

# FLOOD:ED

## #FLOODED BACKGROUND



### What is flooding?

Flooding happens when there is an overflow of water from a water body or excessive rain onto dry land. There are various causes of flooding, including heavy rains, storm surges causing ocean waves to come onto the shore, excessive snow melt, or when dams or levees break. (Source <https://www.nssl.noaa.gov/education/svrwx101/floods/>)

Flooding can cause severe damage to property and important infrastructure. It may take a long time to recover from the damage, requiring significant funding to rebuild structures. In some unfortunate cases, flooding may also claim lives if evacuation measures are not taken effectively and in a timely manner. Therefore, it is extremely important to identify areas with dense populations near rivers, areas downstream from a dam, camping areas along rivers or streams and any other water bodies as high risk areas, vulnerable to possible flooding damage. (Source <https://www.nssl.noaa.gov/education/svrwx101/floods/>)

### Types of floods

In order to best prepare for floods, it is important to understand the different types of floods and what causes them.

- **River floods** are caused by an overflow of water onto surrounding banks, shores and neighbouring land from rivers, lakes or streams due to an

increase in water level. The water level could rise because of increased amounts of rain or snowmelt.

- **Flash floods** are caused by extreme rainfall events causing a flood to happen that is not directly related to an overflow of a waterbody.
- **Coastal floods** are caused by high tides or severe rainfall which results in water overflowing onto the areas near the coast.
- **Storm surge** occurs when there is a rise in water level in coastal areas caused by severe wind, waves and a low atmospheric pressure.
- **Inland flooding** is a result of moderate precipitation accumulating over days due to continued rainfall or a river overflow or a dam failure.

### What is a floodplain?

Floodplain is an area of low-lying ground adjacent to a river, lake, stream, or wetlands, formed mainly of river sediments and subject to flooding.

For more information, visit the link below.

<https://www.nationalgeographic.org/encyclopedia/flood-plain/>

## Watershed

A watershed is an area of land where all the surface water drains into the same place, such as a stream, river, lake or ocean.



“While some watersheds are relatively small, others encompass thousands of square miles and may contain streams, rivers, lakes, reservoirs, and underlying groundwater that are hundreds of miles inland. Shown here: an aerial view of Drakes Bay, part of California’s Tomales-Drake watershed. Credit: Brian Cluer, NOAA Fisheries West Coast Region, California Coastal Office” –

<https://oceanservice.noaa.gov/facts/watershed.html>

## What is the relation between flooding and Climate Change?

Climate change has resulted in an increase in extreme weather events, such as increase in precipitation (rain and snow) and severe droughts across many regions of the world (National Geographic, 2020). Although attributing flooding to climate change may be a difficult task, as there are many factors that lead to the cause of flooding, in its recent assessment report the IPCC concluded that “climate change ‘has detectably influenced’ several water-related variables that contribute to floods, such as rainfall and snowmelt”— as such by influencing various factors climate change indirectly increases the occurrence of flooding (Natural Resources Defense Council, 2019). Other effects of water-related events beside heavy precipitation include more frequent hurricanes and sea level rises,

which make coastal communities increasingly vulnerable to the effects of climate change.

Below are IPCC’s findings from its special report released in 2018, *Global Warming of 1.5°C*:

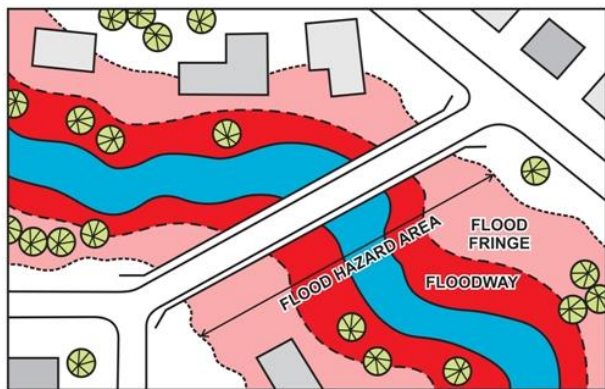
- “Several regional changes in climate are assessed to occur with global warming up to 1.5°C as compared to pre-industrial levels, including warming of extreme temperatures in many regions (high confidence), increases in frequency, intensity and/or amount of heavy precipitation in several regions (high confidence), and an increase in intensity or frequency of droughts in some regions (medium confidence).” <https://www.ipcc.ch/sr15/>
- “Global warming of 2°C would lead to an expansion of areas with significant increases in runoff, as well as those affected by flood hazard, compared to conditions at 1.5°C (medium confidence). Global warming of 1.5°C would also lead to an expansion of the global land area with significant increases in runoff (medium confidence) and an increase in flood hazard in some regions (medium confidence) compared to present-day conditions.” <https://www.ipcc.ch/sr15/>

## Flood Risk Awareness

Flooding can be a real risk for low lying communities and requires adequate measures to prepare for flooding events. There are many tools that municipalities and other authorities employ to best prepare for the potential risk of flooding, these include:

**Flood resilience planning** includes understanding whether a community or a property is prone to the risks of possible flooding. Typically, municipalities or other responsible local authority undertakes thorough planning to make the community or town resilient – strong enough to withstand the effects of flooding.

