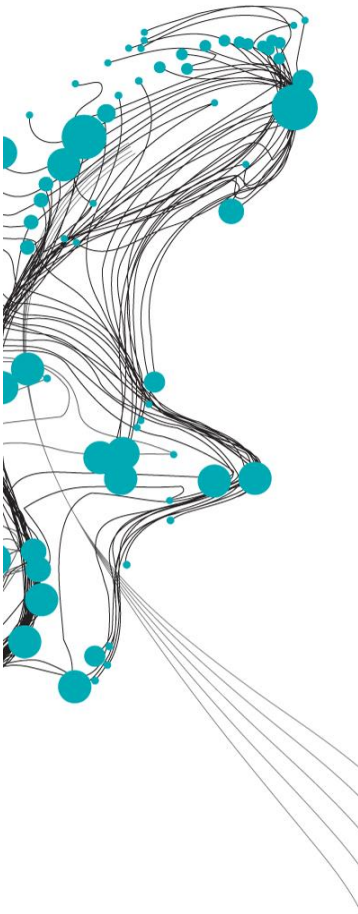


MODELLING LAND USE AND WATER QUALITY MANAGEMENT SCENARIOS FOR THE UPPER CITARUM RIVER, JAVA, INDONESIA



The Citarum River is one of the most polluted rivers in the world. The main reasons for the impaired water quality are the high population density, the rapid industrialization in the catchment, and an under-resourced government. Because of the latter the relevant institutions lack overview of how best to react to the problems.

The goal of this research is to determine relevant scenarios and their effects which give stakeholders a handhold on what measures are most effective. These scenarios are based on solutions suggested in interviews with involved stakeholders. The changes in concentration for the different scenarios are modelled by a one-dimensional hydrodynamic and water quality model (SOBEK).

In the interviews the stakeholders were asked to pinpoint the problems and associated solutions for the impaired water quality in the Upper Citarum Basin related to agriculture (crop growing and animal husbandry), industry and households. These solutions are combined in scenarios and the effects on water quality are quantified for the substances COD, BOD, nitrate, sulphate, zinc and fecal coliform. These substances are characteristic emissions of the land use types mentioned before.

The scenarios determined based on the interviews are:

Reference scenario	The current status in 2015
Worst case scenario 2030	An autonomous growth of population and economy until 2030 without interventions to prevent emissions
Improved sanitation	People without any sanitation facilities provided with a septic tank
Livestock in communal barns	The dispersed cattle is concentrated in large barns
Changing crops	The paddy fields are changed into fields for dry crops
Changing industry	Includes three sub scenarios. First all the emission from industries is set to zero; secondly the emission of the textile industry is reduced to zero; and third the textile industry is converted to other types of industry

The scenarios lead to changes in emissions to the river. Together with a fixed discharge for the wet and the dry season, this is used as input for the SOBEK model to determine the concentration at the end of the Upper Citarum Basin. The calculated concentration is compared to the reference scenario to evaluate the change in concentration.

For all scenarios except the worst case scenario, the water quality overall improves. Based on the results, providing septic tanks to people without any sanitation is the most promising scenario. Followed by putting the cattle in communal barns.

The results show that although measures will lead to an improved water quality, the maximum permissible concentration is still not in reach. This means that the measures in the separate scenarios are not enough to get the river clean enough. However it gives an idea of the effect of the different measures. Combining the measures in the scenarios can lead to a water quality below the maximum permissible concentration.

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