WATER QUALITY MODELING FOR SUPPORTING RIDGE-TO-REEF MANAGEMENT

[1]MYEONG-HO YEO, [2]ADRIANA CHANG

[1,2]Water and Environmental Research Institute of the Western Pacific, University of Guam, Mangilao, GU 96923, USA
E-mail: yeom@triton.uog.edu

Abstract –

Land-based pollutants, such as sediments and nutrients, have been recognized as chronic local stressors to coral reef health and coastal ecosystem. Excessive sediments have direct adverse effects on the coral reef and shallow coastal environment in tropical Pacific islands. Declining water quality induced by high concentration of nutrients may influence the reproductive cycle of corals and benthic habitats. For such coral reef conservation programs, it is therefore essential to manage anthropogenic land-based pollutants.

The main aim of the ridge-to-reef (R2R) approach is to provide the integrated information on inter-connection between freshwater sources from mountain ridges and the shallow coastal areas. Although the sequent actions are to identify and diminish the identified stressors' contributions through many applications, there is still a challenge to account for where best management practices (BMPs) are required.

The Soil and Water Assessment Tool (SWAT) model has been used in numerous applications of watershed-scale models for simulating flow, soil erosion, sediment, and nutrient transport, and for evaluating the effect of climate change, land use change, and BMP applications. Because SWAT model provides inputs and outputs from each delineated sub-catchment, a number of applications have been suggested for simulating soil erosion and non-point loadings at various soil types. This study hence proposes the application of a SWAT model for figuring out the variations of the chronic stressors in time and space for supporting the R2R management.

The overall objective of this study is to develop a suitable SWAT model for supporting a ridge-to-reef management associated with coral reef conservation programs. Because numerous studies related to coral bleaching have been carried out around Pago Bay by the University of Guam Marine Laboratory, the Pago Watershed is selected for this study for linking inland hydrologic inputs to ecological responses in the coastal area. Additional water quality tests from four sites within the watershed are conducted for identifying locations of concern.