



Climate and Land Use Changes May Affect Groundwater Resources

Japanese researchers have analysed the effects of climate and land use changes on underground freshwater resources in coastal areas, and estimated the groundwater loss due to saltwater intrusion. The results suggest that in arid areas, the fresh groundwater loss increases as the percentage of forest cover increases. Deforestation may increase the recharge of existing fresh groundwater sources in these arid areas.

According to the World Meteorological Organisation, only 2.5% of the total volume of water in the world is freshwater. One of the most important sources of freshwater lies underground, and is known as groundwater. The use and exploitation of these reservoirs have increased in response to increased water demand, as a supplementary source to surface water (rivers and lakes). In some places, groundwater can be the only source of freshwater. Coastal aquifers, which are underground sources of freshwater in coastal areas, are a very important source when considering the water resources in areas bordering the sea. These sources are in contact with or close to saline water, and therefore, the intrusion of salt water caused by both natural and man-made processes has become a major threat to the sustainability of such reservoirs. This process is known as salinisation. The development of tools to facilitate prediction of the behaviour of these aquifers under different conditions is crucial for the adequate management of groundwater systems in coastal areas.

Japanese researchers have evaluated the effects of climatic and land use changes on the freshwater resources in coastal areas. They have also studied the dynamics that are established between saltwater and freshwater in groundwater resources due to salinisation in these areas. They have used a numerical based model to estimate the freshwater loss in coastal aquifers due to salinisation under different climate change scenarios, land use patterns, and hydrologic soil conditions. The aridity index was introduced in the model to represent variations in precipitation and temperature.

The results suggest that in arid areas, the agricultural lands provide high groundwater recharge whereas forested land favours a low recharge for all the soil conditions considered. A very interesting finding of the study was that deforestation seems to lead to increased recharge of groundwater resources in arid areas because it contributes to a decrease in the local evapotranspiration, even though it favours run off.

The authors state that numerical modelling could enhance knowledge of the saltwater intrusion process. Despite certain uncertainties in the model, the authors argue that this tool could be very useful in areas with limited hydrological data.

This study provides new insights into the effects of climate and land use changes on groundwater resources in coastal areas. The results of this study could assist planners and decision makers to develop better land use and water resource management practices that could minimise natural and anthropogenic impacts on groundwater resources.

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