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Assessing coastal squeeze of wetlands at the Yellow River Delta in China: a case study

Shuxin Luo (2), Dongdong Shao (1), Wei Long (3), Yajiao Liu (2), Tao Sun (2), and Baoshan Cui (2)

(1) State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China (ddshao@bnu.edu.cn), (2) State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China, (3) School of Geography, Beijing Normal University, Beijing, China

While coastal wetlands worldwide are subject to increasing threats from continued sea level rise, their potential adaptation through land-ward migration is often impeded by natural or man-made barriers. The resultant sea- and land-ward squeeze exacerbates the loss of wetlands, causing severe ecological consequences. To address this issue for coastal wetlands at the Yellow River Delta (YRD) in China, the present study adapted a fuzzy-system-model (FSM) based coastal squeeze assessment method (Torio and Chmura, 2013) to assess the potential of coastal squeeze under assumed future sea level rise scenarios. Specifically, we selected the South and North District of the Yellow River Delta National Nature Reserve as well as Xinhu Town at Hekou District, Dongying City, as the study sites, and derived the slope and surface imperviousness distribution of each site from SRTM 90m and Landsat ETM+ satellite imagery, respectively. Fuzzy sigmoid function was then adopted to relate the derived slope and surface imperviousness to the respective coastal squeeze indices. Due to the predominantly flat terrain throughout the YRD, the surface imperviousness was found to be the dominant contributor to coastal squeeze, and the distribution of the coastal squeeze index for imperviousness (CSII) was used to identify vulnerable area at the various study sites. The present study showcases the assessment of coastal squeeze of wetlands at the YRD and the region, and provides important references for coastal wetland protection and conservation efforts under increasing stress from climate change and human activities.