Determination of Phenol and its Derivative in Wastewater by Capillary Electrophoresis

Ali, I. and Hassan Y. Aboul-Enein,

A simple and reliable capillary electrophoresis method was developed for the analysis of phenol, 3-aminophenol, 3-nitrophenol and 4-cyanophenol. The capillary electrophoresis was carried out using a fused silica capillary (60 cm x 75 m m I.D.) and phosphate buffer (10 mM, pH 7.0) as the background electrolyte. The applied voltage was 18 kV with 20 points per second as the data collection. The detection was carried out at 214 nm for all phenols. The values of retention factors (k) ranged from 1.10 to 2.31, separation factors from 1.14 to 2.10 and resolution factors (Rs) from 4.20 to 20.20. The detection range was 0.1 to 1.0 m g/L. The method was developed to determine these phenols in wastewater samples.

Assessing the Vulnerability to Soil Erosion of the Ukai Dam Catchments Using Remote Sensing and GIS

Jain, Sanjay K. and Goel, M. K.

The investigation of basins for planning soil conservation requires a selective approach to identify smaller hydrological units, which would be suitable for more efficient and targeted conservation management programmes. One criterion generally used to determine the vulnerability of catchments to erosion, is the sediment yield of a basin. In India, sediment yield data are generally not collected for smaller sub-catchments and it becomes difficult to identify the most vulnerable areas for erosion that can be treated on a priority basis. An index-based approach, based on the surface factors mainly responsible for soil erosion, is suggested in the study. These factors include soil type, vegetation, slope and various catchment properties such as drainage density, form factor, etc. The method is illustrated with a case study of sub-catchments immediately upstream of the Ukai reservoir located on the river Tapi in Gujarat state, India. The area is divided into 16 watersheds and different soil, vegetation, topography and morphology-related parameters are estimated separately for each watershed. Satellite data are used to evaluate the soil and vegetation indices, which a GIS system is used to evaluate the topography and morphology-related indices. The integrated effect of all the parameters is

evaluated to find different areas vulnerable to soil erosion. Two watersheds were identified as being most susceptible to soil erosion. Based on the integrated index, a priority rating of the watersheds for soil conservation planning is recommended.

Assessment of Sedimentation in the Bhakra Reservoir in the Western Himalayan Region using Remotely Sensed Data,

Jain, Sanjay K. Singh, P. and Seth, S.M.

Hydrological Sciences Journal, 47(2), 203-212, 2002.

Sediment particles originating from erosion processes in the catchment are propagated along with the river flow. When the flow of a river is stored in a reservoir, the sediment settles in the reservoir and reduces its capacity. Thus assessment of sediment deposition becomes very important for the management and operation of such reservoirs. Some conventional methods, such as hydrographic survey and inflow-outflow approaches, are used for estimation of sediment deposition in a reservoir, but these methods are cumbersome, time consuming and expensive. There is a need for developing simple methods, which require less time and are cost effective. In this study, a remote-sensing approach has been attempted for assessment of sedimentation in Bhakra reservoir, located on the Satluj river in the foothills of the Himalayas, Multi date remote sensing data (IRS-1B, LISS II) provided the information on the water-spread area of the reservoir, which was used for computing the sedimentation rate. The revised capacity of the reservoir between maximum and minimum levels was computed using the trapezoidal formula. The loss in reservoir capacity due to deposition of sediments for a period of 32 years (1965-1997) was determined to be 807.35 Mm, which gives an average sedimentation rate of 25.23 Mm year-1. The average rate of sedimentation using hydrographic survey data for the same period was 20.84 Mm3 year-1. A comparison of the results shows that the rate of sedimentation assessed using the remote sensing based approach was close to the results obtained from the hydrographic survey.

Well Loss Estimation: Variable Pumping Replacing Step Drawdown Test

Singh, S. K.

J. Hydraulic Engineering, ASCE, 128(3), 343-348, 2002.

An optimization method is presented for simultaneous estimation of aquifer parameters and well loss parameters utilizing all the drawdowns observed during a variable rate pumping or multiple step pumping test. The proposed method does not require any graphical analysis. It is shown that a variable rate pumping test is a better substitute for the conventional step drawdown test to estimate well loss parameters. It suggests that the pumping rate may be changed frequently without waiting for a near steady state to be reached (or a selected duration, say 60 min) in each step of a conventional step drawdown test. This can result in a substantial saving of time and money involved in conducting a step drawdown test with a view to estimate well loss parameters. This gives a greater number of distinct discharges, which improves the estimates of the well loss parameters. Application of the method is demonstrated on published data sets, the results of which show that the parameters estimated using the new method are more reliable as compared to those obtained using prior methods.

Snow and Glacier Contribution in the Satluj River at Bhakra Dam in the Western Himalayan Region,

Singh, P. and Jain, S. K.

Hydrological Sciences Journal, 47, 93-106, 2002.

Streamflow in the Himalayan rivers is generated from rainfall, snow and ice. The distribution of runoff produced from these sources is such that the streamflow may be observed in these rivers throughout the year, i.e. they are perennial in nature. Snow and glacier melt runoff contributes substantially to the annual flows of these rivers and its estimation is required for the planning, development and management of the water resources of this region. The average contribution of snow and glacier melt runoff in the annual flows of the Satluj river at Bhakra Dam has been determined. Keeping in view the availability of data for the study basin, a water balance approach was used and a water budget period of 10 years (October 1986-September 1996) was considered for the analysis. The rainfall input to the study basin over the water budget period was computed from isohyets using rainfall data of 10 stations located at different elevations in the basin. The total volume of flow for the same period was computed using observed flow data of the Satluj river at Bhakra Dam. A relationship between temperature and evaporation was developed and used to estimate the evapotranspiration losses. The snow-covered area, and its depletion with time, was determined using satellite data. It was found

that the average contribution of snow and glacier runoff in the annual flow of the Satluj river at Bhakra Dam is about 59%, the remaining 41% being from rain.

A Data Driven Algorithm for Constructing Artificial Neural Network Rainfall-Runoff Models

Sudheer, K. P., Gosain, A. K. and Ramasastri, K. S.

Hydrological Processes, 16(6), 1325-1330, 2002.

A new approach for designing the network structure in an artificial neural network (ANN)-based rainfall-runoff model is presented. The method utilizes the statistical properties such as cross-, auto- and partial-auto-correlation of the data series in identifying a unique input vector that best represents the process for the basin, and a standard algorithm for training. The methodology has been validated using the data for a river basin in India. The results of the study are highly promising and indicate that it could significantly reduce the effort and computational time required in developing an ANN model.

Aquifer Diffusivity and Stream Resistance from Varying Stream Stage

Singh, S. K., Mishra, G. C , Swamee P K and Ojha, C. S. P.

J. Irrigation and Drainage Engineering, ASCE, 128(2), 57-61, 2002.

An efficient method that uses discrete ramp kernel is proposed for obtaining the piezometric head in an aquifer due to an arbitrary variation in stream stage considering stream resistance. The method assumes straight line variation between two consecutive points in representing the arbitrary stream stage variation. Expression for the ramp kernel is derived for homogeneous and isotropic aquifer conditions. Using the method, the stream resistance and hydraulic diffusivity of the aquifer are estimated for a set of published data. It is observed that the hydraulic diffusivity should be estimated along with the stream resistance for a better estimation of aquifer diffusivity.