World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:11, No:06, 2017

Modelling Interactions between Saturated and Unsaturated Zones by Hydrus 1D, Plain of Kairouan, Central Tunisia

Authors : Mariem Saadi, Sabri Kanzari, Adel Zghibi

Abstract : In semi-arid areas like the Kairouan region, the constant irrigation with saline water and the overuse of groundwater resources, soils and aquifers salinization has become an increasing concern. In this study, a methodology has been developed to evaluate the groundwater contamination risk based on the unsaturated zone hydraulic properties. Two soil profiles with different ranges of salinity, one located in the north of the plain and another one in the south of plain (each 30 m deep) and both characterized by direct recharge of the aquifer were chosen. Simulations were conducted with Hydrus-1D code using measured precipitation data for the period 1998-2003 and calculated evapotranspiration for both chosen profiles. Four combinations of initial conditions of water content and salt concentration were used for the simulation process in order to find the best match between simulated and measured values. The success of the calibration of Hydrus-1D allowed the investigation of some scenarios in order to assess the contamination risk under different natural conditions. The aquifer risk contamination is related to the natural conditions where it increased while facing climate change and temperature increase and decreased in the presence of a clay layer in the unsaturated zone. Hydrus-1D was a useful tool to predict the groundwater level and quality in the case of a direct recharge and in the absence of any information related to the soil layers except for the texture.

Keywords : Hydrus-1D, Kairouan, salinization, semi-arid region, solute transport, unsaturated zone
Conference Title : ICWRP 2017 : International Conference on Water Resource and Protection
Conference Location : Venice, Italy
Conference Dates : June 21-22, 2017