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Evaluation of the Results of Land Use Changes on the Discharge of Darre Rood River in A Period of 30 Years Using the SWAT Model

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1-Introduction

In general, land use change is done by human activities that increasing the level of agriculture, deforestation, grazing and urbanization are examples of these human activities that have led to land use change (Vansa et al., 2020: 194). Land use and land cover in river basins are dynamically changing with the changes in the region's population, climate change and local policies, and at the same time, land use changes are also effective factors in regional or global environmental changes and the answer Runoff from land use changes both the freshwater regional conditions and the available amount of water resources (Chen et al., 2020: 1). Land use changes directly affect evapotranspiration, groundwater infiltration and surface runoff. Land use change is an important issue in terms of global dynamics and their response to environmental, economic and social stimuli (Sprus et al., 2020: 1).

2-Methodology

This basin is located in the geographical position of 47 6 34 to 47 51 21 east longitude and 38 27 54 to 39 28 19 north latitude and flows with the south-north trend and leads to Aras River. This basin with a minimum of 200 meters and a maximum of 4811 meters, which is the lowest height in the estuary of the river and the highest altitude includes the peak of Sabalan in the southern part of the basin (Figure 1).

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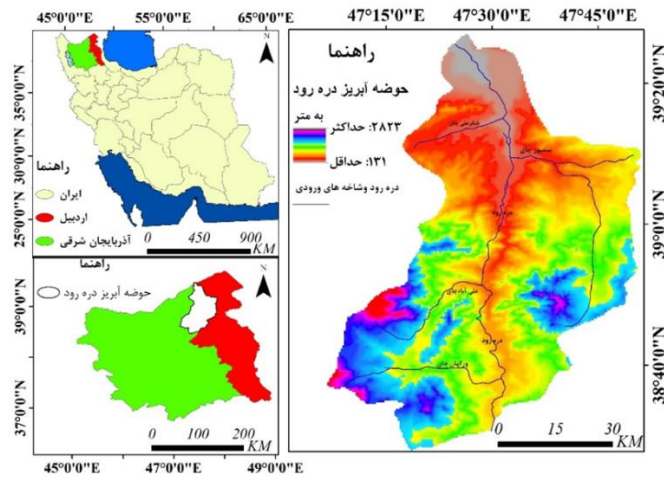


Fig (1): Geographical location of Darre Rood catchment

The data used in this study are: 1- Landsat images, including sensors (TM and OLI) with a path of 168 with a passage of 33 with a spatial resolution of 30 meters related to 1990 and 15 meters for 2019. 2- Digital model of height (DEM) with a spatial resolution of 30 meters and a 1: 50000 topographic map for drawing (Figure 1). 4- River discharge statistics and daily rainfall of the basin received from Mashiran and Bran hydrometric stations from Ardabil Regional Water Organization 5- SWAT model to estimate runoff changes in the basin. 6- Soil hydrology layer to estimate the permeability of the catchment basin. East Azerbaijan Province Natural Resources Department.

3- Results and Discussion

Using four spectral indices (NDVI, GVMI, EVI, CIG) and the characteristics of the average visible bands and the brightness of the image and the shape of the objects, the images were classified into fourteen classes and the land use of the basin was extracted in 1990 and 2019 (Figures 2 and 3). According to the model implementation, the following results were presented, which indicate a decrease in river discharge and irregular flow during the seasons (Figures 4 and 5, Table1).

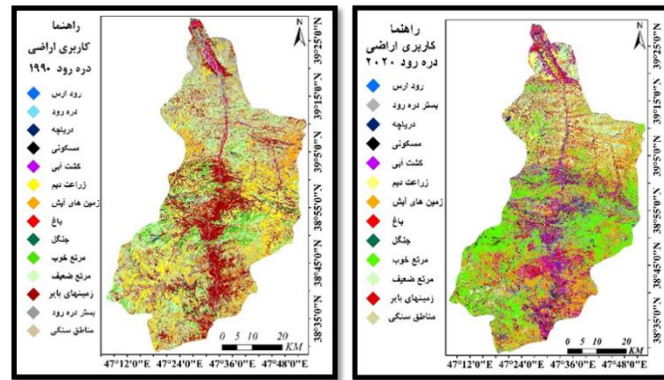


Fig. (2&3): Land use changes in Darreh Rud catchment between 1990 and 2019

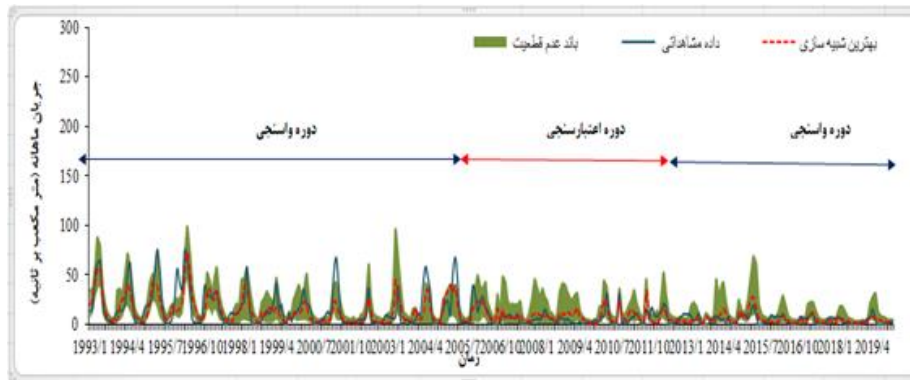


Fig. (4): Calibration and validation results of SWAT model with SUFI2 algorithm in Darreh Rud Basin

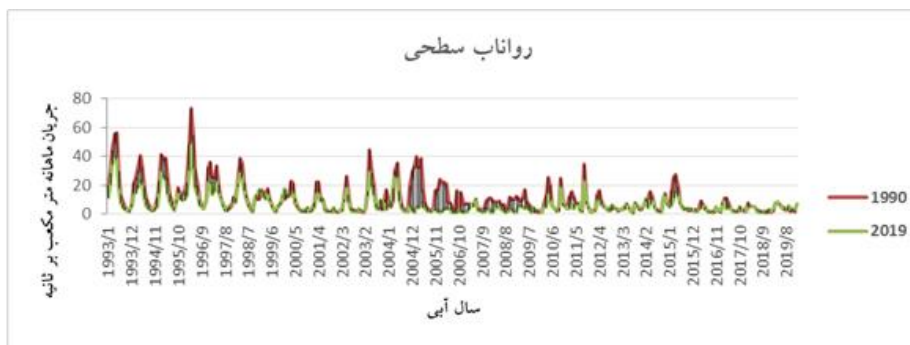


Fig. (5): Surface runoff diagram of two scenarios simulated with SWAT model

4-Conclusions

Darrehrood river in the parts where the bed and plain widens, with the intervention of local farmers to increase cultivated lands, construction of bridges and stone and cement walls along the river, uncontrolled abstraction of river water, construction of livestock stalls and Poultry is faced in the river and digging cubic wells to collect groundwater. By reducing the flow of the river during the warm seasons of the year, it causes gardeners to use the empty river banks and reduce the width of the riverbed by occupying the river banks, which can also cause significant human and financial damages in critical situations. In addition, it should be an important factor in increasing the amount of river sediment, which is proven in studies (Samadzadeh et al., 2013: 178-153) and reduces the productivity of the mansion dam.

Keywords: Land use change, object-oriented classification, SWAT model, SCS method, North Western Iran.

5-References

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