Summary of Strategy for Addressing Climate Uncertainty Affecting Lake Champlain-Richelieu River Flooding

by the Flood Management and Mitigation Measures Technical Working Group

International Lake Champlain Richelieu River Study Board

The International Lake Champlain-Richelieu River Study Board is pleased to release its report A Strategy for Addressing Climate Uncertainty Affecting Lake Champlain-Richelieu River Flooding. The Study Board was tasked with identifying the causes, risks, impacts and potential solutions to flooding in the LCRR basin. Study experts continue to carry out research into both structural and non-structural solutions to flooding in the basin. As the Board explores potential options, it is examining how climate change is affecting the hydrology of the basin and how this may impact the effectiveness of the various solutions under consideration. This report describes the strategy being used for this watershed.

To understand the effects that climate change could have on future water supply, levels and flows in the LCRR basin, the Study is applying the International Joint Commission's Climate Change Guidance Framework. It follows the process of decision scaling. Decision scaling is used to evaluate potential flooding solutions given the uncertainty of how climate change will affect factors in the basin such as net basin supply and river and lake levels and flows.

Decision scaling goes beyond making climate projections, which are inevitably uncertain, by linking potential impacts and plausibility of extreme climate scenarios to policy making.

Net Basin supply (NBS)

NBS = Precipitation + Runoff - Evaporation

The Study is approaching decision scaling from four perspectives. Initially, decision scaling will be carried out by applying each perspective individually and later it will be done by combining them to build robustness to how the study anticipates the effects of climate change in the basin.

Stochastic Model

The first perspective uses statistics. This model uses historical climate data from the basin to predict the likelihood of future floods. Study scientists are developing scenarios to estimate net basin supply. These scenarios are based on three different assumptions about the patterns in historic water supplies that help predict patterns in future water supplies. The supplies can be translated into water levels, flows, extent of flooding and depths and damages when used as inputs to a series of computer models. These scenarios are particularly useful in estimating benefit-cost ratios for potential structural solutions to flooding. If the benefit-cost ratio is high, the potential solution would represent one that would provide less risk and higher benefit if implemented.

Probable Maximum Flood Scenario

The second perspective is a probable maximum flood scenario. The historic 2011 flood was the product of three key factors: a heavy snowpack, spring temperatures that preserved much of that snow, and heavy precipitation in March and April in the region, which quickly melted the snow. The probable maximum flood scenario considers the possibility that each of those three factors could be greater individually and could then act together to create a larger flood than in 2011. This type of scenario has been used to avoid flood project designs that could cause catastrophes if a flood project were to fail. In addition, this concept could be useful in delineating boundaries for where floodplain management recommendations might be most stringent.

Weather Generator

The third perspective is referred to a stress testing. To run this stress test, study experts incrementally increase average annual temperature and precipitation amounts and a weather generator is used to create inputs to a basin model thus producing net basin supplies to Lake Champlain. This allows them to calculate the effect these changes have on flood levels and damages. Results can then be compared to a wide range of precipitation and temperature projections from various climate models, allowing the study experts to map the range of flood impacts projected by those models.

Global/Regional Climate Models

The fourth perspective is to create a basin model inputs from global and regional climate model projections over time, generating net basin supplies that might occur under different greenhouse gas emission scenarios at future times in the 21st century. The regional and global climate models are used to determine whether or not the scenarios generated under the stress test are plausible.

The four perspectives will be combined in various ways to challenge and refine the findings from the individual perspectives about likely Lake Champlain levels in the 21st century. These perspectives will assist the Board in developing recommendations for flood response plans and floodplain management. A climate report will be developed to share outcomes of the various models on their own and when they are combined.

To learn more about the Study's approach to assessing climate change in the basin, and applying decision scaling to its recommendations, consult the report, A Strategy for Addressing Climate Uncertainty Affecting Lake Champlain-Richelieu River Flooding and watch the Study Board's recent webinar on this topic.

