



Impervious Cover — Paving Paradise

The Importance of Impervious Cover

Nonpoint source pollution is pollution from diffuse sources such as urban/suburban areas and farmlands; this is now recognized as the primary threat to water quality in the United States. As urban and suburban development increases, the amount of land covered with impervious surfaces -- areas where infiltration of water into the underlying soil is prevented -- also increases. Roadways and rooftops account for the majority of this impervious area. Research in recent years has consistently shown a strong relationship between the percentage of impervious cover in a watershed and the health of the receiving stream. Scientists generally agree that stream degradation consistently occurs at even relatively low levels of imperviousness (10 to 20%). Increased impervious surfaces alter stream hydrology resulting in lower flows during droughts and higher peak flows during floods. Roadways and other impervious areas channel pollutants directly into streams without their being processed during transport through the soil. With advance planning and identification of at-risk watersheds, total impervious cover can be reduced during development within a watershed, and steps can be taken to mitigate the impacts of added impervious cover.



Examples of impervious cover

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GIS and Spatial Data

A Geographic Information System (GIS) is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information (i.e., data identified according to set locations). The way maps and other data have been stored or filed as layers of information in a GIS makes it possible to perform complex analyses.

With the aid of GIS software, a human analyst can efficiently and accurately identify and categorize ground features visible in computer-generated versions of aerial photographs that represent true map distances available throughout the nation. High-resolution satellite imagery is rapidly expanding use of remote sensing techniques for impervious cover estimation. Classified land cover data are now available throughout the country. Detailed road networks and block level census data are other GIS data sources available to aid in estimating impervious cover.

Research Objective

Impervious cover is proposed as an indicator of aquatic conditions for sub-watersheds throughout the country. Researchers are focusing on methods that would be useful in doing region-wide environmental assessments.

The usefulness of impervious cover as an indicator is a function of the ease and accuracy for estimating it. Testing is underway to determine with what degree of accuracy impervious cover can be estimated for sub-watershed areas from data available throughout a region.

Research Summary

An impervious cover test data set for 56 sub-watersheds in Frederick County, MD was developed and used to evaluate different estimation techniques suitable for application to a regional-scale characterization. Using a combination of data sources, researchers were able to estimate the percentage of impervious cover in a watershed to within +/- 1%.

Additional impervious cover data sets are being developed from aerial photographs for approximately 209 watersheds in the Atlanta, GA area for two time periods. These data sets will be used to confirm estimation methods and to determine the accuracy of methods to project future changes in impervious surface area. The estimation technique that was developed in this research project can be used by local and national agencies to target watersheds for monitoring and mitigation efforts.

Office of Research and Development
National Exposure Research Laboratory
Ecosystems Research Division

For more information contact:
Sandra Bird, bird.sandra@epa.gov
U.S. Environmental Protection Agency
960 College Station Road
Athens, GA 30605
706-355-8124

<http://www.epa.gov/athens>