"Managing Riverbank Erosion"

A Guide for Property Owners

Photo source: *Slope Stability, Erosion Assessment and Adaptation Solutions, Town of Grand Falls*, Gemtec Report. www.atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Grand%20Falls-Slope%20stability-erosion%20assessment-GEMTEC-2012.pdf

Introduction

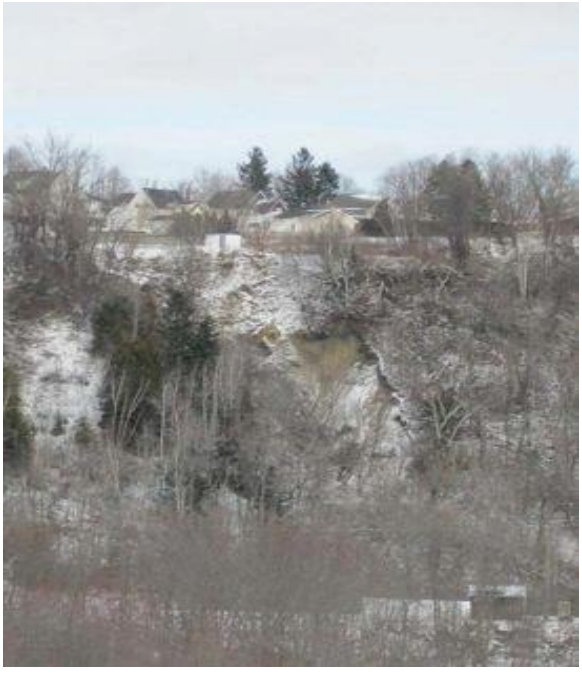
For some time now, erosion and slope instabilities have been evident in and around the town of Grand Falls, mainly on or next to river banks. An assessment conducted in 2011 by GEMTEC Consulting Engineers and Scientists concluded that this was mostly due to extreme precipitation events and land use activities.

This guide provides ways of addressing erosion along inland waterways, and may assist other communities that face similar issues.

It is intended to raise awareness about climate - related impacts and to provide general adaptation solutions and best management practices for homeowners in response to erosion.

Climate trends may make erosion worse in the future. It is prudent to make adjustments and plan for these changes.

Photo Source: Grand-Falls, New Brunswick Government Website



What is Erosion?

Erosion is the process by which surface material such as soil and rock are moved from one place to another by wind or water. River banks are formed by erosion and deposition processes and often have low resistance to sliding or slumping. The surface layer may show evidence of slow creep down slopes due to seasonal and factors such as frost and infiltration of water. This is often revealed by curvature of tree trunks on the slope, which is evident in vegetation on many slopes throughout the town of Grand Falls. Since the stability of such slopes is typically

low, relatively minor changes in vegetation, surface runoff, water infiltration, slope geometry, or other land use changes, can result in further sliding or slope failure erosion.

Climate Change

Climate change is becoming increasingly obvious. More frequent intense rain and high flow events are changing river and stream patterns and the rate of erosion. Most erosion occurs during high stream flow events caused by high intensity rainstorms and spring runoff. Once erosion has begun it can be difficult to control, and lead to continued slope instability and failure.

Runoff is water that flows on the ground surface into nearby storm drains or into water bodies.

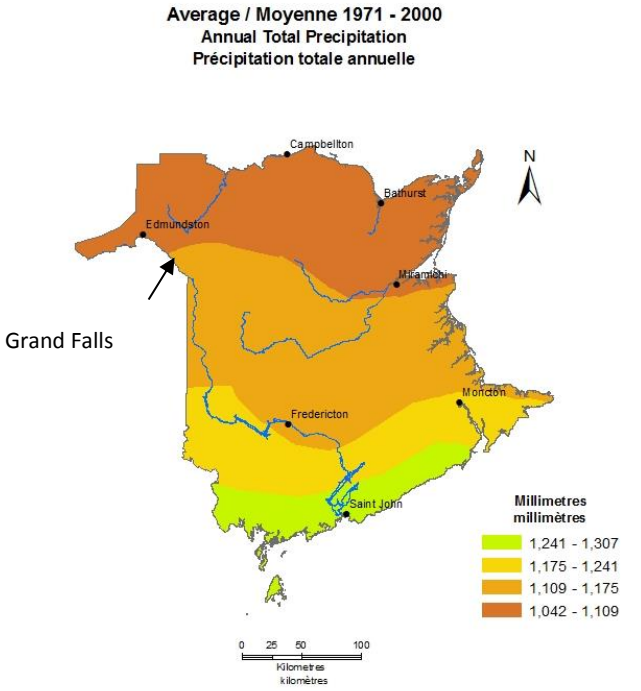
It appears as though the slides that have occurred over the past five years in the Grand Falls area were primarily caused by high precipitation events, resulting in saturated soils, which increased the weight of the slopes and caused them to slide. Other contributing factors are loss of vegetation, dumping of material over the slopes, and surface water runoff.

