Effects of resolution and scale on the accuracy of “impervious fraction” for urban catchments in Australia

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Abstract The fraction and spatial distribution of impervious area are vital to modelling stormwater and its quality for urban catchments. This research quantifies and compares the accuracy of impervious fraction images for an urban catchment. These fraction images were derived from two high-resolution (1-m) multispectral data sources (scanned airphotos and Quickbird imagery with a near-infrared band), at two scales: 25 m and 100 m. The maximum likelihood classification algorithm was used to produce 10 fraction images. When compared with measured impervious areas, results for the high-resolution Quickbird imagery were superior to those based on airphotos, both for the image using only visible bands and for additional images incorporating the near-infrared band with the Nash-Sutcliffe model efficiency, E, >0.80 for all fractions. On balance, the Infrared-Green-Blue combination produced best overall results with E ranging from 0.89 to 0.94, and low bias of 1–4% across both aggregation scales.

Key words impervious fraction images; multispectral imagery; image classification; Quickbird