Modelling the impact of retention-detention units on sewer surcharge and peak and annual runoff reduction

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flood problems in major cities can be eliminated. The study area, Sungai Kedah ungauged catchment, is located at the northern region of Malaysia. The Kota Setar subcatchment is located downstream of Sungai Kedah with the newly completed development of a control barrage at the upper Kota Setar. This paper describes the analyses of the infiltration curves at Kota Setar. The resulting infiltration maps have been developed based on the infiltration capacities.

Keywords
Sungai Kedah ungauged catchment, type of soil, infiltration curve, infiltration map

2518343

Modelling the Impact of Retention-Detention Units on Sewer Surcharge and Peak and Annual Runoff Reduction

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Abstract
Stormwater management using water-sensitive urban design (WSUD) is expected to be part of future drainage systems. The novelty of this paper is in the combination of local retention units, such as soakaways, with subsurface detention units. Soakaways aim at reducing (by infiltration) peak and volume stormwater runoff; however, significantly high retention volumes are required for peak reduction. Peak runoff is therefore handled by detention units coupled to soakaways. This article aims at modelling the impact of retrofitting retention–detention units at a small catchment scale.

The impact of retention-detention units on sewer surcharge was simulated for a small catchment in Copenhagen (Denmark) for a single design event. The software Mike Urban with an integrated soakaway model was used. Results showed that a retention–detention unit of 3.2 $m^3/100\ m^2$ (volume/impervious area) could avoid sewer surcharge during a 10-year design event. The initial water content for the single event simulation and annual water balance of storage units was estimated by 22 years of continuous simulation and the effect of several retention-detention volume combinations on peak and annual runoff reduction was determined. Results show that for a given storage volume, combining detention and retention improve the overall performance.

Keywords
Soakaways, water-sensitive urban design, stormwater runoff, modelling, detention units

2518643

Simulation of Green Roof Impact at Basin Scale by Using a Distributed Rainfall-Runoff Model

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Abstract
Currently widespread in new urban projects, green roofs have shown a positive impact on urban runoff at the building scale, that is, decreased and slow peak discharge and decreases runoff volume. The aim was to study the possible impact of green roof at the catchment scale, more compatible with stormwater management issues. For this purpose, a distributed rainfall-runoff model (Multi-Hydro) devoted to urban environment and able to simulate the hydrological behaviour of green roof has been used to assess the green roof impact at such a scale.

It has been applied on an urban catchment (Loup basin located in the Seine-Saint-Denis county, East of Paris, France) where most of the building roofs are flat and assumed to easily accept the implementation of green roof. Catchment responses to several rainfall events covering a wide range of meteorological situation have been simulated. The simulation results show that green roof can significantly reduce runoff volume and the magnitude of peak discharge (up to 80%) depending on the rainfall event and the initial saturation of the substrate.

Keywords
Green roof, source control, hydrological modelling, multi-hydro

2518795

A Study on Hydrograph Design in Ungauged Basins Using Digital Elevation Models

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Abstract
A hydrologic design of hydraulic structures in tropical Andean zones is normally affected by the challenge of the estimation of discharges in ungauged basins or basins with short time series information. Therefore, a synthetic unit hydrograph, empirical approaches and regressions among other gross methodologies are widely used to estimate the transformation of precipitation into runoff. The main inconvenience of all these methodologies is that they were created for other latitudes, climates, soil characteristics and geomorphometry, which are quite different to the mountain areas located in tropical Andes where non-linearity is highly present. This paper tackles this problem using the promising tools available in the geographical information systems (GISs). The case study area is located in Manizales city of Colombia (South America), where three small basins were studied: the San Luis creek, the Olivares-El Popal creek and the Manizales-Tesorito creek. All of them have been monitored with a temporal resolution of 5 minutes since 5 to 10 years ago, so the flow levels of main events were extracted and the dimensionless observed unit hydrograph (OUH) for each basin was obtained. The OUH was then compared with the unit hydrograph extracted from DEM through the width function (WF) and topographic index (TI) strategies.

Keywords
Hydrological design, urban drainage, unit hydrograph, GIS, DEM

2528455

Identifying Changes in Rainfall Extremes in South Australia

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