Storm Surges Congress, Hamburg, Germany
13–17 September 2010
SSC2010-84-1

Risk Management of Sea Level Rise Uncertainty-Insights from a Decision Analysis Approach

J. Rice
Pacific Northwest National Laboratory, Richland, WA, USA jennie.rice@pnl.gov

Scenario analysis estimates the damages due to sea level rise (SLR) in the US by 2100 at $185 billion for 1/2 meter SLR to $429 billion for 1 meter SLR. The costs of adaptation range from $50 to $174 billion, for 1/2 meter and 1 meter SLR, respectively (Easterling, W., Hurd, B., Smith, J., Coping with Global Climate Change, The Role of Adaptation in the U.S., Pew Center for Global Climate Change, June 2004). Clearly, if we knew for certain the magnitude of future SLR we could take appropriate action. However, cost-effective adaptation to SLR involves long lead times and therefore must be decided well before the uncertainty in SLR resolves. How can planners and policy makers move forward in this situation to identify and justify risk management actions? A potentially useful approach is decision analysis, a quantitative and rigorous process designed to provide key insights and help guide decision-making complicated by risk and uncertainty.

This presentation describes a decision analysis of a decision to adapt for 1/2 meter versus 1 meter SLR in the US generally, assuming that this decision must be made before the uncertainty in SLR resolves. The goal of the analysis is to demonstrate the types of insights available from a decision analysis approach using a simplified example, not necessarily to provide a general recommendation for pre-emptive SLR adaptation in the US. The types of insights include: the recommended decision given an assumed probability distribution for the potential magnitude of SLR, the sensitivity of the decision to this probability distribution, the economic value of research to resolve the uncertainty about the magnitude of SLR, and the economic value of new alternatives that could provide a measure of control over SLR. The analysis shows that adaptation to address 1 meter SLR is recommended assuming a 50-50 chance of 1/2 meter versus 1 meter SLR. If the likelihood of 1/2 meter SLR exceeds about 75%, then adaptation at that level would be the recommended course of action. Additional research to resolve the 1/2 meter versus 1 meter uncertainty in SLR has an economic value of up to $33 billion. The economic value of a means to prevent SLR from exceeding 1/2 meter is $65 billion. The decision analysis process and analytical methods will be reviewed in conjunction with presenting the results of the analysis. Recommendations for utilizing this type of approach at local and regional levels will be provided and the pros and cons of implementing decision analysis methods will be discussed.