

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



**ANALYSIS AND EVALUATION OF OPERATION AND MAINTENANCE OF
URBAN DRAINAGE SYSTEMS**

Case Study: Sub-catchment Bendung, Palembang, South Sumatra

Flora Prima Synthia

MSc Thesis WSE-HE-LWD-09.18

October 2009

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Master of Science Thesis
by

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This research is done for the partial fulfilment of requirements for the Master of Science degree at the UNESCO-IHE Institute for Water Education, Delft, the Netherlands and the Magister Sains degree at the Sriwijaya University, Palembang, Indonesia

**Delft, the Netherlands
October 2009**

Summary

In some large cities in Indonesia, flooding problems increase due to the subsidence of the coastal surface level and the rise of the sea level. Consequently, frequent flooding occurs and inundations in the streets of a few centimetres to decimetres are becoming common. The floods may cause severe disturbance to society, disrupting not only social life but also damaging health – there are great health risks for the inhabitants of the affected urban areas. Economic development may be damaged significantly with companies retreating from the city. It may affect the functioning of infrastructure and often does damage to roads, sewers and warehouse buildings with their contents.

Palembang is one of the cities that have flooding problems, with high rainfall, large amount of discharge and sedimentation from upstream, high tide from the sea, and the topography, which is relatively flat and low. In future, a systematic approach for urban drainage system development, water management and flood protection schemes has to be introduced by taking into account the technical aspects including the operation and maintenance of the systems, socio-economic and environmental aspects.

The term operation and maintenance as used in this study is defined as the activities related to the existing condition of urban drainage in Palembang with case study of Sub-catchment Bendung area, including existing operation and maintenance and future recommendations as well as the institutional aspects in present and future conditions. Operation covers the role of the agency for urban drainage of Palembang, existing staff and their tasks and the actual operation rules of the structures. While for maintenance, it will cover the existing maintenance already carried out by the agency, including routine and periodic maintenance.

The approach used in this study consisted of literature review, data collection, data analysis and computation. The study was carried out by reviewing the master plan of the drainage system and land use of Palembang, journals, reports and books that are related to this subject. Literature review on certain studies has been used as a main resource of this study. Some data that have been collected cover some aspects; it can be rough data, reports, maps and graphics. There are two main data processing and analysis directions in this study, which are spatial analyses and hydraulic analyses. GIS spatial analyses used ARCGIS 9.2 software, while the hydraulic analysis used a spreadsheet for rainfall analysis and DUFLOW for hydraulic modelling and analysis.

Result from DUFLOW simulation and GIS analysis clearly shown that if there is high tide from Musi River and there is rainfall, whether in the existing condition or in future condition (influenced by sea level rise), the capacity of Bendung River cannot collect the runoff until the flood is occurred especially in the lower part of the catchment. Result of DUFLOW analysis also shows that pumping station is not enough to evacuate the excess water from the existing drainage canal, it only moves the inundated area to another location, where area along the downstream part of pumping station have lower topographic condition.

The establishment of controlled structured with flapgate in the mouth of Bendung River can be considered as an alternative to cope with routine or periodic flooding in the sub-catchment Bendung area. The flapgate will effectively function with a construction of

dike along Musi River together with construction dike along Bendung River. Dike along Bendung River can also be used as inspection road and to prevent land utilization along Bendung River bed.

Optimization of Bendung River can be done by maintaining the river routinely and periodically or incidentally, such as by dredging the river, excavation, desiltation, cleaning the river by setting floating trash rack. Frequent and timely maintenance is of importance for obtaining the benefits of the systems and it will make the system working properly.

For long-term development, integrated urban drainage management is needed to implement in order to have sustainable development. Some structural and non-structural measures had to be taken in this development. For further study, it is recommended to use surveyed data to model precisely the area of flooding. The additional data can also be used from the latest data and information, such as high-resolution satellite imagery or aerial photo.