**Flood hazard mapping** includes identifying and mapping flood hazard areas in communities and are an important source of reference for municipalities and authorities.



Source: <http://protectcalgary.com/wp-content/uploads/2015/12/FHIP-RHS-Presentation-Water-Collaborative-5Nov2015.pdf>

**Flood risk disclosure** includes disclosing information about a property's flood damage history and its exposure to future flood risk. This allows potential property buyers to be equipped with all the information about the property and best prepare themselves as new owners of the property.

**Flood insurance** is a valuable tool that allows for recovering from a flood damage event. It is important for property owners to gain information about the flood risk of their properties, and then explore the insurance options.

### Why do we need to plan for floods in Canada?

There are several communities in Canada that are prone to natural disasters, including flooding. Over the previous few years, the frequency of disasters in Canada have actually been increasing. Some of the recent disasters include Hurricane Igor in Newfoundland in 2010, the Prairie floods in 2011, the 2013 Southern Alberta floods, the Toronto urban flood in 2013, and the 2017 flood in British Columbia. These disasters cost tens of billions of dollars in damages and takes months, in some cases even years, to recover from.

In response to Canada's increasing risk to disasters, Canada has an Emergency Management Strategy in place that aims to strengthen "Canada's ability to assess risks and to prevent/mitigate, prepare for, respond to, and recover from disasters."

<https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgncy-mngmnt-strtgty/index-en.aspx>

Find out what your local authority and / or municipality is doing to make your community a resilient community.

### Additional Resources

If you find additional helpful resources you would like to share with educators, send us the details and we can add them here.

Climate Change, Floods, and Municipal Risk Sharing in Canada

[https://munkschool.utoronto.ca/imfg/uploads/373/1917\\_imfg\\_no\\_30\\_online\\_final.pdf](https://munkschool.utoronto.ca/imfg/uploads/373/1917_imfg_no_30_online_final.pdf)

Creating a model of a floodplain (aimed at middle school)

[https://www.teachengineering.org/activities/view/cub\\_natdis\\_lesson07\\_activity1](https://www.teachengineering.org/activities/view/cub_natdis_lesson07_activity1)

Extreme Events Resilience Toolkit

<https://toolkit.climate.gov/topics/human-health/severe-storms-and-flooding>

11 Facts About Flooding

<https://www.dosomething.org/us/facts/11-facts-about-floods>

How to Prevent Deaths from Flooding

<http://www.bbc.com/news/av/science-environment-42018364/floods-how-can-you-save-your-life-when-disaster-strikes>

Flooding Safety Tips

<https://www.ontario.ca/page/floods>

Government of Canada: Floods - What to Do?

<https://www.getprepared.gc.ca/cnt/rsrscs/pblctns/flds-wtd/index-en.aspx>

Government of Canada: Flood Ready  
[https://www.canada.ca/en/campaign/flood-ready.html?utm\\_source=PS&utm\\_medium=GtPrprd&utm\\_campaign=fld-rdy](https://www.canada.ca/en/campaign/flood-ready.html?utm_source=PS&utm_medium=GtPrprd&utm_campaign=fld-rdy)

Intact Centre on Climate Adaptation  
<http://www.intactcentreclimateadaptation.ca>

Getting Started with Student Inquiry  
[http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/cbs\\_studentinquiry.pdf](http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/cbs_studentinquiry.pdf)

Make a Rain Barrel  
<https://www.motherearthnews.com/diy/garden-yard/how-to-make-a-rain-barrel-ze0z11zkon>

Make a Rain Gauge  
<https://www.metlink.org/experiment/make-a-rain-gauge/>

Mind Mapping software (online)  
<https://www.goconqr.com/en-CA>

Pierre-Lewis, Kendra, "Historic Floods are Ravaging Canada"  
<https://www.popsci.com/canada-flooding>

Prestwich, Emma, "Flooding in Canada is a Big Problem, But Few Canadians Know They're at Risk: Study"  
[http://www.huffingtonpost.ca/2017/05/16/flooding-in-canada\\_n\\_16645746.html](http://www.huffingtonpost.ca/2017/05/16/flooding-in-canada_n_16645746.html)

Preventing Disaster Before it Strikes: Developing a Canadian Standard for Flood-Resilient Communities - 20 Best Practices  
<http://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/10/Preventing-Disaster-Before-it-Strikes.pdf>

Severe Weather 101 from NASA  
<https://www.nssl.noaa.gov/education/svrwx101/floods/>

Ten Tips for Keeping Children Safe in a Flood  
<https://www.savethechildren.org/content/dam/usa/reports/emergency-prep/GRGS-FLOOD-SAFETY.PDF>

TRCA Flood Plain Map  
<https://trca.ca/conservation/flood-risk-management/flood-plain-map-viewer/>