



## Sea Level Influence on High Water Occurrence in Coastal Urban Areas – Umag case study

Josip Rubinić<sup>1</sup>, Elvis Žić<sup>2</sup>, Vanja Travaš<sup>3</sup>

<sup>1</sup> Faculty of Civil Engineering, University of Rijeka, Croatia, [josip.rubinic@gradri.hr](mailto:josip.rubinic@gradri.hr)

<sup>2</sup> Faculty of Civil Engineering, University of Rijeka, Croatia, [elvis.zic@gradri.hr](mailto:elvis.zic@gradri.hr)

<sup>3</sup> Faculty of Civil Engineering, University of Rijeka, Croatia, [vanja.travas@gradri.hr](mailto:vanja.travas@gradri.hr)

### ABSTRACT

High water occurrences in coastal areas have multiple causes and are determined by different influences – the storm water and other related hydrological occurrences in the inflow catchment area, technical and non-structural solutions for urban water drainage, as well as in the often neglected component of the design solution – the sea level states at the watercourse and the storm water sewage collection facility inflows into the sea.

Based on the example of the city of Umag and the occurrence of an extremely large flood wave in September 2010, this paper analyses the contribution of particular influences to this flood, with special regard to the sea influence on the evacuation capacity of the Umag stream canal. Both time series of the short-duration yet heavy rainfall and sea level variations were analyzed in order to determine changes in the boundary conditions during the period of time in which the canal drainage system of the Umag stream was constructed.

The modelling of the drainage canal maximum capacity was performed with respect to different occurrence probability at its inflow and the dependence on the sea level and projections for potential changes in the future are suggested in terms of further reduction of the high water evacuation possibility related to the possible consequences of expected climate changes/variations and the expected rise of the sea level.

### KEYWORDS

Umag stream, flood, urban water drainage, canal capacity, sea level dependence