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Conceptual models and sustainable groundwater resource indicators as transfer tools to stakeholders of the Lake Champlain transboundary aquifer

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Regional aquifer assessments produce a wealth of scientific and technical information that is essential for the sound management of groundwater resources. However, regional water stakeholders are not generally groundwater specialists and cannot be expected to readily handle specialized hydrogeological maps and data. Without efficient information transfer, groundwater resources cannot be adequately considered in water governance by watershed organizations and in land-use planning by regional municipalities. This presentation provides an overview of the efforts undertaken to transfer information as part of a four-year regional aquifer assessment in the transboundary Canada-USA Champlain Lake watershed, with an emphasis on the southern Quebec part. This project was part of both the provincial aquifer assessment program (*Programme d'acquisition des connaissances sur les eaux souterraines*, PACES) of the Quebec Environment Ministry and the *National inventory of regional key aquifers* of Natural Resources Canada.

In Quebec, the study area extends over 9 000 km^2 and includes three major watersheds and 106 municipalities with 792 000 inhabitants. Five distinct hydrogeological contexts were defined based on bedrock geology and hydrogeological conditions: St. Lawrence Lowlands (North and South), Appalachian Piedmont, Appalachian Uplands, and Monteregian Hills. Extensive fieldwork filled knowledge and spatial data gaps identified during the compilation of existing data. To illustrate hydrogeological contexts, two conceptual models of different areas were developed. These conceptual models reflect three aspects of aquifer conditions: geological context, groundwater dynamics and groundwater quality. The first representation of the conceptual model presents the geological context including typical surficial geology units as well as major bedrock geology units (including faults and dykes). The second representation shows schematic groundwater flow paths, relative well yields of aquifer units, confinement conditions, as well as recharge and discharge zones. The third representation provides information on groundwater quality and aquifer vulnerability. These conceptual models proved invaluable tools to clearly explain to water stakeholders basic hydrogeological facts and concepts as well as key issues pertaining to each of the regional contexts.

To portray the state of groundwater resources in a more accessible way to water stakeholders, indicators of sustainable groundwater management were also produced on the basis of specialized hydrogeological maps and regional statistics. These indicators were based on the five objectives of sustainable management defined by the Canadian Council of Academies. Water stakeholders were consulted on the relevance and interest of indicators and their usability to identify key issues and priority action areas. Indicators were also found of interest as communication tools to better convey information about the state of groundwater resources to non-specialists. These indicators thus represent a basis for the development of a regional groundwater management plan. However, further efforts are needed to enhance the knowledge of stakeholders about groundwater resources and to develop a participative approach for the development of a regional groundwater management plan.