



Impact of Climate Change to Flood in Klang River Basin

Workshop on Disaster Resilient Cities:

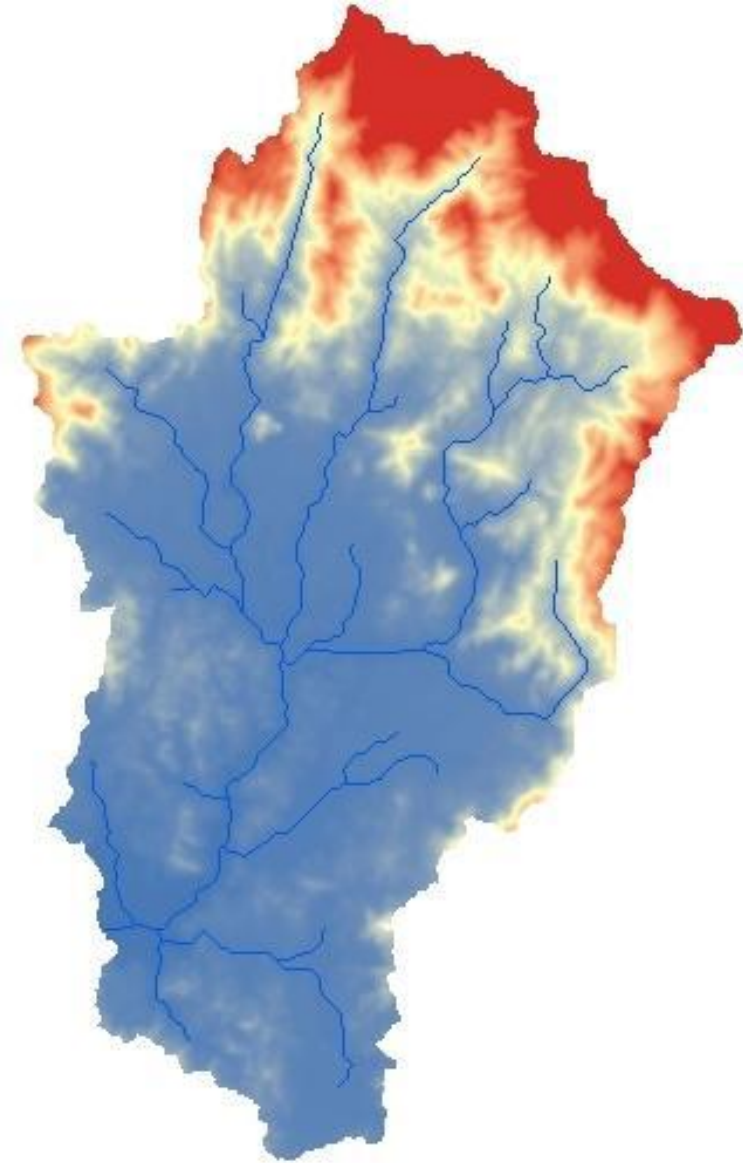
Advances in Meteorological Forecasting and Hazards Assessment

