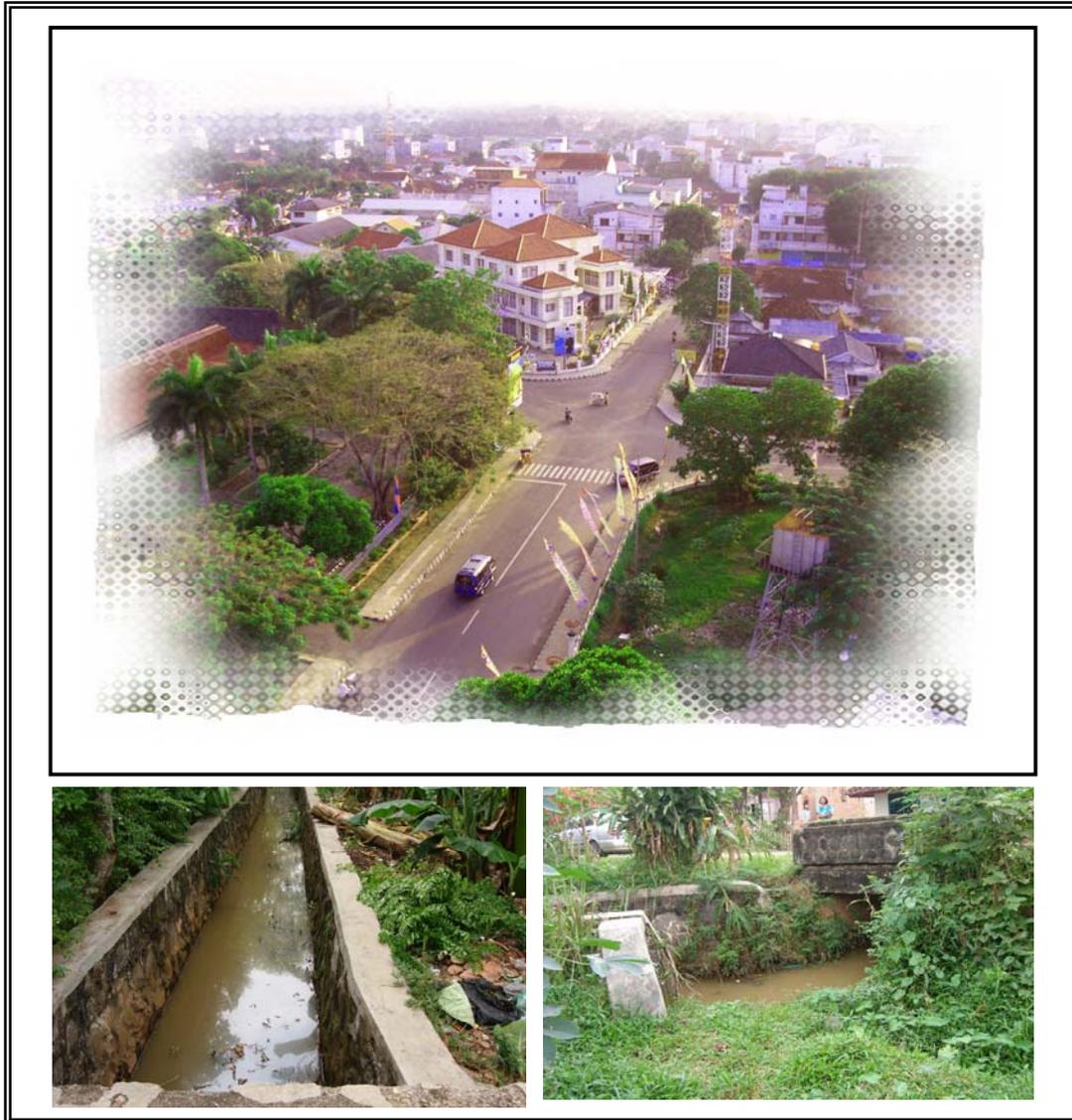


**UNESCO-IHE
INSTITUTE FOR WATER EDUCATION
AND
SRIWIJAYA UNIVERSITY**



**Impact of City Development on Urban Drainage and Flood
Protection Systems in Metro City, Lampung**

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Master of Science Thesis
by

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Summary

Metro, as one of ten cities/districts of Lampung Province in the Southern part of Sumatra Island in Indonesia, is located in the central part of the province. Administratively, the city was newly positioned in 1999, before that it was the capital city of Central Lampung Districts (Kabupaten Lampung Tengah). It had two sub districts, after the administrative changes, it now has five sub districts and twenty-two sub villages (Kelurahan). The development of the city is very fast, so many land uses have been changing, and some agricultural lands have been converted into settlement and public buildings, causing new problems due to the increase of the runoff coefficient.

Due to the topographic condition and inadequate drainage system, Metro has a potential to be inundated in some areas, mostly in the rainy season. The study area is located in one river basin area, that is Way Batanghari river basin, where four sub districts, i.e. Central Metro (Metro Tengah), East Metro (Metro Timur), West Metro (Metro Barat), and South Metro are included in these river basins. Those sub districts have some inundated areas, mostly in the lower parts and in the newly urban areas as the most potential crowded region. The problem of inundated areas in the city is not so acute yet, but it has negative impact on the people in that area. In the future as the city will be more developed, an adequate urban drainage system and flood protection is needed.

With respect to this, an integrated approach of water management is needed, by integrating urban water management (drainage and wastewater), river basin management, and urban management (land use and infrastructure). Hydrologic and hydraulic modelling can be used as decision support system tool. The process of runoff in the urban drains and the rivers has been simulated by using the one dimensional unsteady hydraulic model DUFLOW. Then the model results have been combined with Geographic Information System (GIS) data of the area and analyzed with appropriate analysis tools from many sources.

The methodology of this thesis comprised: preparation, data collection, data analysis, modelling simulation, scenario development, and reporting. Preparation included a literature review, collection of data and field observation. Data collection included collecting secondary data e.g. topographic map, land use map, river cross-sections, and existing drainage system in the area. The modelling simulation included running of GIS and DUFLOW.

Three scenarios have been studied to overcome the problems in the existing condition and also in the case of city development, namely:

- Horizontal works, creating more room for flood by widening the main drain;
- Vertical works, increasing capacity of the main drain by deepening the main drain to 1.5 m for the main drain and 2 m for the river;
- Hold the peak, constructing retention storage to hold an amount of flood during peak flow and release it during depression flow.

Those scenarios have been constructed using DUFLOW and the result of DUFLOW, which is water level in every section has been intersected with a DEM. All areas below the interpolated flood levels are indicated as inundated, and inundation water depth is the difference between the terrain elevation and the flood level. The result of model simulation presents that constructing retention basins is the proposed solution both in the

present time and in the future in this area. It will not change the river or canal morphology thus the environmental condition will be in balance. It is also considered as a multifunction basin, it is not only used as retention in the extreme rainfall condition, but also as a recreation place in the dry season. In order to cope with the development of the city, the area for constructing a retention basin should be put in the spatial planning of the city, so that the difficulties to find empty space can be avoided.

Based on these three scenarios, conclusions and recommendations for future development of Metro City are given. As a recommendation for further research the effect of land subsidence to the water management and flood protection systems are given.