



ABSTRACT

Ground-water recharge in the Upper Passaic, Rockaway and Whippany watersheds in northeastern New Jersey was calculated using a methodology developed by the New Jersey Geological Survey. This methodology requires knowledge of the soil type, land use, climate and basin calibration factor. The results are applicable to land parcels as small as 5 acres. In the study area recharge ranged from 0 inches/year to 22 inches/year. Recharge from wetlands, hydric soils and surface-water bodies is not calculated.

INTRODUCTION

The New Jersey Department of Environmental Protection has a goal of protecting 1 million more acres of open space by the year 2008 (NJDEP, 1999). Prioritizing land parcels for open-space preservation requires an evaluation process. One factor that should enter this process is ground-water recharge. Land-use changes which reduce recharge will decrease the volume of water available to nearby water-supply wells and may decrease baseflow in nearby streams. Preservation of open space can help prevent these reductions.

METHODOLOGY

Ground-water recharge in the map at left is based on a methodology developed by Charles and others (1993). It requires knowing the soil type, land use/land cover and climate. Recharge under wetlands, hydric soils and surface-water bodies is not calculated. This map was created using a geographical information system (GIS). A more detailed description of the process by which this methodology is applied in New Jersey is shown on the map of recharge in Middlesex County (French, 1996). A detailed map of recharge in Morris County showing the GIS input data layers is in preparation.

In the study area recharge ranged from 0 inches/year to 22 inches/year. A brief description of ground-water recharge in the study area is shown in NJDEP, 1998. Note that in NJDEP, 1998, a basin calibration factor of 1.3 (as recommended by Charles and others, 1993) was used to calculate ground-water recharge. Further investigation has shown that a basin calibration factor of 1.0 results in a net ground-water-recharge volume that better matches stream baseflow in the area (Hoffman, in press). The map at left uses the corrected basin calibration factor. This correction has reduced estimated recharge rates by about a third from the values reported in NJDEP, 1998.

MAP LIMITATIONS

The underlying calculation of ground-water recharge makes numerous assumptions which impose some limitations to the method. See Charles and others, 1993, for a thorough description of the assumptions made and the subsequent limitations. A brief description of the major ones follows.

- During this analysis all recharge rates were rounded to the nearest inch. Thus recharge rates are displayed in the map at left as integer values.
- Ground-water recharge in Essex County has not been calculated because there are no current soil maps available although work on them is currently underway.
- Ground-water recharge to and from wetlands and surface-water bodies cannot be determined using the methodology as these areas may be discharge or recharge areas, or neither. Site specific studies are needed to determine the recharge potential of individual wetlands.
- This map does not show land owned by the counties or municipalities because a GIS coverage is not currently available.
- The map shows ground-water recharge. This is water which has migrated downwards to below the root zone. The map does not indicate where aquifers are nor how productive they are. A more detailed analysis (after French, 1996) is needed to produce a map of aquifer recharge.

REFERENCES

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Ground-Water-Recharge Rates and Land Owned by the Federal and State Government and Water Purveyors in the Upper Passaic, Rockaway and Whippany Watersheds, New Jersey

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