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Editorial

Special Issue: Stormwater/Drainage Systems and Wastewater Management

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For the purposes of this Special Issue of *Hydrology*, “Stormwater/Drainage Systems and Wastewater Management”, it is worth noting that hydrology, as defined by the US National Research Council [1], is a science that is concerned with the waters of the Earth and their occurrence, circulation, distribution, chemical and physical properties, and reaction with the environment, including their relationships with living things. As a result, this Special Issue is mainly concerned with the important component of the “waters of the Earth”, including stormwater/drainage and wastewater and their relationships with people and the environment. The increasing population, in addition to droughts and climate change, may further intensify the hydrologic cycle, which would lead to rainfall pattern changes and an increased number of flooding events. These hydrological changes transform our urban landscape, and a change in the way that we manage stormwater, drainage, and wastewater systems is still required, but one which is still within the realm of hydrologic principles. Typically, urban drainage systems are considered to include the collection, storage, and conveyance of surface water, and the management of all of these components holistically is the management of stormwater in the urban area. Historically, conventional urban drainage systems aim to collect both surface water runoff and wastewater, transferring these to a location remote from the source [2]. These systems have been designed to deal with flooding, sanitary drainage, public health issues, and the protection of the natural environment. With the issues brought about by combined surface water runoff and wastewater systems, there is now a shift to decentralise and make these systems sustainable, enabling stormwater to be managed separately and close to the point where it is generated. These systems are known as SUDS (Sustainable Urban Drainage Systems) in the UK, BMP (Best Management Practice) or LID (Low-Impact Development) in the USA, and WSUD (Water-Sensitive Urban Design) in Australia. The latter places emphasis on the integration of drinking water supply and wastewater and stormwater systems, with the objectives of reduced water demand, reduced sewage discharge, and decentralised stormwater management. The aim of this Special Issue of *Hydrology*, “Stormwater/Drainage Systems and Wastewater Management”, was to collect relevant contributions from different researchers across the globe with the aim of understanding novel and up to date methodologies and approaches of managing stormwater and wastewater, specifically in urban areas.

In this Special Issue, researchers shared the findings of their investigations on uncertainties in the quantification of first flush in stormwater runoff [3] and on inflows in urban sewer networks in Portugal [4]. The modelling of stormwater quality by taking on a new approach while applying the same metrics to peak flows [5], and the development of support vector regression models, as has been adopted in India, are presented in Ref. [6]. The adoption of sustainable decentralised systems, such as LID in the Philippines [7], detention tanks [8], detention basins [9], and combined but affordable wastewater treatment systems in Egypt [10], was investigated. With the increasing urban area population, the influences of urban discharges and the effects of heat on stream temperature in southern Denmark are presented in Ref. [11].

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Maniquiz-Redillas et al. [3] address the uncertainties in quantifying the first flush in stormwater runoff in urban catchments using a bibliometric and comprehensive review of the literature relating to first flush. The authors found that the effect of the first flush could vary depending on the geographical location of the site and the climatic conditions and pollutants present. Thus, it is critical that initial rainfall monitoring, runoff sampling, and water quality testing are undertaken when characterizing first flush in urban catchments. Meanwhile, Bentes et al. [4] tackle the growing concern of the improper waterflow to wastewater treatment plants (WWTP) in Vila Real, Portugal, brought about by the unaccounted rainwater inflow, infiltration, and deteriorating infrastructure.

The challenges in modelling small urban catchments are addressed by David and Mota [5] in their new approach to the quality assessment of stormwater models, adopting metrics to peak flows for a selected set of different durations. Kshirsagar and Khare [6] attempted to model the stormwater quality of mixed urban land use water in Pune, India, by developing support vector regression models. This is to understand the non-linear complex relationship of rainfall characteristics with significant stormwater pollutant parameters including dump trash materials, garbage, and roadside litter.

Garbanzos and Maniquiz-Redillas, [7] assessed the hydrologic performance and cost-effectiveness of LID in a residential park area in the Philippines and recommended that determining the target capture goal, applicable LID types, and cost estimations from a pilot project are vital components in the future application of LIDs in these regions. Pochwat and Pizzo [8] revealed that the use of a detention tank may significantly reduce the amount of sewage outfall from a drainage system, and that the method of connecting the device to a network has an influence on its efficiency. Humphrey et al. [9] evaluated the nitrogen treatment efficiency of a detention basin (DB) that exhibited some wetland characteristics. The findings from their study suggest that the TN treatment efficiency of DBs may be improved by incorporating wetland characteristics. Gabr et al. [10] researched a combined wastewater treatment system as an affordable wastewater treatment method for developing nations with dry and semi-arid climates such as in the El-Moghra Oasis of the western desert of Egypt. The treated water can be a nonconventional water source for irrigation.

Kolath and Egemose [11] focused on the less-studied field of the collective impact of the urban heat island (UHI) and stormwater discharges on stream temperature, especially regarding seasonal changes. In this study, the temperature effect of the urban village Aarslev on Vindinge stream in southern Denmark was examined, and it was concluded that the rise in temperature through the village was due to the UHI.

I envision that the findings from the latest research presented in this Special Issue can serve as a foundation to further research and assist relevant stakeholders in the management of stormwater, drainage, and wastewater systems as we deal with uncertainties in the future and as the situation of more variable and changing hydrological conditions becomes more challenging.

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