

GREEN UNIVERSITY TOWN SUCCUMBS TO BLACKTOP: QUANTIFYING THE INCREASE
IN IMPERMEABLE SURFACES AND RUNOFF THROUGH TIME

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High-resolution orthophotographs show a marked decrease over the past
20 years in greenspace in student neighborhoods surrounding the
University of Vermont. Simple hydrologic modeling suggests that this
paving of permeable areas increases run off volume and peak flow.

We determined land use changes in Burlington, VT neighborhoods using
high-resolution, low-altitude orthophotographs taken in 1978 and
1999. Using these images, we identified and mapped 5 land use
categories: buildings, paved parking areas, unpaved parking areas,
sidewalks, and greenspace. Questionnaire surveys, field assessment,
and analysis of Historic Preservation Studies provided demographic
profiles of the past and present residents of the study area. The
data generated from these maps and investigations showed a 10% loss
of available greenspace over 21 years in the primary study area; 67%
of this loss occurred on the 43% of parcels currently inhabited by
students. Losses of greenspace in satellite study areas, as
determined by teams of students in an undergraduate hydrology class,
ranged upward toward 50% of available greenspace, particularly in
neighborhoods with no owner occupants.

Loss of greenspace has occurred incrementally and in a predictable
sequence. First, occasional lawn parking results in compaction,
lowered infiltration rates, and muddy rutted areas. These areas are
then "improved" with gravel, reducing detention storage. Finally,
graveled areas are paved, reducing infiltration to zero. Curve number
and rational runoff method modeling of the 10-year, 6-hour storm
event suggest increases from 1978 to 1999 of approximately 10% for
both runoff volume and peak flow. Conversion of lawn parking to
formalized paved parking often escapes zoning controls and usually
occurs without thoughtful planning or approval by the land owner.

Use of these methods illustrates a direct, quantifiable hydrologic
impact that residents have on their immediate surroundings. Surveys
of this kind can be done rapidly by students and provide data for
urban environmental planning including urban catchment dynamics,
increasing urban heat island effect, and possible remediation
strategies.

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