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ASSESSMENT OF POTENTIAL IMPACTS OF CLIMATE CHANGE ON RECHARGE TO GROUNDWATER IN THE GRAND RIVER BASIN, WITH VISUAL-HELP MODEL

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ABSTRACT

The implications of climate change are evaluated to assess impacts to groundwater recharge rates for the Guelph region of the Grand River Basin in Canada to year 2050. The analyses include assessment of several climate change models and alternative vegetation and soil strata as inputs to the water balance and ultimately, how much of the infiltration into the surface soil becomes percolation to groundwater. While the climate change impact assessments indicate the evapotranspiration is increased and percolation is decreased during the summer, increased percolation in the winter creates an overall net increase in percolation because of the additional freeze/thaw dimensions of climate change. The net effect is that climate change is expected to increase groundwater recharge by 10 and 11 percent, respectively, using the GISS and GFDL models.

Adjustment in the vegetative species is demonstrated as a possible adaptation strategy to climate change to increase groundwater recharge by shifting vegetative species to species with lesser rootzone depths, resulting in an increase of percolation of 7 percent.

Keywords: Climate change, Evapotranspiration, Groundwater recharge, GCM models, Grand River watershed, HELP model, Runoff, Percolation.