverbanks

## CONCLUSION

Various environmental values on the banks of the river described above are:

1. Riverbank as a buffer zone to maintain a stable function of the river. Functions related to the river flow velocity, erosion and sedimentation. Vegetation on riverbanks affect the position of silt are carried by runoff.
2. Riverbank has benefit to prevent of flooding. Water absorption of land in riverbank can prevent the increasing of velocity of river flow. The impact of high velocity of flow effects the incidence of flooding in downstream area.
3. Riverbank as area to develop of conservation area and biodiversity. The area along the river with sediment soil conditions has high nutrient, it facilitates the growth of various vegetation or biodiversity.
4. Riverbank as environmental education tools for the community.

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