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A model to assess the transmission losses along an arid course stream: the Paran course, Israel case

Gefen Ronen-Eliraz (1), Dody Avraham (2), Dan G. Blumberg (1), Hanan Ginat (3), and Ofer Dahan (4)

(1) The Department of Geography and Environmental Development, Ben-Gurion University of the Negev, Beer-Sheva, Israel (gefenre@gmail.com), (2) NRCN, Israel, (3) Dead Sea & Arava Science Center, Kibbutz Ketura, 88840, Israel, (4) Department of Environmental Hydrology, Ben-Gurion University, Sde-Boqer 84990, Israel

Appropriate management of groundwater, runoff and water supplies in extreme arid regions is essential to the livelihood of these areas. Knowing the potential recharge of the aquifer is an important step in management planning and estimating the effects of possible climate change on water resources.
The Paran course is the largest basin draining from the western side of the Arava valley, southern Israel. Floods and runoffs at the Paran often result from rain initiating in the Sinai or Negev mountains and constitute a significant potential for water recharge resource to the Arava desert aquifers.
Even though the process of water recharge is affected by a multitude of different variable, we found that it is possible to describe the main pattern of those variables using a common and simple model with a geometric progression decrease. In this model we demonstrate the ability to calculate and predict the decrease of water discharge. Moreover the increase and decrease of the groundwater level, in response to the flood wave, can be calculated according to the exact same model.
In harmony to the hydrograph and groundwater level pattern, we assume that the transmission losses will show a similar behavior. Accordingly we established a model to describe the transmission losses of floodwater along a stream course. Respectively, the model calculates the transmission losses where data is being collected from two different hydrometric stations along the same course and when there are no tributaries contributing additional water to the volume measured at the upstream station.
In order to calculate the transmission losses using the model, it is necessary to first calculate the common ratio of each specific flood event. According to the data collected in this research, the common ratio seems to be very similar for all flood events measured in the Paran course. This implies that the common ratio determined by a stream course is more significant than the flood characters. This conclusion is significant since it seems like it is possible to use the common ratio value as a stream course coefficient and then to assess transmission losses by this course coefficient using data collected in one station only.