Impact of Harbor Expansion on Water Resources in the City of Savanah

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1. Introduction

Engineered infrastructures are backbones of municipal activities and economic development. Without adequate supporting infrastructure, the expected economic benefit of port expansion will not be feasible, especially with the competition among ports in the region. The growth of economic activities in the region will also lead to increasing population and industries, both of which require infrastructure expansion. To ensure we build asset instead of liability, it is important to understand the interaction among engineered system and the socio-economic and ecological environment. This understanding can be obtained with improved predictability of the system dynamics and long term complexity of system evolvement. One important element within the coastal system in consideration is the water resources. It has reported that economic growth and urban expansion will result in degraded eco-environments [1] and declined condition for the water resources, especially on groundwater [2]. A multi-factor modeling framework was built to assess the direct and indirect impacts of planned expansion of Savannah Harbor on local economy and water resources.

2. Methodology

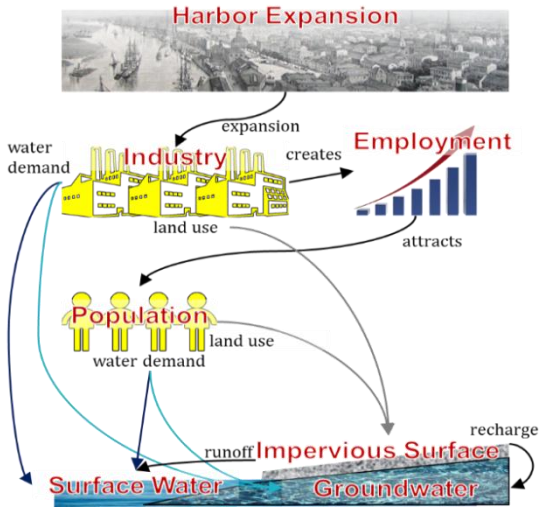

Figure 1. Conceptual diagram of the proposed framework.

As shown in Fig. 1, harbor expansion is assumed to result in local industry growth, thus create more jobs. The estimation of the employment growth is modeled by the labor productivity (i.e. value added per man-hour/man-year) constants according to the United Nations demographic manuals [3], given the planned industry development as the input. The increased economic activities lead to the increase of both municipal (through population increase) and industrial infrastructures. These infrastructures affect water resource both directly and indirectly. The direct impacts are determined by the type of residential buildings and industrial categories which can be estimated based on the Georgia regional water plan [4]. The indirect impacts are mainly due to the reduction of impervious surface which alternate the hydrological recharge cycles. The hydrological changes are modeled by the increased runoff to the surface water and the decreased recharge to groundwater from precipitation recharges [5].

3. Preliminary Results with Hypothetical Scenario

Preliminary assessment was carried out with hypothetical scenario. The simplified scenario assumes an increasing employment scenario with total employment for commercial businesses and small industries of 1,500, employment for each major water-intensive industrial category is equally set to 30. The impervious surface per capital is estimated according to data from Georgia GIS Data Clearinghouse of Chatham County. The total impervious surface increase due to harbor expansion is then estimated as the population increase multiplied by impervious surface per capital. The preliminary analysis shows the link between economic growth and water availability and demands.

4. Acknowledgment

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5. References

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