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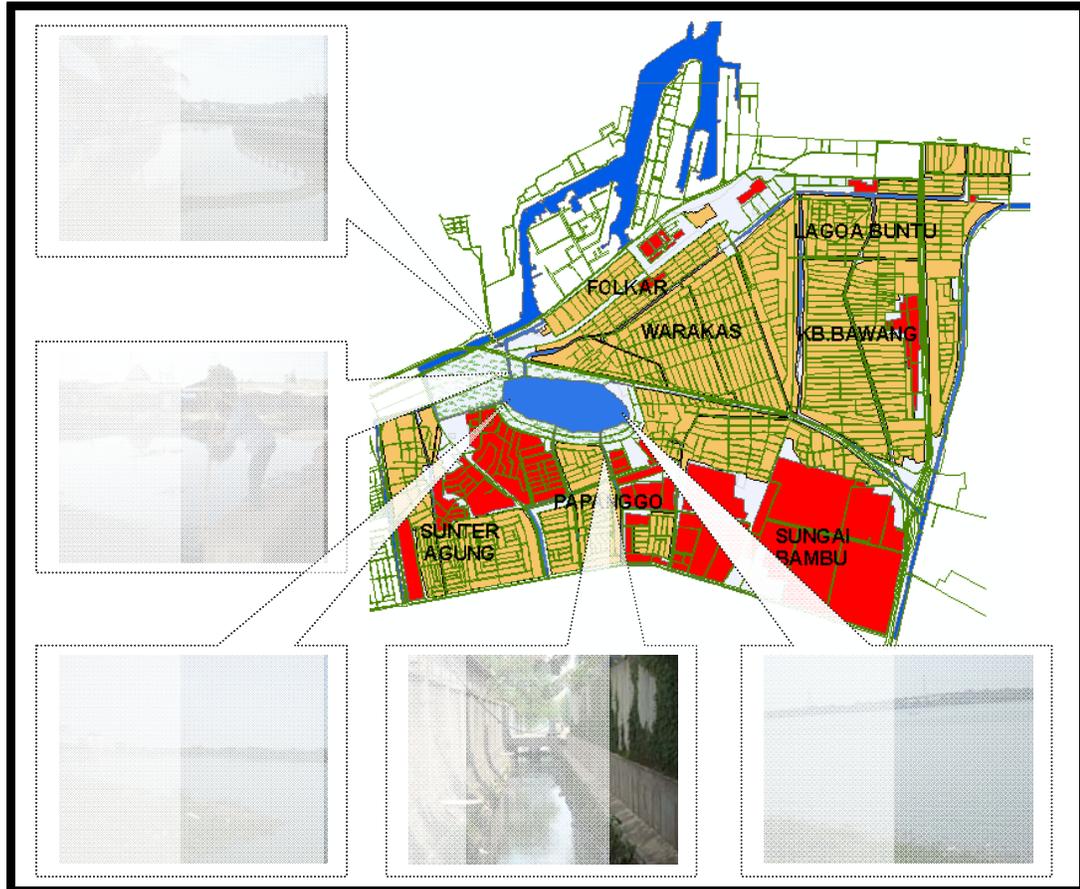# INSTITUTE FOR WATER EDUCATION
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SRIWIJAYA UNIVERSITY

Evaluation of Urban Drainage and Flood Protection Systems in Jakarta
Case Study: Papanggo Area, North Jakarta

ALBERT REINALDO

UNESCO-IHE
Institute for Water Education

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Master of Science Thesis
by

Albert Reinaldo

Supervisors

Prof. Bart Schultz, PhD, MSc (UNESCO-IHE)
Prof. Dr. Ir. Robiyanto H. Susanto, M.Agr.Sc (UNSRI)
F.X. Suryadi, PhD, MSc (UNESCO-IHE)

Examination Committee

Prof. Bart Schultz, PhD, MSc (UNESCO-IHE)
Prof. Dr. Ir. Robiyanto H. Susanto, M.Agr.Sc (UNSRI)
F.X. Suryadi, PhD, MSc (UNESCO-IHE)
Ir. Peter H.J. Hollanders (Principal Water Board of Delfland)

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Summary

Since ancient times, flooding has becoming a regular and a common disaster in Jakarta that makes enormous impacts in various sectors, for instance environment, business, and society. Most of the floods about 40% of Jakarta area such as in the North Jakarta are caused by an overflowing of a huge mass of water to lowland areas because water bodies such as rivers, streams, lakes and canals cannot collect any accumulation of water more when heavy rainfall occurs. Papanggo area is situated in lowland area also suffers from flooding.

A Flood in an urban area can be considered as a natural hazard when the nature influences flood such as a heavy rainfall and high tide. A flood can be considered as man-made causes if the river or drainage systems cannot work as usual due to system disturbance by human for example, the land subsides due to groundwater extraction; water flow is blocked by garbage and changing of the land use.

The thesis research would be carried out to study urban drainage and flood protection systems in Papanggo area using hydrology, hydraulics and spatial modelling techniques (the DUFLOW and GIS).

To achieve the objective, simulating scenarios were used as follows:
- Scenario 1: the urban drainage represents the existing conditions and has been used as the basic case. Under Scenario 1, the existing urban drainage was considered as one system;
- Scenario 2: design urban canal profiles are used. Under Scenario 2, alternatives in mitigating flood would be applied;
- Scenario 3: as the second scenario, but it would also investigate the sea level rise and the effect of the land subsidence for 25 years from now;
- Scenario 4: proposed development.

Mitigation scenarios both structural and non-structure measures are evaluated in inundation areas. For structural measures, three alternatives of design urban canal profile and one for proposed development considering land use and sea level rise were studied. For non structural measures,

A polder with its water management and flood protection system can be one of the solutions for flooding problem in the Papanggo area. Then for non-structure measures, several measures need to be implemented in order to eliminate or to minimize adverse effect of flooding with modifying structural measures. Several non-structural measures such as local society organization, public awareness campaigns, spatial plan implementation, a flood forecast-warning system, flood hazard mapping and a database, a disaster recovery plan, structural organization, legislation-law enforcement and also operation-maintenance of urban polder water management are proposed.

In order to make benefit cost analysis, the alternatives studied were calculated as a project cost and material losses were calculated as a benefit after doing projects. The alternative 1 needs to be chosen as alternatives for urban drainage design profiles.

Keywords: *GIS modelling, DUFLOW hydraulic modelling, polder system, urban drainage, flood protection, structural and non-structure measures, cost benefit analysis.*