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Exploring pathways for urban coastal flooding in the city of Miami, Florida

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Exploring pathways for urban coastal flooding in the city of Miami, Florida

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Abstract: Coastal and low-land flooding in urban areas is causing increasing nuisance and flood damages in many communities across South Florida. Sea-level rise, storm surge and extreme rainfall events are projected to increase the likelihood of such flood events in the future. Here, we present the results from a study by a consortium of researchers and local policymakers and planners, aimed at understanding which adaptation actions in the water system and local communities can deliver more resilience to flooding. We followed an iterative and collaborative approach to explore adaptation pathways using model simulations and expert-judgement. We focus on a coastal watershed in Miami-Dade county in South Florida, USA. First, current and future flood risk due to storm surge and rainfall were assessed with a hydraulic model (XPSWMM) and flood damage model (Delft-FIAT). Next, potential adaptation measures and pathways were collaboratively explored to reduce flood occurrence as well as flood impacts. Promising adaptation measures were then evaluated using the suite of models. Performance of the adaptation measures is expressed as the level of current and future expected direct flood damages (EAD). For each measure the sea-level rise was determined at which a threshold value of the EAD was exceeded, which was then used to explore adaptation pathways. We show how the costs, sequencing and timing of the different sets of measures can best be approached, when taking into account the uncertainties about future sea-level rise. Results are presented for several pathways that have been illustrated to and discussed with local policymakers using the Pathways Generator software.

Keywords: adaptation pathways, sea-level rise, flood risk, uncertainty