

PDF - EFFECTS OF URBAN CONSTRUCTION ON VEGETATION AND RAINFALL RUNOFF -

researchcub.info1.1 Background to the Study

1. Introduction

Growing populations and migration towards built areas is driving land use change in the form of urbanization across the globe and by 2050 some 70% of the world's population are expected to live in urban areas (UN, 2008). The population of the United Kingdom is projected to increase by 9.6 million over the next 25 years from an estimated 63.7 million in 2012 to 73.3 million in 2037 (ONS, 2012), requiring significant new housing stock that cannot always be developed within existing urban areas or on Brownfield¹ sites. A significant proportion of the growth will be met by an expansion of the peri-urban environment – defined as ‘the space around cities that merges into the rural landscape’ (Piorr et al., 2011). Contemporary planning policy within the United Kingdom (Department for Communities and Local Government, 2012) reflects this, recommending that the supply of new homes can sometimes best be achieved through large scale new developments or extensions to existing settlements.

Urbanization brings with it a range of environmental challenges for both the local, regional and wider environment as a direct result of the biochemical and physical changes to hydrological systems (Fletcher et al., 2013; Jacobson, 2011). The loss in pervious surfaces reduces the infiltration into soils, while the introduction of artificial drainage replaces natural pathways. This combination is generally considered to have considerable effect on the hydrological response of an area to rainfall, such as: faster response (Huang et al., 2008), greater magnitude of river flow (Hawley and Bledsoe, 2011), higher recurrence of small floods (Hollis, 1975; Braud et al., 2013a), reduced baseflow and groundwater recharge (Simmons and Reynolds, 1982). The reality is often further complicated by the installation of storm water retention systems, and the import/export of water to and from a catchment. For example, some studies suggest leakage from water mains can sustain baseflow during dry periods, while storm water drains coupled with retention features can attenuate flows (Scholz and Yazdi, 2009).

1.2 Statement of the Problem

Urbanization brings with it a range of environmental challenges for both the local, regional and wider environment as a direct result of the biochemical and physical changes to hydrological systems (Fletcher et al., 2013; Jacobson, 2011). The loss in pervious surfaces reduces the infiltration into soils, while the introduction of artificial drainage replaces natural pathways. Hence there is need to investigate the effects of urban construction on vegetation and rainfall runoff.

1.3 Objectives of the Study

The major objective of the study is the effect of Urban construction on vegetation and rainfall. This is to be achieved through the following specific objectives;

- (i) Observations from monitoring of two adjacent catchments are utilized to characterize rainfall runoff response from different types of urban construction,
- (ii) The temporal and spatial change in urbanization is mapped for a particular period and
- (iii) Finally, a semi distributed hydrological model is calibrated and validated against observed rainfall runoff and subsequently used to back cast and investigate the effects of urbanization process on vegetation and rainfall runoff.

1.4 Research Questions?

- (1) what is Rainfall runoff?

(2) what is urban construction?

(3) what are the effects of urban construction?

1.5 Significance of the Study

The research investigates changes in rainfall runoff resulting from transformation of previously rural landscapes into urban. This research also gives a clear insight into the effects of urban construction on vegetation and rainfall runoff.

1.6 Scope of the study

The research focus on the effects of Urban construction on vegetation and rainfall runoff.

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