

**UNESCO-IHE
INSTITUTE FOR WATER EDUCATION
AND
SRIWIJAYA UNIVERSITY**



**ANALYSIS AND EVALUATION OF URBAN DRAINAGE
AND FLOOD PROTECTION PROBLEMS IN SURABAYA
CASE STUDY: EAST SURABAYA**

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by
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SUMMARY

In general, Surabaya can be divided into three topographic areas, which are areas with elevation up to 5 m+Mean Sea Level (+MSL), 5-20 m+MSL, and above 20 m+MSL. The first category is located in the eastern, central and northern portions of Surabaya, while the second and third category are located mostly in the western portions of Surabaya. As a lowland area, East Surabaya is threatened by floods, which are worsened by tidal fluctuation.

By development, Surabaya became a metropolitan city to support the activity of its inhabitant. The urban area then developed to the eastern and western part of Surabaya. The agricultural area was changed into residential area, but still there is insufficient infrastructure, such as urban drainage and flood protection systems. Related to those problems, this study is done to analyze the existing drainage and flood protection systems in Surabaya; to study the effect of land subsidence and sea level rise to the urban drainage and flood protection systems; to identify and discuss possible options for urban drainage and flood protection systems in future; and to formulate alternative development scenarios in order to reduce the waterlogged area and provide adequate urban drainage and flood protection.

By using DUFLOW for modelling, it has been analyzed that Jeblokan and Kenjeran canals are not sufficient for the existing condition. There are some inundated areas which can be seen in the model. In order to solve the problem, Jeblokan Canal should have flap gate and this solution will be sufficient up to 2% chance of occurrence per year. Meanwhile, Kenjeran Canal has more complex solution because the flood problem cannot only be solved by a flap gate but also by building a shortcut, pond and canal dike.

Considering the sea level rise and land subsidence phenomena, pumps and dikes should be added to solve flood problem in East Surabaya. Pumps will be used if the tide level is higher than the water level inside the system. Contrary to that, gravity drainage will be applied if the tide level is lower than the water level inside the system. Dikes along the coast line are also important structures to be built as flood protection against high tides.

For Jeblokan Canal, combination of flap gate and dike will be sufficient up to 2% chance of occurrence per year, although the land subsidence and sea level rise phenomena are considered. Meanwhile, for Kenjeran Canal, the flap gate has to be fully replaced when land subsidence and sea level rise phenomena are taken into account.

Keywords: flooding, floods, urban drainage, flood protection, GIS, DUFLOW