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Infrastructure effects on estuarine wetlands increase their vulnerability to sea level rise

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At the regional and global scales, coastal management and planning for future sea level rise scenarios is typically supported by modelling tools that predict the expected inundation extent. These tools rely on a number of simplifying assumptions that, in some cases, may result in important miscalculation of the inundation effects. One of such cases is estuarine wetlands, where vegetation strongly depends on both the magnitude and the timing of inundation. Many coastal wetlands display flow restrictions due to infrastructure or drainage works, which produce alterations to the inundation patterns that can not be captured by conventional models.
In this contribution we explore the effects of flow restrictions on inundation patterns under sea level rise conditions in estuarine wetlands. We use a spatially-distributed dynamic wetland ecogeomorphological model that not only incorporates the effects of flow restrictions due to culverts, bridges and weirs as well as vegetation, but also considers that vegetation changes as a consequence of increasing inundation. We also consider the ability of vegetation to capture sediment and produce accretion. We apply our model to an estuarine wetland in Australia and show that our model predicts a much faster wetland loss due to sea level rise than conventional approaches.