

# **Freedom Space for Rivers: An economical approach to sustainable management in a changing climate**

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Giving more space to rivers is increasingly considered as an alternative to constraining engineering approaches. The “freedom space” of rivers corresponds to zones that are frequently flooded or actively eroding, together with riparian wetlands. According to Provincial Policy, projects in Ontario consider natural hazards in planning development. However, the “freedom space” concept goes further to envisage retreat of certain management practices, for example agricultural cropping, to enable re-establishment of a long-term, functional stream corridor that offers greater resilience to climate change.

Freedom space limits were mapped for the Yamaska, De La Roche and Matane rivers in southern Quebec. This built on techniques already established in Ontario, but also utilized alternative methods of flood risk mapping based on hydrogeomorphological techniques and an approach to combining different levels of flood and erosion risk within the definition of the freedom space.

Freedom spaces defined for the three rivers were subsequently used to assess the long-term societal value of the approach. Costs include loss or limitations to the right of farming and construction, whereas benefits are avoided costs for existing or future bank stabilization and avoided costs of flooding in agricultural areas. The economic value of ecosystem services, provided by riparian wetlands and increased buffer zones, were also included.

Results show net present values ranging from CDN\$0.7 to \$3.7 million for the three rivers, with ratios of benefits over costs ranging between 1.5:1 and 4.8:1. Using a lower discount rate of 2%, which allows for the long-term ecosystem services to be taken into account, results in ratios ranging between 2.3:1 and 7.1:1. River management based on freedom space for these three rivers is thus beneficial for society over a 50-year period. The presentation will outline the methods utilized and lessons learnt, in the hope that such an approach could be applied to rivers.