FloodNet Briefing
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Standards for urban infrastructure design in Canada need to be updated

100-year extreme events that are the basis for infrastructure planning have recently occurred every 10 years

Calgary flooding in 2013: In recent decades, extreme storm events across Canada have occurred more often than urban planning standards predict, causing severe damage at a cost of billions of dollars to properties and the population. This research suggests that municipal planning criteria (IDF curves) need to be reviewed and regularly updated to reflect the current reality.

There is compelling evidence that current design criteria for municipal infrastructure – the essential elements needed to mitigate and manage water-related damage to extreme weather events – need to be revisited. Studies by the FloodNet Research Team show that, while infrastructure planning is based on a 100 to 200-year return period, the reality is that these extreme events have been occurring in several Canadian locations once every 10 years.

Studies were across Canada. An example is Central Alberta, which experienced several extreme weather events in 1995, 2004 and 2012. It shows that, in this context, the current design criteria for the City of Edmonton are obsolete, as its current infrastructure design standards do not reflect the reality of extreme weather events.

The study also refers to extreme flood events of Calgary and Toronto in 2013, ranked as the first and third largest natural disasters in Canada. In Calgary some 10,000 basements were flooded and 100,000 people evacuated, with total damage exceeding $5 billion CAD. Edmonton was badly flooded in 1995, 2004 and 2012. According to the city's current design standards, these were supposed to be 100 or 200-year floods. Based on these observations, the research team says that the design standards for urban infrastructure in many Canadian cities are likely to be faced by more acute weather events with the potential intensification of climate change.

To decrease potential damage expected from anticipated more frequent intensive storms, FloodNet Team recommends that municipal design standards are updated. Specifically, this research team calls on city planners and national infrastructure decision makers to revise Intensity-Duration-Frequency (IDF) curves that are the basis for long term infrastructure and design.

To minimise the future risk of flood hazards, municipal decision makers need to revisit current policies on drainage services for Canadian cities. New policies should require that municipal engineers and planners periodically update urban infrastructure design standards to include the latest observed data available.

For municipal engineers, this means updating the IDF curves. The update and approval by municipal policymakers should be done every decade, to ensure that future urban infrastructure is designed to reflect the probability of more frequent extreme weather events. A further ongoing task for municipal planners is to regularly review the safety of existing infrastructure and take action if designs and structures do not reach the new standards. Actions can include enlargement of existing flood drainage infrastructure or mitigation measures such as replacing concrete with permeable or perforated pavements in areas classified as floodplains or high-risk flood areas.

The FloodNet Team is currently working in developing a Canadian Flood Estimation Handbook and Toolbox that will facilitate the evaluation and updating of urban infrastructure design standards.

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