River Flow and Precipitation

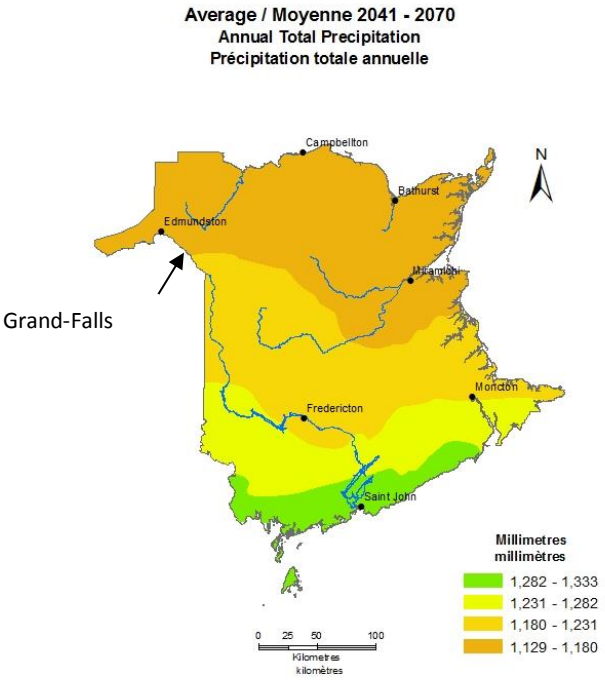
An analysis consisting of 78 years of flow records for the Saint John River at Grand Falls revealed that on average, the annual peak daily flow (the highest daily flow in the river during the year) is increasing by 4.4 m^3/s per year. A review of precipitation records at Saint-Leonard shows that the total annual precipitation is increasing by 4 mm/year on average. In New Brunswick, the frequency of extreme rainfall events is also expected to increase in the future, as temperatures continue to increase. Observations in recent years are consistent with this trend.

Total annual precipitation is expected to increase even more in the future in New Brunswick (see reference maps below). This increase is anticipated to fall in fewer, but more intense events, which will increase the risk of flooding and erosion. The maps show the total annual precipitation between 1971 and 2000 and the predicted average for the period 2041-2070.

Grand Falls



Grand-Falls



Emissions Scenario / Scénario d'émissions: A2

Source: Atlantic Climate Adaptation Solutions website - *www.acasamaps.com*

Best Management Practices for Homeowners

There are two simple best management practices that homeowners can follow to minimize risks of erosion to their property: reducing runoff and restoring vegetation.

Reducing Runoff

Reducing the quantity and improving the quality of storm water runoff in a community can start with individual homeowners. For any new development or work on site, homeowners should consider how to manage storm water to limit runoff.

Did you know?
The Town of Grand Falls has established a "share-the-cost" program for the purchase of rain barrels. This program is designed to provide an incentive to the business community or individual residents to better manage rain water runoff.
More information:
www.grandfalls.com/news/environ_01_en.pdf

Storm water best management practices can be implemented when first planning and building a home and designing the landscape, which may include:

Minimizing impermeable surfaces. Permeable pavers can be used instead of traditional paved driveways or sidewalks that force water to run off the surface and enter storm drains. Permeable pavers are designed to allow rainwater to drain between the paver stones into a layer of gravel.

Creating rain gardens. Rain gardens are planted depressions that are designed to absorb rainwater runoff from impervious areas like roofs, driveways, walkways and compacted lawn areas. Rain gardens are specifically designed to receive, filter, and absorb water runoff into the ground.

Using mulch or drought-resistant ground covers. Reduce the need for watering your yard by replacing lawn with native ground covers, and allowing grass to grow a bit longer before mowing.

Other options for minimizing runoff are the use of rain barrels or cisterns: **Rain barrels** are an effective way to capture rain. A barrel may be used to collect and temporarily store rainwater for re-use. **Cisterns,** large storage tanks for holding water, can be as simple as a larger version of a rain barrel, or large tanks, usually concrete or some type of heavy-duty plastic.

Restoring Vegetation

Before beginning work to stabilize a bank, investigate any significant erosion. In cases of extreme erosion that is a danger to buildings or personal safety, you will have to consult an expert to determine the best procedure to follow or technique to use.

Many river banks in the Grand Falls areas are made of loose, easily eroded materials. On these soils, even on gentle slopes, runoff can quickly cause erosion. Planting grass or other groundcovers is the best way to slow down erosion. Native shrubs and trees can also be planted. These species require very little maintenance once they are established. It is best to select local species that are adapted to the environment.

If there are already signs of erosion and the surface is bare, it can sometimes be difficult to restore vegetation. In such cases, use landscape fabric pegged in place to cover eroded areas and plant through holes in the fabric.

Some other improved management practices:

- Avoid discharging storm water from parking lots or roof drains directly over slopes;
- Do not dump fill over slopes, or pile or push snow over the slopes;
- Avoid removing vegetation from river banks and slopes; and
- Set back any new buildings or structures near river banks or top of slopes a distance from the bank. Each property should be evaluated on an individual basis and you may need to seek professional advice.

Watercourse and Wetland Alteration Permit

In an effort to protect watercourses and wetlands, the New Brunswick Department of Environment and Local Government (NBDELG) requires that a Watercourse and Wetland Alteration Permit be obtained before you undertake certain activities within 30 metres of a watercourse or wetland. To see if your project requires a permit or for information on how to obtain a permit, contact the NBDELG. For general information about WAWA guidelines, please refer to this website - http://www2.gnb.ca/content/gnb/en/services/services_renderer.2935.html

Website Resources

The full technical study on which this brochure is based,Ge*Slope Stability, Erosion Assessment and Adaptation Solutions, Town of Grand Falls* is available on the Atlantic Climate Adaptation Solutions website :

www.atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Grand%20Falls-Slope%20stability-erosion%20assessment-GEMTEC-2012.pdf .

Stormwater Management Practices in Kitchener, Ontario: www.kitchener.ca/en/livinginkitchener/Stormwater_Management_Practices_Defined.asp.

Detailed information on current and future climate in New Brunswick can be accessed a t: http://www.acasamaps.com/.

Green lawn and garden care: www2.gnb.ca/content/dam/gnb/Departments/env/pdf/LandWaste-TerreDechets/GreenLawnGardenCare.pdf.

Additional Resource

For more information on climate change adaptation, please refer to the New Brunswick Department of Environment and Local Government website at www.gnb.ca/climatechange, the Atlantic Climate Adaptation Solutions website at www.atlanticadaptation.ca or the Town of Grand Falls website at http://www.grandfalls.com/english/services/environ.html