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## Hydrological responses of a watershed to historical land use evolution and future land use scenarios under climate change conditions

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**Abstract.** Watershed runoff is closely related to land use but this influence is difficult to quantify. This study focused on the Chaudière River watershed (Québec, Canada) and had two objectives: (i) to quantify the influence of historical agricultural land use evolution on watershed runoff; and (ii) to assess the effect of future land use evolution scenarios under climate change conditions (CC). To achieve this, we used the integrated modeling system GIBSI. Past land use evolution was constructed using satellite images that were integrated into GIBSI. The general trend was an increase of agricultural land in the 80's, a slight decrease in the beginning of the 90's and a steady state over the last ten years. Simulations showed strong correlations between land use evolution and water discharge at the watershed outlet. For the prospective approach, we first assessed the effect of CC and then defined two opposite land use evolution scenarios for the horizon 2025 based on two different trends: agriculture intensification and sustainable development. Simulations led to a wide range of results depending on the climatologic models and gas emission scenarios considered, varying from a decrease to an increase of annual and monthly water discharge. In this context, the two land use scenarios induced opposite effects on water discharge and low flow sequences, especially during the growing season. However, due to the large uncertainty linked to CC simulations, it is difficult to conclude that one land use scenario provides a better adaptation to CC than another. Nevertheless, this study shows that land use is a key factor that has to be taken into account when predicting potential future hydrological responses of a watershed.

- [Final Revised Paper](#) (PDF, 681 KB)
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