



Predicting losing and gaining river reaches in lowland New Zealand based on a statistical methodology

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The phenomenon of losing and gaining in rivers normally takes place in lowland where often there are various, sometimes conflicting uses for water resources, e.g., agriculture, industry, recreation, and maintenance of ecosystem function. To better support water allocation decisions, it is crucial to understand the location and seasonal dynamics of these losses and gains. We present a statistical methodology to predict losing and gaining river reaches in New Zealand based on 1) information surveys with surface water and groundwater experts from regional government, 2) A collection of river/watershed characteristics, including climate, soil and hydrogeologic information, and 3) the random forests technique. The surveys on losing and gaining reaches were conducted face-to-face at 16 New Zealand regional government authorities, and climate, soil, river geometry, and hydrogeologic data from various sources were collected and compiled to represent river/watershed characteristics. The random forests technique was used to build up the statistical relationship between river reach status (gain and loss) and river/watershed characteristics, and then to predict for river reaches at Strahler order one without prior losing and gaining information. Results show that the model has a classification error of around 10% for “gain” and “loss”. The results will assist further research, and water allocation decisions in lowland New Zealand.