Evaluation of Strategies for Rising Sea Levels using System Dynamic

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Abstract

Due to human induced global warming, sea levels are increasing globally. From 2006 to 2015, the rate of its increase has more than doubled, from 0.06 inches (1.4 millimeters) per year over the majority of the twentieth century to 0.14 inches (3.6 millimeters) each year. The current reliance on fossil-based socioeconomic system, along with land subsidence and groundwater extraction, are only some of the factors that accelerate the rise of sea levels. Different local governments propose adaption measures to aid cities from the effects of rising sea levels but effective policies to combat climate change have been marginal due to the inability to properly conduct an integrated assessment on the different factors that influence climate change . The complexity and dynamic nature of this issue presents difficulties for policy and decision-making processes. System dynamics modeling has proven to be extremely valuable in a variety of sectors for assisting decision-makers in grasping and projecting the dynamic behavior of complex systems to enable the creation of successful policy initiatives. This paper makes use of a system dynamics model to evaluate different adaptation strategies to determine which information and evidence is seen to be relevant for policymaking. Results show that efforts to reduce carbon emissions depend heavily on the transition of its energy mix from carbon-rich coal to low-carbon natural gas. Temporarily reducing a basin's water stress through various policy changes can also alleviate groundwater activities and further slow down the rise of sea levels. Sensitivity and scenario analyses were also conducted to illustrate "what if" relationships in relation to these policy changes. These results provide relevant information that can be utilized by government bodies around the world.