Mapping inland to coastal flooding: streams, rivers, lakes

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Atlantic Climate Adaptation Solutions
1. How can your work contribute to better decision-making in landuse planning?

Digital elevation modelling improves

• land-use planning,
• wet-area, wetland, and flood extent mapping,
• assessing of hydrological infrastructure capacity and connectivity to accommodate severe flood & stream discharge events

All at 10 m and 1 m resolution:

10 m resolution: comprehensive across provinces and large watersheds.
1 m resolution: increases precision and accuracy for target areas.

Provision of planning tools: TRAIL, SPILL, FLOOD, LOCATE
2. What do we know, and what do we need to better manage inland flooding?

Provision of data layers:

Depression, stream channel, flood plain and wet-area map updates
10 m resolution: comprehensive across NB and adjacent watersheds
1 m resolution: 15% coverage for NB; moving to 100% within 2 to 3 years

geoNB: properties, road, train tracks, pipelines, conservation areas, municipal borders etc.

Other: Sparse on historic inland and coastal flood events (geoNB, DTI, JDI)
Sparse on hydrological infrastructure, decreases from urban to rural centres
Sparse onflow blockages (culverts, bridges, hydro dams, river and stream narrows)

Needs: comprehensive compilation of hydrological infrastructure, upgraded with DEM-modelled flow capacity and flood expectations

Workshops to discuss/adopt emerging planning tools,
including geoportal to compile and display emerging data, images, maps, etc.
Floodplain mapping for the general Sussex area, NB:

Provincial. DEM (latest version, 10 m resolution),
  hill-shaded and
coloured from
  11 m (lightest green)
to 180 m (deepest brown)
Floodplains: shaded dark to light blue
  up to 4 m in elevation away
  from the flood plain channels

Also shown:
Stream flow channel network
  (each stream starting with 4 ha flow initiation)
Bridge locations by elevation

Checking
hydrological infrastructure:
bridges
Rated by capacity to
accommodate 100mm discharge
(appr. 100 year storm event)
according to upstream
watershed area
Location conformance
to LiDAR-derived
road-stream crossings
Depression mapping
for the general Sussex area, NB
based on LiDAR DEM
(1 m resolution)
Showing depression depths
up to 6 m (shaded green to brown)
The deeper depressions occur
when -road crossings are blocked

Soil drainage (DTW) mapping
for the general Sussex area, NB
based on LiDAR DEM
(1 m resolution)
Showing the elevation rise
away from all streams
with 4 ha flow initiation,
up to 1 m (shaded green)
Water backing up in a depression towards Highway 1 along Leonard Drive. Flooding was aggravated by culvert blocking; April 2014.

Checking flood levels
(the hard way)

April 2014 flood

Average gauge height and potential obstruction scenarios
3. **How can we manage the challenge of uncertainty (future flood scenarios, precautionary principle)?**

Using maps layers that locate flood vulnerabilities within specific community and property contexts

Systematically locate, quantify and risk-prioritize flow blockages:
- depressions,
- eroding slopes and stream channels,
- flow blockages (roads, dams, dykes, culverts, bridges, stream and river narrows)

Reduce flow rates through
- trail and road decommissioning
- restrict developments in floodplains, wetlands and depression
- soil protection
- stretch snowmelt season through watershed-based management of forest / vegetation cover

Improve flood forecasting and mapping through systematic GPS-GIS capture and analysis of flood events and damage reports; includes integration of river watch programs and activities

Flood monitoring and systematic reporting
Automated community-based flood monitoring, modelling, mapping, & web display

Flood monitoring well (pressure head)

Signal reception towards flood map conversion & web display

WiFi signal transmission

Nashwaak floodplain
Penniac, NB

Flood stage (blue shading)
Flood extent 2008 (red)
Property lines (yellow)
geoNB imagery
Nashwaak floodplain
Penniac, NB

Flood stage (blue shading)
Flood extent 2008 (red)
Property lines (yellow)

Hillshaded bare-earth DEM
(LiDAR, 1 m resolution)