The failure of river dikes frequently leads to disastrous consequences in protected areas. Among all causes of dike breaching, overtopping is by far the most common. Nonetheless, the physics of erosion process is still poorly understood, making prediction of breach formation under different conditions difficult.

Most experimental research works have concentrated on dikes perpendicular to the main flow (i.e. dam embankments), whereas only a few have dealt with fluvial dikes (dikes parallel to the main flow). Rifai et al. (2017, 2018) conducted laboratory tests of fluvial dike breaching to determine the influence of main channel inflow discharge, downstream boundary condition, floodplain tailwater, channel width, and bottom and dike material. The impact of dike geometry has never been thoroughly examined.

Here we report the results of a new laboratory study assessing the influence of dike geometry on the breaching of non-cohesive homogenous fluvial dikes. The crest length and inner and outer slopes of the dike were modified systematically. The breach discharge and breach width were monitored continuously. During the initial stage of breach expansion (i.e. rapid erosion), dikes with a larger volume per unit width result in a more progressive increase in breach discharge and breach width. The influence of dike geometry decreases during the later stage (i.e. progressive breach widening). Two extreme configurations (dikes with particularly small and large volumes per unit width) were tested to generate breach discharge and breach widening envelopes. This will be presented for the first time in this communication.