

1.14 Impervious Surface

Impervious surfaces are areas within a watershed that impede the infiltration of precipitation and melt water to the underlying soil. The degree of impervious is correlated with the level of urbanization within the watershed. As a watershed becomes more urbanized there is an increase in the amount of constructed surfaces such as rooftops, sidewalks, roads, and parking lots--covered by impenetrable materials such as asphalt, concrete, and stone. Surfaces covered by such materials are hydrologically active, meaning they generate surface runoff. According to Novotny and Chesters (1981), impervious surfaces are nearly 100 percent hydrologically active, and high percentages of such surfaces occur within urbanized areas containing commercial, industrial, transportation, and medium to high density residential land uses. Other impervious, hydrologically active surfaces include compacted soils, high clay content soils, frozen soils, saturated soils, and soils with high groundwater tables (Novotny and Chesters, 1981). With the last three, imperviousness and hydrological activity is usually seasonal or temporary, in marked contrast to urbanized areas, which are permanently impervious and hydrologically active. (Barnes, et al, 2001).

An increase in impervious surface within a watershed poses a significant impact to natural and manmade environments. These threats include increased stormwater runoff, reduced water quality, higher maximum summer temperatures, degraded and destroyed aquatic and terrestrial habitats, and the diminished aesthetic appeal of streams and landscapes. (Barnes, et al, 2001). These impacts occur at surprisingly low levels of impervious surface coverage (Arnold and Gibbons, 1996). The first signs of impact to a watershed occur when impervious surface coverage reaches approximately 10% of the total area. Once the impervious surface coverage reaches approximately 30% the watershed's health has reached a degraded level.

Status and Trends

The New Jersey Department of Environmental Protection (NJDEP) 1995 GIS land use database indicates that the New Jersey portion of the watershed management area 6 is 14.5% impervious. Plate 1.14.1 depicts the distribution of impervious areas, which correlates with urbanization within the watershed as depicted in Plate 2.2.3.

Areas in the central portion of the watershed adjacent to the Routes 46, 287, 124 and 10 in Morris and Somerset Counties and areas in the Southeastern portion in Union County have a relative higher concentration of imperviousness than the Northern and Southwestern portions in Morris and Sussex Counties. The Whippany River Basin (Plate 1.1.2) has the highest degree of imperviousness at 20.9%, the Upper Passaic River Basin (above Pine Brook Bridge) is 15.4%, the Middle Passaic River Basin (Pompton to Pine Brook Bridge) is 14.3%, and the Rockaway River Basin is 10.5%.

References:

Arnold, C., L., and Gibbons, C, J., 1996, Impervious Surface Coverage: The Emergence of a Key Environmental Indicator. *Journal of the American Planning Assoc.* v62 n2, Chicago IL, pp. 243 - 258

Barnes, Kent and John Morgand III et al. 2001. *Impervious Surfaces and the Quality of Natural and Built Environments*. Baltimore, Towson University.

Novotny, V. and G. Chesters. 1981. *Pollution from impervious urban areas*. Handbook of non-point pollution. New York, Van Nostrand Reinhold.

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