Extreme Precipitation

Unusually intense or prolonged precipitation that exceeds typical amounts for a given area.

EXTENTS	CONSEQUENCE
LOCAL-REGIONAL	LOW

TYPE	DURATION	SEASONALITY	WARNING TIME	LIKELIHOOD
SHOCK	HOURS-DAYS	WINTER	DAYS-WEEKS	LIKELY

About the Hazard

Extreme precipitation can occur as sudden, torrential downpours or persistent heavy rain over time. Its linkages with other priority hazards multiply potential impacts. Extreme precipitation is primarily **driven** by large-scale climate atmospheric systems, such as fall and winter atmospheric rivers that transport moisture-laden air masses from the Pacific Ocean. In summer, warm weather can drive convective precipitation events. The event itself is then **modulated** by watershed physical characteristics (mountain topography causes air masses to rise and cool, causing precipitation) and, to a lesser extent, by proximity to large water bodies. Heavy precipitation can fall as snow, especially at higher elevations. Otherwise, it generally falls as rain.

What We Assessed

We assessed and mapped a subset of precipitation-based climate indices to understand changes in frequency and severity. The climate indices were obtained from PCIC high-resolution (e.g. 800-m horizontal) climate modelling data available for the RSA. Our statistics and maps compared conditions of the recent past (1981-2010) and future (2050s).

Challenges

- Global climate models (GCMs) are extremely complex and have large uncertainty, especially at smaller scales.
- The GCM data is "downscaled" to account for regional effects such as from the ocean and mountains; however, this process can introduce further uncertainty through biases in local observed data.
- Results are best interpreted in terms of understanding relative changes between recent past and future conditions.

Mapping Results

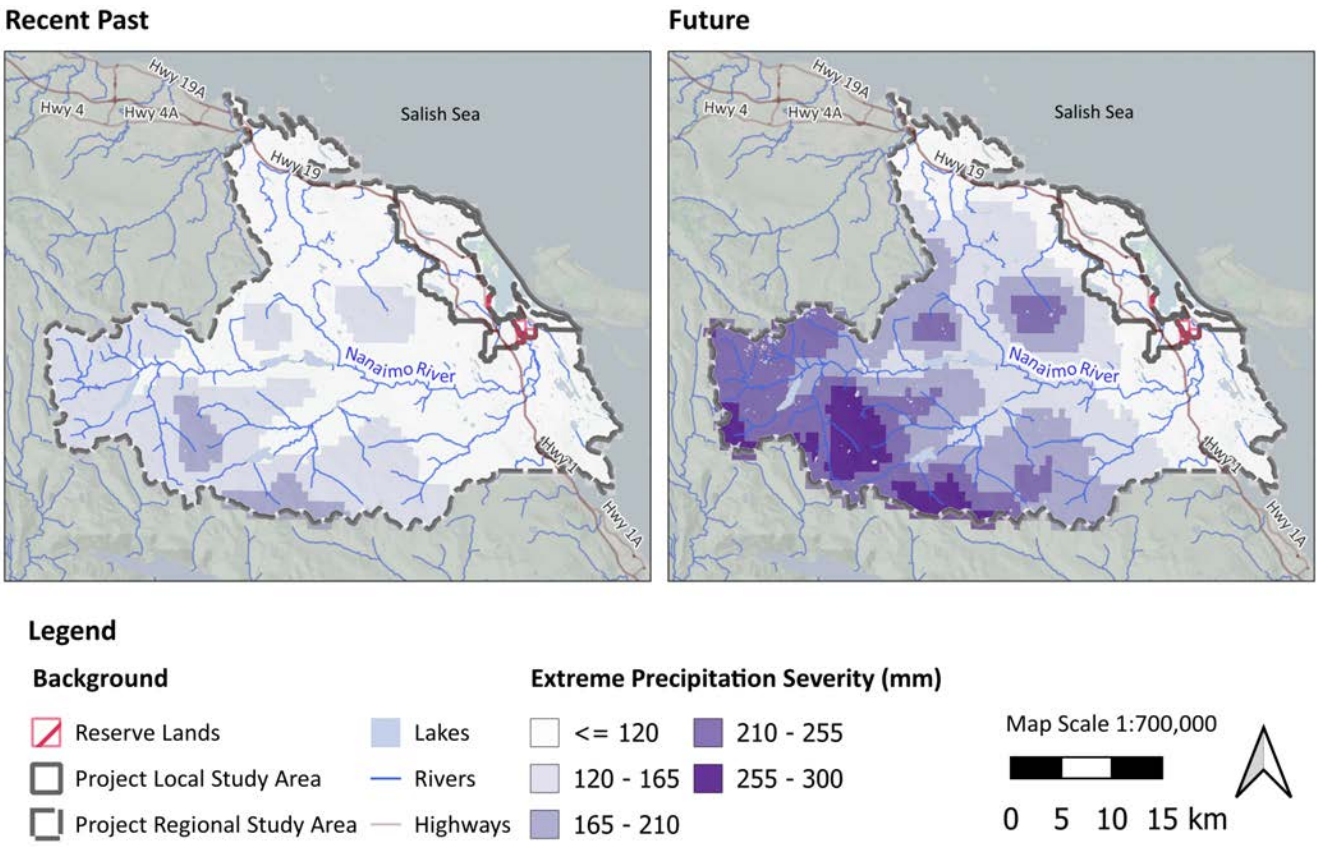
- More precipitation falls in the higher elevation western regions of the RSA (see darker colours on the map), while the LSA experiences slightly less (see lighter colours).
- Water from the higher elevations enters the LSA through river channels (see the riverine flood hazard summary).

