Influence of Local Wisdom to Prevent Disappearance of Cebong Lake in Sembungan Village Wonosobo District

Putri Nurfahmia, Rizal Faozi Malika, Ratih Paniti Saria, Afid Nurkholis

^{a)} Gadjah Mada University,
Bulaksumur, Yogyakarta 55281, Indonesia

Abstract: Dieng Plateau which is located in Wonosobo district is has more than 2000 masl region. Lake in Dieng Plateau were formed by volcano activities, include Cebong Lake. This lake is located under Pakuwojo, Saroja and Sikunir foot mount. Sedimentation is eminent problem in Cebong Lake, because it may silting up and repeal the lake. Disappearance of Cebong Lake would threaten any human activities whose trade on its resources especially for farming activities as the main activity in this region. In addition, inhabitants want to preserve Cebong Lake. Therefore, they have to be a wise to environment. Methods used in this research are direct measurement of bathymetry mapping using echosounder, interpretation of suspended sediment in Cebong Lake, and interview. Result from this research is the lifespan prediction of Cebong Lake to supply water resources for farmers. In addition, it is concluded that local wisdom re-actualization is important to gain longer life span of the lake and impede its disappearance.

Keywords: local wisdom; Cebong lakes lifespan; bathymetry; sedimentation.

1. Introduction

Lake in Dieng Plateau were formed by volcano activities, include Cebong Lake. This lake is located in Sembungan village Wonosobo district, Central Java, Indonesia. This lake located under Pakuwojo, Saroja and Sikunir foot mount. The characteristic of this lake is eutrophic lake. Land use in the lake environment (Pakuwojo, Saroja and Sikunir mount) is agriculture land with potato as the main vegetation. Agriculture develop rapidly in Dieng Plateau. Because of that, deforestation be something that can't be reined. The land conversion caused the land erosion intensively, especially at three decade ago (Setiawan, 2012).

This condition become special attention for limnologist, because precipitation in Dieng Plateau is high up to 3917 mm/year (Andiana, 2007). It may cause big land erosion and enter the lake due to the land use. Dieng has a high rate erosion up to 9,2 kg/m² at the potato agriculture area (Setiawan, 2012). Sedimentation is eminent problem in Cebong Lake, because it may silting up and repeal the lake.

Catchment area around Cebong Lake has slope up to 30-40% with potato agriculture land use. Potato agriculture area located around Cebong Lake has contribution to increase erosion rate. Run off from catchment area take the sediment along and it's accumulated in the lower land, it is Cebong Lake.

Sedimentation may influence any important thing in the Cebong Lake ecosystem. Decreasing of Cebong Lake's life span is one consequence of the sediment accumulation so it may decrease the water capacity in the lake. This sediment accumulation also may cause the disappearance of Cebong Lake. In addition, sedimentation also has side-effect for water quality in the Cebong Lake like Dissolve Oksigen

(DO) or any chemical content in the water of Cebong Lake due to fertilizer utilizing. Fertilizer utilizing also may cause eutrophication, over fertility. Water ecosystem in Cebong Lake may disturbed. The example is decreasing of fish population in Cebong Lake, its mean that water quality in the Cebong Lake is decrease.

The detriment of physical environment is related with human behavior. This detriment can be prevented by human empowerment on local wisdom. The value of togetherness in local wisdom regarding human behavior with others include with the environment (Santosa, 2011). The balance of natural resources usage and conservation produce the sustainable development. Actualization of local wisdom keep natural resources to be useful not only for present but also for the future. The purpose of this paper is to find out the local wisdom of Sembungan village to carry out Cebong Lake. This paper also discuss about physical characteristic of Cebong Lake.

2. Method and Theory

2.1 Lake and Sediment

Lake/ pond/ reservoir can be defined as an enclosed body of water surrounded by land and has no access to the sea (Thomas et al, 1992). Lake has many functions, among others as a raw source of drinking water, irrigation, power generation (hydropower), fisheries and so forth, so that the lake plays an important role in the economic development of the region (Pusat Litbang Sumberdaya Alam, 2012). According Suyono (2004), a body of water can be referred as a lake if :

- 1) deep enough to form a vertical strata of water temperature;

- 2) the floating vegetation is not sufficient to cover the entire surface of the water and just cover the edge of the lake;
- 3) it showed waves that could form the barren or wave swept shore.

Sediment is the result of various erosion process, either because of cliff erosion, soil erosion, or other erosion. That erosion then transported and flows into the lower place to the lake by surface flow (Manalu, 2012). Sediments in Cebong Lake can be rotten by potato crop and plants that died and decomposed by bacteria that live in the Cebong Lake.

2.2 Local Wisdom

Local Wisdom is any understanding, confidence, knowledge, insight, customs, and ethics as the reference, as well guideline guiding humans behave in life at ecological community. Cultural landscape is a real appearance of the interaction, adaptation, and adjustment of the human with the natural environment (Santosa, 2011). Different physical environments would produce different social conditions.

