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Significance of DCIA in Hydrological Response and Hysteresis Patterns in Urban Residential Environments in Singapore

WAN AIK, DESMOND LEE

National University of Singapore

Urban environments possessed high degree of impervious cover and low pervious surfaces. With larger volumes of overland flow, sediment is more readily transported from origin to receiving waters. A study on hydrological response and sediment flux in two small urban residential areas namely Jurong West (JW) (1 ha) and Ang Mo Kio (AMK) (0.6 ha) in Singapore was carried out. GIS mapping of the two sites' land surface covers have indicated a higher percentage of impervious cover than pervious cover. Mapping results also showed a significant percentage (> 80 %) of impervious cover belongs to DCIA (directly connected impervious areas) and various Non-DCIA areas. DCIA is highly influential in the hydrological response and sediment flux in both catchments. First, despite varying dry antecedent periods and rain magnitudes recorded during the sampling period, direct runoff duration for both Jurong West (JW) (10 – 15 minutes) and Ang Mo Kio (AMK) (4 - 10 minutes) catchments showed similar timings in several rain events. Second, first-flush is highly prominent, thereby producing more clockwise, followed by eight-shaped hysteresis patterns during rain events. Certain implications with regard to stormwater quality can be drawn from this study. One of which would be the containment of TSS levels not only during initial period of the storm but also during latter part of storm event.