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Variation of curve number with storm depth

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The NRCS Curve Number (known also as SCS-CN) method is well known as a tool in predicting flood runoff depth from small ungauged catchment. The traditional way of determination the CNs, based on soil characteristics, land use and hydrological conditions, seemed to have tendency to overpredict the floods in some cases. Over 30 year rainfall-runoff data, collected in two small (A=23.4 & 82.4 km2), lowland, agricultural catchments in Center of Poland (Banasik & Woodward 2010), were used to determine runoff Curve Number and to check a tendency of changing. The observed CN declines with increasing storm size, which according recent views of Hawkins (1993) could be classified as a standard response of watershed.
The analysis concluded, that using CN value according to the procedure described in USDA-SCS Handbook one receives representative value for estimating storm runoff from high rainfall depths in the analyzes catchments. This has been confirmed by applying "asymptotic approach" for estimating the watershed curve number from the rainfall-runoff data. Furthermore, the analysis indicated that CN, estimated from mean retention parameter S of recorded events with rainfall depth higher than initial abstraction, is also approaching the theoretical CN. The observed CN, ranging from 59.8 to 97.1 and from 52.3 to 95.5, in the smaller and the larger catchment respectively, declines with increasing storm size, which has been classified as a standard response of watershed. The investigation demonstrated also changeability of the CN during a year, with much lower values during the vegetation season.

Banasik K. & D.E. Woodward (2010). "Empirical determination of curve number for a small agricultural watrshed in Poland". 2nd Joint Federal Interagency Conference, Las Vegas, NV, June 27 - July 1, 2010 (http://acwi.gov/sos/pubs/2ndJFIC/Contents/10E_Banasik_ 28_02_10. pdf).
Hawkins R. H. (1993). "Asymptotic determination of curve numbers from data". Journal of Irrigation and Drainage Division. American Society of Civil Engineers, 119(2). pp. 334-345.

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