2.3 Method

Methods used in this research are direct measurement of bathymetry mapping using echo-sounder, interpretation of suspended sediment in Cebong Lake, laboratory analysis and interview. Echo-sounder is an instrument for measuring the depth of water or a tool for sounding activities. This tool can measure the water depth from the surface of the water until the water base. Results from the echo-sounder is the depth point that is processed into bathymetric map (Bruinsma, 1997). Advantages of echo-sounder is able to record continuously from one point to another point. Echo-sounder can distinguish the materials of mud, clay, or sand and the layer thickness can be estimated.

To predict the remaining life of a lake can be calculated by the amount of the average entry of sediment into the lake minus sediments output in one year, then multiplied by the number of years of lake operation (Nursa'ban, 2008). The results of these calculations can obtain lifespan prediction of the lake. Measurements of sediment in Cebong Lake can use the bathymetric data with temporal measurement so it looks the addition of sediment each year and can predict capacities of Cebong Lake. Laboratory analyzes performed to determine the substances that contained in the lake. Parameters used are pH, DHL (electrical conductivity), TSS (Total Suspended Solid) and TDS (Total Dissolve Solid). The last method is interview. The interviews were conducted using depth interviews individually.

3. Social Characteristic

Sembungan village has a socio-economic uniformity. That uniformity form of livelihood which produce similarity of needs. The main requirement of agrarian society in Sembungan village is irrigation water.

Irrigation water supply in Sembungan agricultural areas comes from two sources. Rain as a source of irrigation water in the rainy season and the lake as a source in the dry season. Cebong Lake is a natural resource which is used together.

Based on interviews with several people in the Sembungan village, can be described some information related to the preservation of Cebong Lake. That information is about tradition are still maintained by people in Sembungan village, such as cleaning the Cebong Lake during the *Sya'ban* month, *nyadran*, shaving *gimbal* kids, *mujahadah*, and *marawis*. In addition, there are some rules related to the treatment in Cebong Lake, such as people are not allowed to swim in the lake, haven't to throw garbage on the edge of the lake and liquid waste of potato farming banned to entered into the lake. That rules does not directly impact on the conservation of Cebong Lake. However, if these activities are strictly obeyed and implemented, there would be real impact on the existence of Cebong Lake.

The most lately prominent issue in the Cebong Lake which initiated by the society and the government is making of integrated waste irrigation channels of potato farming. The irrigation channels are at the edges of the Cebong Lake and drain off the waste directly into the outlet of Cebong Lake so it could not enter the lake. The manufacture of irrigation channels are an integration between local wisdom and technology. Technology makes local wisdom more optimally to provide more real benefit. The benefits of irrigation channels are the sediment and pesticides does not enter into the lake so the condition of lake morphology still natural and far away from sedimentation which makes silting the lake. If the silting of the lake can be prevented, it can be said that Cebong Lake can be more sustainable.

4. Physical Characteristic

Sembungan is the highest villages on the Dieng plateau. The village is located at an altitude of 2300 m above sea level and the climate is cold with temperatures 14-23°C. The most productive land for the cultivation of potatoes are on the slope 2-15 degrees which covers 15.77% region with topography wavy until hilly, which is around Cebong Lake (Arbangiyah, 2012).

The first interpretation of physical characteristic using satellite image produce the area of Cebong Lake which is 84847,85 m². In addition, bathymetry

measurement produce the bathymetric map of Cebong Lake (Fig. 1). It show that average of the depth of Cebong Lake is 2,179 m.

Results of laboratory tests on variables TSS and TDS (Table 1) shows that the water of the lake is still normal. Compared with water quality standards

of freshwater fish farming, livestock, and irrigation (PP 82 in 2001), the water is still under standard. These data indicate that the function of irrigation canals were built around the lake was optimal in order to prevent the entry of sediment into the lake.

Figure 1. Bathymetric map of Cebong Lake. Source: Field Measurement (2015) Table 1. Distribution of Suspended Sediment in Cebong Lake

No.	Depth	Sample's depth	TDS (mg/l)	TSS (mg/l)
1	2.5	0.8	196	30.1
		0.2	244	18
2	3.5	0.8	212	20.2
		0.2	172	21.3
3	1.75	0.8	128	12.3
		0.2	232	9.2
4	2.6	0.8	192	14.8
		0.2	212	34.3
5	1.5	0.6	216	24.8

Source: Laboratory Analysis (2015).

5. Conclusion

As an eminent problem, sedimentation in lake can't be solved without local people contribution. This research shows that sediment rate in Cebong Lake is not apprehensive. Nowadays agriculture system in Cebong lake environment is comprehensive with drainage system which minimalized sediment enter the lake. Drainage system building by local people is one result of technology and local wisdom

integration. This integration may preserve Cebong Lake and impede its disappearance.

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