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# STUDY OF THE EFFECT OF RIVER BASIN MORPHOLOGY CHANGE ON THRESHOLD PARAMETERS IN CIMAHI FLOOD EARLY WARNING SYSTEM

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## BACKGROUND

Flood early warning systems are used for flood disaster preparedness to reduce disaster risks. The system uses threshold parameters to provide flood information quickly to communities and stakeholders via telemetry networks. The commonly used threshold parameter is the river water level. In Cimahi flood early warning system, there are two parameters of threshold that is river water level and rainfall. The problem that happened was flooding but the warning alarm did not ring. Based on field observations, this occurs because the change in threshold parameters where the water level that causes the flood is lower than the threshold water level that has been set in the system. Similarly for threshold rainfall parameters, floods occur before the precipitation reaches the threshold limit.

## PURPOSE

The purpose of this research is to determine the influence of river basin morphology change on threshold parameters in flood early warning system. The river morphology parameters reviewed are bed river elevation, land cover and river border. Change of bed river elevation effect on river water level measurement while change of land cover affect the magnitude of runoff coefficient. Changes in river borders occur in urban areas that use river banks for construction and activities. The relationship between changes in river basin morphology parameters to the change of threshold parameters can also be used as a guide in river management and flood control.

## METHODS

This research was conducted by field data analysis using mathematical model to get correlation between morphology parameters of watershed and threshold parameters of flood early warning system. There are 15 cross-sections of the river that are used scattered in the upstream, midstream and downstream areas of Cimahi river basin, and then one of the cross section of the river is determined as a threshold. The measured hydraulic parameters are the flow depth, flow velocity and the slope of the river bed. The land cover analysis was conducted using the Cimahi river basin land use map to determine the runoff coefficient. Water level of the river on the threshold cross section and the rainfall threshold are determined using the rainfall runoff model where the direct runoff discharge is determined by the convolution method which is the function of effective rainfall and unit hydrograph.

## RESULTS

The results of this study indicate that the morphological changes of the watershed significantly influence the parameters of the threshold. A 0.5 m rise in river water level can reduce river capacity by 14.3% and narrowing of the 2 m-wide river border lowers river capacity by 11.6%. If it occurs at the same time as the rise of the river basin as high as 0.5 m and the narrowing of the 2 m wide border then the decrease of river capacity up to 35%. The runoff coefficient affects linearly to direct runoff discharges. An increase of the drain coefficient of 17% increased the direct runoff rate by 17%. If the change occurs simultaneously ie the elevation of the river basin as high as 0.5 m, the narrowing of the river border by 2 m and the increase of drain coefficient of 17% then the river capacity will decrease by 45%. The maximum capacity of the Cimahi river in the downstream section of the threshold section is 269 m3 / s. The unit hydrograph for the downstream sections yields a peak discharge of 3.5 m3 / s. With a drainage coefficient of 0.57 and a maximum downstream cross section load of 269 m3 / s, a 135 mm threshold rainfall is obtained.

## CONCLUSION

The morphological changes of the watershed with three parameters: bed river elevation, river border and land cover reduces river capacity up to 45%. Reducing this river capacity makes the threshold parameters in the flood warning system invalid causing flood events can not be detected early by the system. To obtain a more valid flood early warning system, some threshold parameters can be overridden, ie, bed river elevation, land cover and river border. Flood early warning system with one threshold parameter ie river water level is a flood early warning system that does not have preparedness for morphological changes of watershed that will always occur in a watershed so that the system with one of these threshold parameters if no improvement will be no serves for flood preparedness.

*Keywords*: *Flood. threshold. water level. watershed . morphology*

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