28 June – 29 June 2018

Background

Klang River Basin

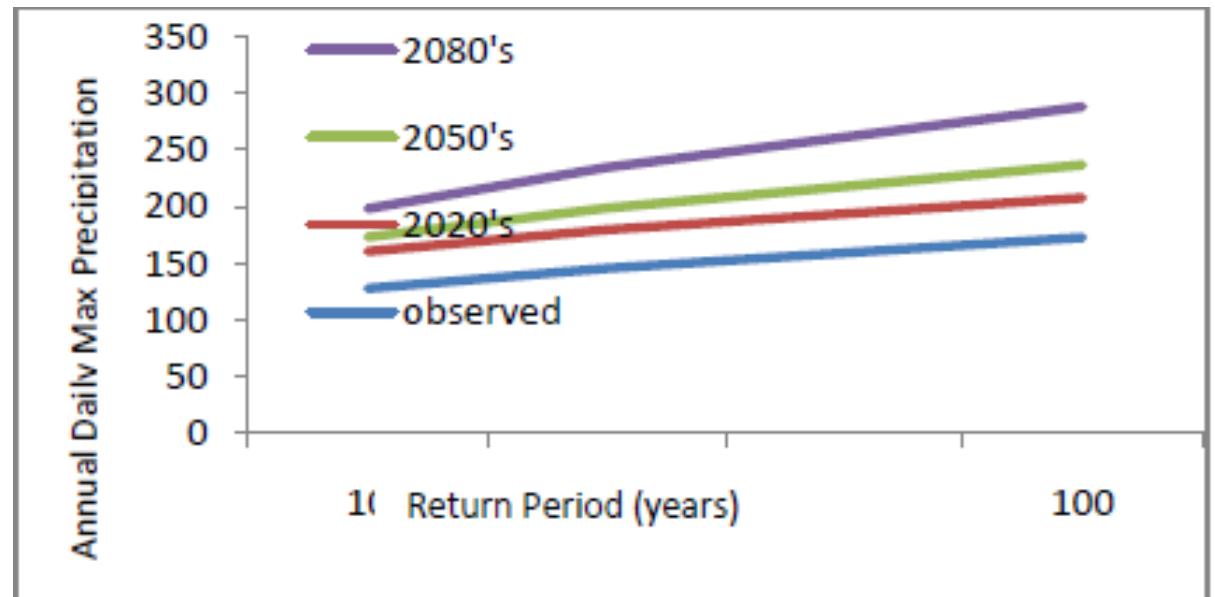
- Located between Selangor and Wilayah Persekutuan Kuala Lumpur
- Channel length : 120 km
- Catchment area : 1,288 km²
- Estimated population : > 3.6 mil
- Growth rate : 5% per year



Background (cont.)

- The graph shows observed annual daily maximum rainfall for the period 1975 – 2001 and three future projections generated under A2 scenario (HadCM3 GCMs)
- The result shows increasing precipitation scenario.
- Assumption made flood occurrence also increase.
- Urbanization + climate change increased the risk of flood to the basin.

Frequency analysis results of Kampung Sungai Tua Station at Klang River Basin



(Source: Kabiri et. al., 2012)