DECISION SCALING PROCESS

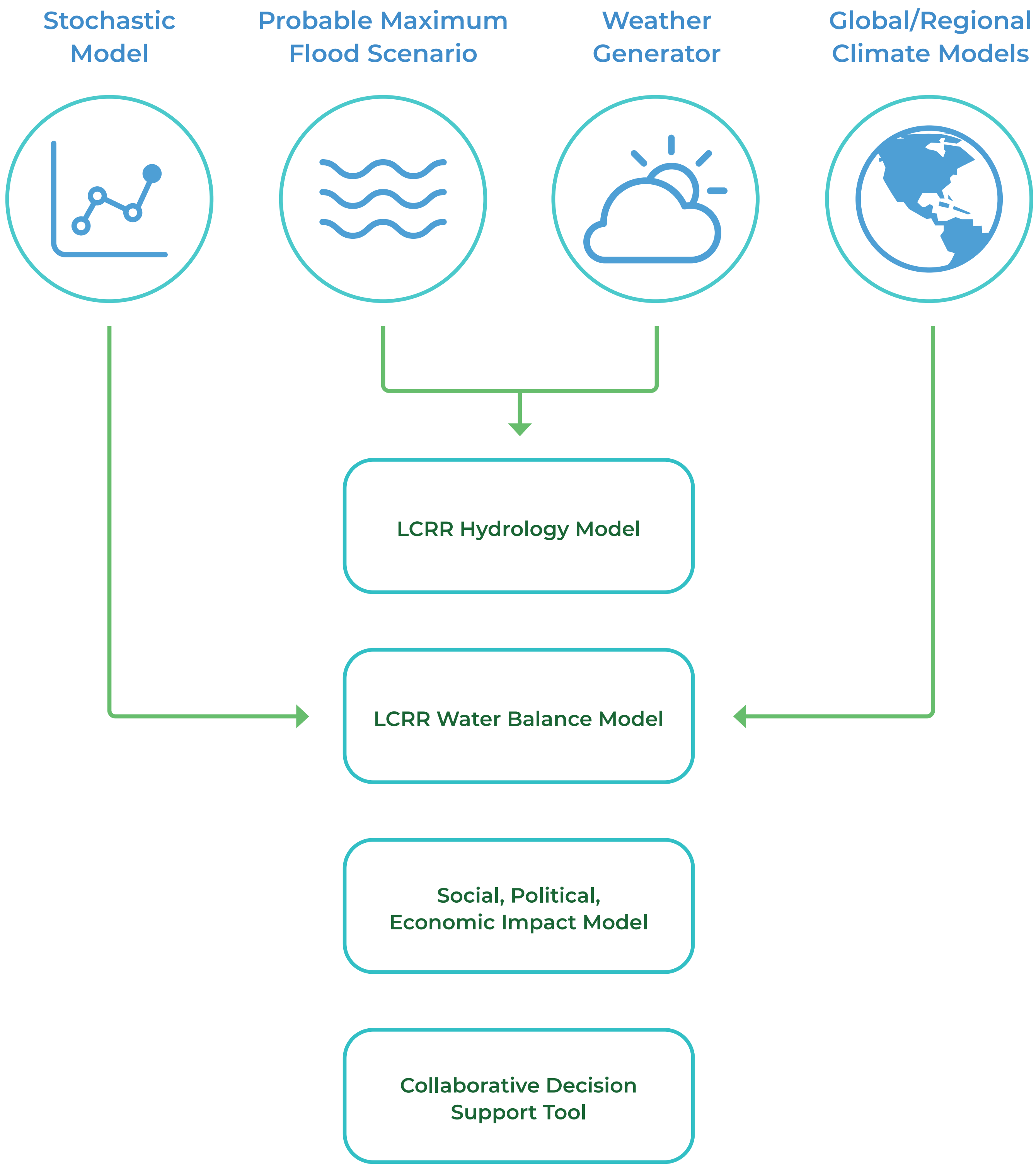

Figure 1 *Decision scaling process, through which study recommendations are considered*