Climate Change Projections (2050s)

Very wet and extreme precipitation are likely to become more frequent and severe. Changes in the RSA in the future compared to the recent past are as follows:

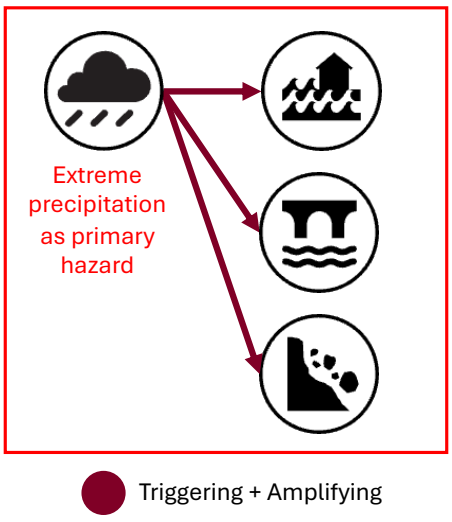
- The number of very wet days (9.1) and extreme wet days (1.8) occurring in a year are projected to increase by 2.4 and 0.9 days, respectively.
- The annual total precipitation falling during very wet days is projected to increase from 361 mm to 477 mm (30% increase).
- The severity of single- and multi-day extreme precipitation events is likely to increase by approximately 10% to 16%.

In the next 5-10 years, the above trends are likely to apply, meaning that this hazard is worsening.



Interactions with Other Hazards

Extreme precipitation directly triggers, amplifies, and coincides with riverine flooding, stormwater flooding, and mass movement geohazards. It often coincides with extreme cold (as snow/ice), coastal flooding, and windstorms (as part of the same weather system). Extreme precipitation events can be succeeded by periods of extreme heat, and they play a crucial role in terminating drought conditions. Extreme precipitation is frequently triggered by or coincides with heatwaves (convective storms).



Emergency Management Considerations

- Higher annual precipitation amounts are linked to La Niña events, whose forecasting can be used to track upcoming hazard potential (see Provincial resource discussed in Section 9 Recommendations)[24].
- Follow weather alerts, local forecasts, and websites to monitor rainfall accumulations.
- Monitor Nanaimo weather forecast (see Federal resource discussed in Section 9 Recommendations)

24 The ENSO index is based on long-term average conditions, and it does not mean that an extreme precipitation event cannot occur during an El Niño phase.