Mitigation Measure

Structural

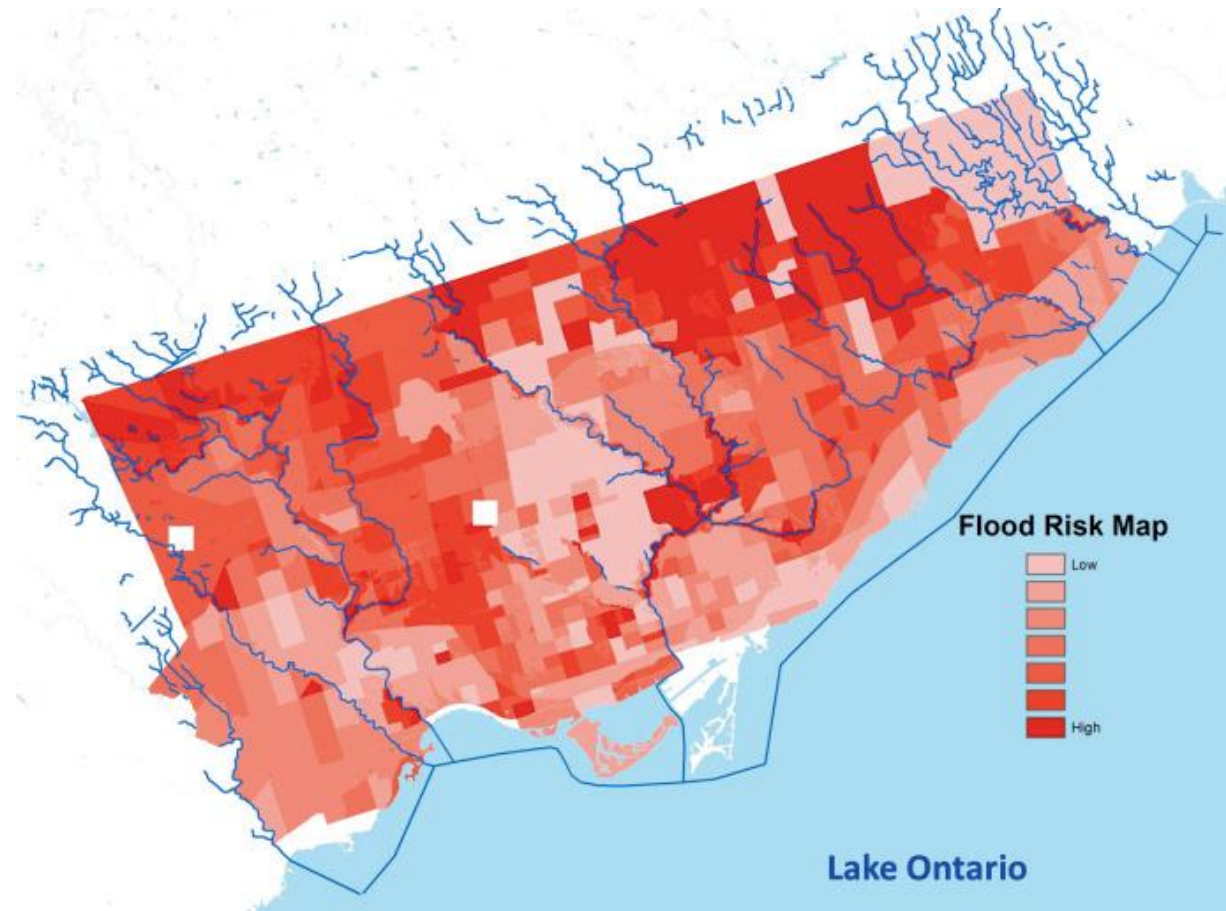
- Batu Dam
- Klang Gates Dam
- Stormwater Management and Road Tunnel (SMART)

Non-structural

- Flood forecasting
- Early warning system
- Flood hazard map
- Awareness campaign
- Education program

Example:

