



A Review of Infiltration Excess Overland Flow (IEOF): Terms, Models and Environmental Impact

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ABSTRACT

High precipitation rate usually give an impact on soil instability and streamflow volume that lead to hazard such as landslide, soil erosion and flood. However, such hazard might happen as a result of various factors including types of soil, soil structure, land used, human activities and surface and subsurface water flow. The major changes on flow rate might change the soil structure and flow direction due to high volume of precipitation with uneven dispersion, especially in hilly topography. The research on Streamflow Generating Process (SGP) has been advancing in order to understand the formation of stream resulting from both surface and subsurface flow comprising Infiltration Excess Overland Flow (IEOF), Saturation Excess Overland Flow (SEOF), Shallow Subsurface Flow (SSF), Direct Precipitation onto Stream Surface (DPOSS), percolation, evapotranspiration and ground water (GW). This paper will only focus on one of the process which is IEOF. Despite the apparent important of IEOF in determining changes in environment, relatively little is understood in the processes that occurred behind. The review aims to minimize the misconception on the terms that regularly used in IEOF studies such as overland flow, surface runoff, urban runoff and stormwater. The term used can make the meaning become misleading and give confusion to the readers. A numerous of terms used to explain the process in Hydrology does not pose problems for Hydrologist but effect the understanding of those who are from different field of background. Besides, this study also discussed on the current model that used in IEOF studies and the trend of integrated hydrological and Geographic Information System (GIS) model in solving IEOF problems. In addition, this paper also concentrates on one of the environmental issues that give impact to IEOF which is global warming.

Keywords: Streamflow Generating Process, Infiltration Excess Overland Flow, hydrology, Geographic Information System.

Academic Discipline And Sub-Disciplines

Hydrology, Geography and Environment

SUBJECT CLASSIFICATION

Subsurface water in Hydrology

TYPE (METHOD/APPROACH)

Literary Analysis

1.0 INTRODUCTION

High intensity short duration rainfall is much more likely to exceed the capacity of the soil to infiltrate water and result in overland flow than a longer less intense rainfall (Tarboton, 2003). Water from surface water input takes various pathways to reach the stream channel. Water from precipitation will infiltrate into the soil either will remain in the soil, percolate to ground water, infiltrate as subsurface flow, flow as overland water or directly enter the stream. Study on the pathway of the infiltrated water is important to enable further research related to streamflow is practicable. Kirkby and Chorley (1967) stated that the maximum hillslope water flow that might occur can be divided into zones consist of base of the slopes in hollows, in slope profile concavities and in areas of thin or less permeable soils. The surrounding terrain contributes to the rate of velocity of streamflow of an area. The steep surrounding terrain will produce greater runoff that moves downhill since the water from precipitation will have less time to infiltrate into the ground compared to the level terrain area. The path taken by water usually depends on the topography of the area and the resulting streamflow can give impact to both human and environment.

The movement of water in soil involves infiltration and redistribution process which critically depends on the hydraulic properties and the material of the soils it flow through. Infiltration can be simply defined as the water movement into the soil from the soil surface. Redistribution in the other hand comprises of exfiltration, recharge, capillary rise and interflow. Redistribution is the term used to describe the movement of water that infiltrated in the unsaturated zone of a soil. Exfiltration is the movement of water from the layer of the soil to the air in the process of evaporation, while recharge is