INTRODUCTION

Uncontrolled land use of the upper Cimanuk watershed causes a decrease in river water quality. The status of the average water quality in Cimanuk River based on the Water Quality Standard is heavily polluted where the parameters of Total Suspended Solid (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), detergent, stool, nitrate, nitrite, sulfide, and Dissolved Oxygen (DO) has exceeded the class II water quality standard (Environmental Management Agency of West Java, 2012)

The heavily polluted Cimanuk water quality is also mentioned by Yuanda et al. (2012). In the condition of water quality is weighted heavy, if there is addition of pollutant load into the waters then the waters are no longer able to accept pollutant load.

The upper Cimanuk watershed is dominated by agricultural activities as much as 72% of the existing land area. Agricultural activities have contributed as the largest pollutant source besides livestock and industry. 10% of dryland farming is on very steep land, 32% of dryland farming and 25% of rice fields are in steepslands, 42% of dryland farming and 33% of rice fields are on rather steep. Agricultural on land with a very steep slope up to a steep slope, has greater potential than sloping and flat. The erosion of topsoil is a major source of pollutants from dryland farming. Increased agricultural activity by 10% can decrease the capacity of 12.55%. If the agricultural activity of 10% is converted to forest then there is an increase of capacity as much as 8%. Restrictions on the size of agricultural land need to be done to prevent the decrease of river water quality. It can be done by arranging the layout of agricultural land so as not to reduce agricultural productivity.

METHODOLOGY

Research Location

The research location covers 2 administrative areas of Sumedang and Garut regencies. The upper Cimanuk watershed area from the foot of Mount Papandayan up to a height of + 750 m (a.s.l). It located between 107°42’16” - 108°10’54” EL and 06°45’00” - 07°24’30” SL with an area of ± 152,982 , 67 ha (Territory Agency of Cimanuk Cisanggarung Rivers, 2013). The location of the research can be seen in Figure 1.

Analysis of Load pollutant potential

Analysis of pollution load potential based on land use as emission factor. Potential pollutant loads of agricultural activities affect the parameters of BOD, N, P, TSS, and pesticide. Analysis based on land use as an emission factor (Fatmawati et al., 2012).

Analysis of Load Capacity

Method for determining the load capacity of water pollution on water source using QUAL2Kw model (Pelletier et al. 2006). QUAL2Kw modeling applies the process of dissolving oxygen dissolution (deoxygenation) due to bacterial activity in integrating
All three locations have a heavily polluted status. Boyongbong is -75, Sukaregang equal to -85, and Wado equal to -88.

Based on storet analysis, water quality of Cimanuk upstream for rice fields are on rather steep land. The rest on the land is flat and on very steep fields. 42% of farming land agriculture and 33% of dryland farming and 25% of rice fields sloping at 11.20%, and flat at 22.4%. 10% of dryland farming is very steep at 29.99%, steep at 15.60%, rather steep at 20.81%, and flat at 0.03%.

The upper Cimanuk watershed pollutant load is influenced by land use as pollution load pollution factor. Pollutant load potential calculations also consider the activities of communities in the basin area. These activities include livestock, industry and domestic activities (residence, hospitals, & hotels).

**CASE STUDY**

The upper of Cimanuk watershed land use can be seen in figure 2.

![Figure 2: the upper cimanuk watershed land use map](Image)

Sources: Planology and Forestry Agency, 2013

The upper Cimanuk watershed land use consist of forest 20.42%, dryland farming at 47.01%, rice field at 24.25%, plantation at 1.15%, bushes at 0.72%, residence at 6.43%, and watering at 0.03%.

Agriculture on land with a very steep, steep, and rather steep slope, has greater potential than sloping or flat. The erosion of topsoil is a major source of pollutants from dryland farming. It also has the potential to increase TSS in river waters. The area adjacent to the river is dominated by rice fields. This causes the potential of pollutant load, especially pesticides that enter the waters.

The distance from the pollutant source to the river affects the amount of pollutant load of river water. If the location of the polluter source is far from the water, it is possible to have self purification before entering the river.

The contribution of agriculture as a source of pollution is seen in the high value of BOD and TSS. High BOD shows the high organic material entering the river. The source of pollutants comes from the erosion of humus on dryland farms. TSS illustrates the high rate of erosion on farmland. Based on the results of analysis of domestic waste pollutant sources illustrates that the contribution of domestic waste to the increase of BOD is only 2%. This explains that the main cause of high BOD is agricultural activities.

Agricultural activities should be conducted in areas with flat, sloping and slightly steep slopes to minimize the occurrence of humus and soil erosion. Agricultural activities should be carried out in areas far enough from the river that allow agricultural waste to decompose before entering the river. This should also be balanced by maintaining the water quality in the tributaries to support the occurrence of self purification.

**ANALYSIS OF LOAD CAPACITY CHANGES**

Based on the analysis of Qual2Kw illustrates that all sections of the river have exceeded the standard quality of class 2. Increased agricultural activity by 10% can decrease the capacity of 12.55%. If the agricultural activity of 10% is converted to forest then there is an increase of capacity as much as 8%. This happens because the forest is also a source of pollutants so that it becomes a contributor in the decline in capacity.

If it is converted to settlements, livestock and industry, the rising pollution load depends not only on the area of land converted but also the number of pollutants.

**CONCLUSIONS**

The area of agricultural land in the Upper Cimanuk watershed is 42% and agricultural activities contribute 23% of all pollutant sources. Restrictions on the size of agricultural land need to be done to prevent the decrease of river water quality. Prevention of river water quality degradation can also be done by arranging the layout of agricultural land. It does not reduce agricultural productivity.
REFERENCES


