

Performance Indicator Summary

Performance indicator: Theoretical number of expropriated properties

Technical Workgroup: Coastal TWG – Lower river

Research by: Environment Canada, Meteorological Service of Canada – Hydrology (Bernard Doyon *et al.*)

Modeled by: B. Doyon (in the Flood Damage Assessment System), and also B. Werick (in the STELLA Shared Vision Model)

Activity represented by this indicator: Based on provincial government rules, this Performance Indicator allows, for a given water level, the appraisal of the theoretical number of expropriated properties among residences located within the St. Lawrence River 100-year floodplain.

Link to water levels: This PI is based on government rules establishing whether or not a property owner should receive an indemnity for his loss or, on the contrary, be dispossessed of his property because it is too severely damaged and, or, too exposed to future risks.

Importance: We believe that economic PI are not sufficient to fully describe the impacts of a flood on communities and therefore societal PI – such as the theoretical number of expropriated properties – have been established to form the basis of a socio-economic assessment tool for flooding. As a result, some PI measure the damage in terms of dollars while others account for societal aspects of the damage. However, they all reflect direct damage.

Performance Indicator Metrics: Number of residences.

Temporal validity: Each impact function representing this PI should be updated after a major flood event – or at least each time a house has been torn down or moved. It should be noticed that this PI loses some accuracy each time a property owner applies mitigation measures against flooding to its property – such as raising or moving the house. This PI concerns the houses that are most prone to flood damage. Moreover, because there are a limited number of such houses, each mitigative measure should be taken into account by the corresponding impact function.

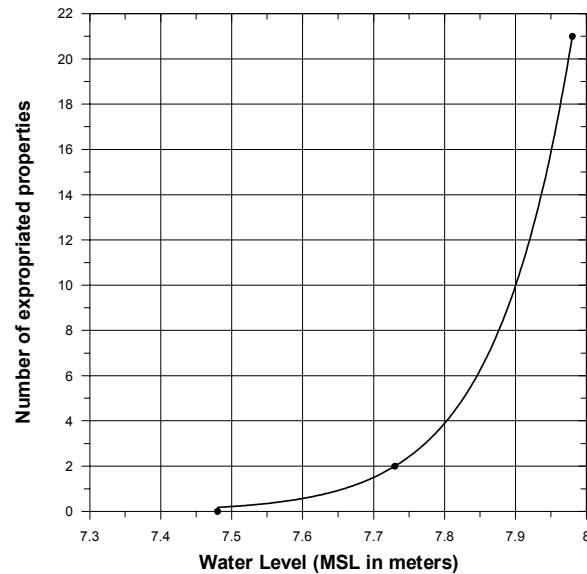
Spatial validity: One impact function has been developed for every municipality where at least one building lies within the 100-year floodplain. Each impact function is geo-referenced and associated with a specific hydrometric station. The impact functions are not interchangeable.

Links with hydrology used to create the PI algorithm: Each impact function is constructed by aggregating the theoretical number of expropriated properties of a given municipality for different water levels. Once the curve is complete, the theoretical

number of expropriated properties for a municipality is simply obtained by reading on the graph the number of houses corresponding to the water level observed at the associated hydrometric station.

As with the other impact functions, this function is also site-specific, *i.e.* it allows the appraisal of the theoretical number of expropriated properties for a given municipality. Thus, the function must be solved at the location of its corresponding hydrometric station.

The Algorithm: The theoretical number of expropriated properties can be evaluated at any time during a simulation and for any water level. However, it is more appropriate to use this PI in conjunction with the PI allowing assessment of the damage on residential buildings. Therefore, the theoretical number of expropriated properties should be evaluated with the flood peak. Assessing the theoretical number of expropriated properties associated with the maximum water level provides a better understanding of the extent of the damage resulting from the flood.



Validation: Due to the lack of data on that issue – to our knowledge, only one cottage were completely destroyed by the 1998 flood – the impact functions have been broadly validated. It should be added that this PI concerns only houses with severe flood damage, a situation unseen since the major flood of 1976.

Documentation and References:

Doyon, B., Dallaire, É., Roy, N., Morin, A. and J.-P. Côté (2004). Estimation des dommages résidentiels consécutifs aux crues du fleuve Saint-Laurent. Technical Report MSC Quebec Region – Hydrology RT-133, Environment Canada, Ste-Foy, 41 pages (in French).

Doyon, B., Morin, A., Roy, N., Dallaire, É. and J.-P. Côté (2004). Assessment of Flood Damage: Impact Functions for the Lower St. Lawrence. Technical Report MSC Quebec Region – Hydrology RT-128, Environment Canada, Ste-Foy, 27 pages + Appendix.

Risk and uncertainty assessment: We are confident that this PI will allow a good appraisal of the theoretical number of expropriated properties. However, we insist on the theoretical aspect of the PI because we know for a fact that, in the past, some property owners who should have been dispossessed of their property were not, simply because they did not ask for any indemnity thus avoiding them to lose their vested rights.