



Small scale flood risk assessment: a case study from inter-dune catchments in the Campine area, Belgium

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The objective of this study is to assess the risk of flooding on a small scale due to heavy rainfall in local depressions in the landscape. The methodology is applied to a zone of approximately 1000m by 700m. The study area is located on an interfluvium in the river Nete catchment in the Campine region, Northern Belgium. The site is characterized by sandy soils (podzols) and a temperate climate (~ 800 mm precipitation). The flood risk on the site originates from heavy rainfall and runoff in local depressions in the landscape. These depressions are inter-dune areas that are situated 1 – 2 m below the surrounding dune tops. Several buildings are situated in the area, for which the minimal height of the entry points has to be determined in order to eliminate the risk of flooding. A very detailed digital elevation model (DEM) acquired from lidar data (1 point per 4 square meter) was imported in a GIS environment. From the DEM, the flow direction of the water was calculated and small scale catchments were generated, consisting of all the upslope and downslope areas to the buildings. For each catchment or local depression, the volume-height relationship was derived. As an initial condition, two extreme cases were considered: (1) the permeability of the soil (and thus the amount of infiltration) is reduced to zero, which is the case when the soil is completely saturated or frozen and (2) the infiltration is maximal and thus equals the permeability of the sandy soil. For each local depression and each of the two cases, the volume-height relationship was used to calculate the amount of rainfall needed to completely fill up the depression. This amount was then compared to data from the intensity-duration-frequency curve of the same region, indicating under which conditions maximal flooding of the local depression will occur.