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Robust Decision Support Framework for Addressing Uncertainties in Water Resources Management in the Mekong

Authors : Chusit Apirumanekul, Chayanis Krittasudthacheewa, Ratchapat Ratanavaraha, Yanyong Inmuong

Abstract : Rapid economic development in the Lower Mekong region is leading to changes in water quantity and quality. Changes in land- and forest-use, infrastructure development, increasing urbanization, migration patterns and climate risks are increasing demands for water, within various sectors, placing pressure on scarce water resources. Appropriate policies, strategies, and planning are urgently needed for improved water resource management. Over the last decade, Thailand has experienced more frequent and intense drought situations, affecting the level of water storage in reservoirs along with insufficient water allocation for agriculture during the dry season. The Huay Saibat River Basin, one of the well-known water-scarce areas in the northeastern region of Thailand, is experiencing ongoing water scarcity that affects both farming livelihoods and household consumption. Drought management in Thailand mainly focuses on emergency responses, rather than advance preparation and mitigation for long-term solutions. Despite many efforts from local authorities to mitigate the drought situation, there is yet no long-term comprehensive water management strategy, that integrates climate risks alongside other uncertainties. This paper assesses the application in the Huay Saibat River Basin, of the Robust Decision Support framework, to explore the feasibility of multiple drought management policies; including a shift in cropping season, in crop changes, in infrastructural operations and in the use of groundwater, under a wide range of uncertainties, including climate and land-use change. A series of consultative meetings were organized with relevant agencies and experts at the local level, to understand and explore plausible water resources strategies and identify thresholds to evaluate the performance of those strategies. Three different climate conditions were identified (dry, normal and wet). Other non-climatic factors influencing water allocation were further identified, including changes from sugarcane to rubber, delaying rice planting, increasing natural retention storage and using groundwater to supply demands for household consumption and small-scale gardening. Water allocation and water use in various sectors, such as in agriculture, domestic, industry and the environment, were estimated by utilising the Water Evaluation And Planning (WEAP) system, under various scenarios developed from the combination of climatic and non-climatic factors mentioned earlier. Water coverage (i.e. percentage of water demand being successfully supplied) was defined as a threshold for water resource strategy assessment. Thresholds for different sectors (agriculture, domestic, industry, and environment) were specified during multi-stakeholder engagements. Plausible water strategies (e.g. increasing natural retention storage, change of crop type and use of groundwater as an alternative source) were evaluated based on specified thresholds in 4 sectors (agriculture, domestic, industry, and environment) under 3 climate conditions. 'Business as usual' was evaluated for comparison. The strategies considered robust, emerge when performance is assessed as successful, under a wide range of uncertainties across the river basin. Without adopting any strategy, the water scarcity situation is likely to escalate in the future. Among the strategies identified, the use of groundwater as an alternative source was considered a potential option in combating water scarcity for the basin. Further studies are needed to explore the feasibility for groundwater use as a potential sustainable source.

Keywords : climate change, robust decision support, scenarios, water resources management
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