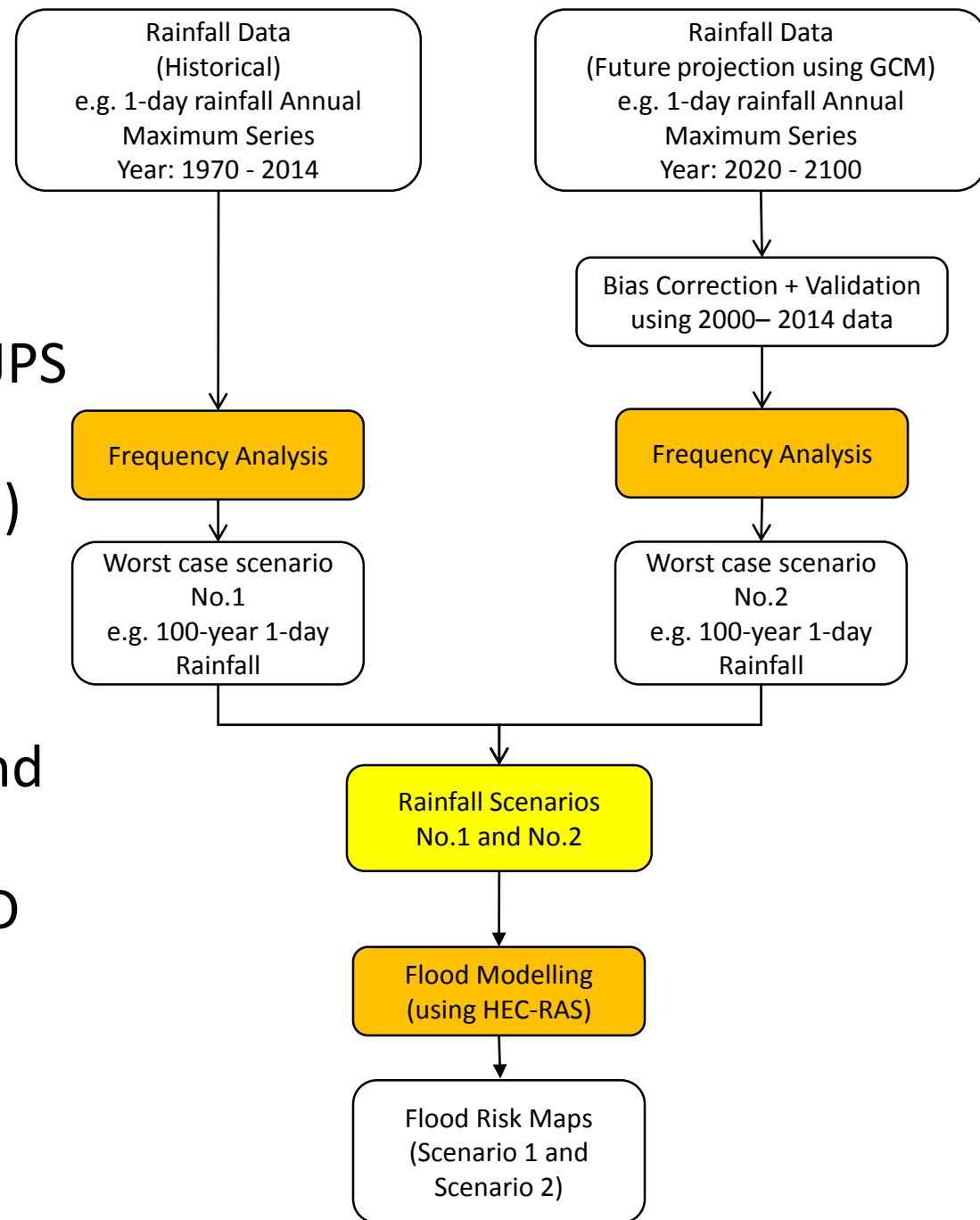
City of Toronto flood risk map



(Source: C. Armenakis and N. Nirupama, 2014)

Methodology

- Historical data is obtained from JPS
- Future data is projected from General Circulation Model (GCM) (MRI-AGCM3.2s - Japanese GCM model)
- The GCM model has 20 km resolution climate projections and scenario used is RCP8.5.
- Flood model used is HEC-RAS (1D model)
 - Input : rainfall and geometry data



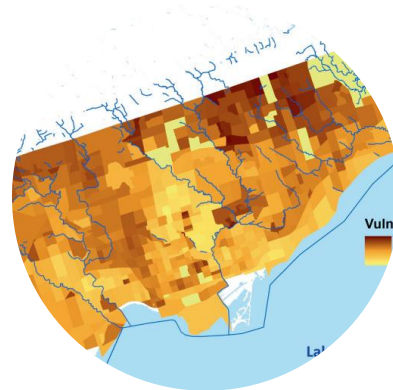
Methodology (cont.)

- Flood risk map is generate by integrating hazard map and vulnerability.
- Risk equation :

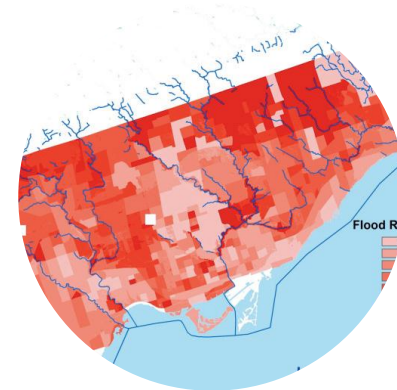
$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$



Hazard map



Vulnerability



Risk map

Conclusion

- Expected finding is to produce flood hazard map and flood risk map for Klang River Basin.
- Flood risk map can enhance city's flood mitigation and preparedness planning.
- It also help public understand the risk of flood in their surrounding.