

## ABSTRACT

### Hydrological Response of Steep Tropical Catchments with Unplanned Development

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This study examines the anthropogenic impact on the rainfall-runoff relationship of steep tropical catchments subject to unplanned development (informal squatter settlements), and proposes modifications which should be made to the NRCS model (formerly the SCS CN model) for predicting runoff volume. From such catchments, assessment of the spatial distribution of housing units and anthropogenic impacts on the hydrological soil group through field test of bulk density and terrain analysis was conducted. Soil test showed a significant difference between soils under the natural vegetation and those subjected to anthropogenic influences. Landscape analysis showed that natural drainage pathways, concave and convex slopes were consequently impacted by this type of developments. The results showed bulk density impact must be accounted for when using the CN method in this type of developments. Parameter optimization using the SCE resulted in CN values of 86 for Guaratta and 89 for Blackpool as opposed to CNII values of 43 and 58 using the CN method without modification. The study concluded that increased percent impervious with the inclusion of compacted soils were more appropriate for use in runoff calculations. Further investigations in similar catchments on the adjustment method should be undertaken to confirm the results.

**Keywords:** Paul Hinds; CN values; bulk density; shuffled complex evolution; anthropogenic; percent impervious; unplanned hillside development; Nash-Sutcliffe efficiency.