Hydroinformatics in Hydrology, Hydrogeology and Water Resources (Proc. of Symposium JS.4 at the Joint IAHS & IAH Convention, Hyderabad, India, September 2009). IAHS Publ. 331, 2009, 72-79.

Integration of hydrological modelling with artificial intelligence tools for an agricultural watershed in India

T. V. RESHMIDEVI[1], T. I. ELDHO[2] & R. JANA[3]

1 *Centre for Inter-disciplinary Studies in Environment and Development, ISEC campus, Nagarbhavi, Bangalore- 560072, India*
reshmidevi@isec.ac.in.

2 *Department of Civil Engineering, Indian Institute of Technology Bombay, Powai, Mumbai-400076, India.*

3 *Environmental Assessment Division, Bhabha Atomic Research Center, Mumbai-400 085, India.*

Abstract In this paper, a fuzzy membership-based approach is presented to estimate the surface water potential of an area for supplementary irrigation both in terms of soil moisture stress and feasibility for supplementary irrigation from the nearby surface water bodies. The model is applied to the Gandheshwari sub-watershed in West Bengal, India. With the help of a geographic information system (GIS), a raster-based analysis is performed. The area is divided into cells of 20 m × 20 m spatial resolution. Remote sensing satellite imageries are used to identify the agricultural areas as well as to locate the spatially distributed water bodies in the area. The Natural Resources Service (previously known as Soil Conservation Service) Curve Number-based method is modified and used for the simulation of soil moisture condition in the agricultural fields. Further, a fuzzy membership-based approach is used to aggregate various attributes related to the surface water potential.

Key words artificial intelligence; fuzzy logic; geographic information system; soil moisture; supplementary irrigation