## **Extreme Weather Events 1**

## **Outcome: (331-4)**

## **Content: Page 236-237**

## **Extreme Weather in the News:**

* Hazardous weather in Canada results in dozens of **lives lost each year.**
* Property losses typically reaching into the **hundreds of millions of dollars.**
* For these reasons **everyone should keep track of the weather and understand what to do** if severe weather occurs.
* Environment Canada has the responsibility of **warning people of the possibility of severe weather-related events.**
* Warning programs have been developed to inform the public of the **weather hazards**.
* Quick action to such information can save lives, reduce injuries, and lessen property damage. (Remember the Tsunami in Southeast Asia

**There are three levels of warnings issued by Environment Canada.**

##### **Weather watch**

* + A weather watch means that **conditions that are needed to produce an extreme weather event** exist in your area.
  + It does **not** necessarily mean you will get the severe weather.
  + It simply means that familiar patterns of severe weather are **beginning to develop**.
  + You should stay tuned for updated weather reports.

##### **Weather advisory**

* A weather advisory means that **severe weather is predicted for your area.**
* Bad weather has developed and using satellite imaging the storm is **predicted to move in your direction**.

##### **Weather warning.**

* A weather warning means that **extreme weather is forecasted and is likely to happen** in your area.
* Depending on the type of severe weather being forecasted **you will need to take some action**.

**Things to know about media weather reports:**

* Quite often media reports tend to **make more of the weather** than it actually is.
* In such cases some people sometimes ignore weather alerts.
* However, weather alerts should be **taken seriously** since they are only issued by the **Meteorological Service of Canada**.

##### **Example:** Wind Warning...

* For example a wind warning would be issued when you expect winds blowing steadily at 60 km/h or more, or winds gusting to 90 km/h or more, for at least one hour.
* Environment Canada suggests you **secure or put away loose objects such as outdoor furniture, put your car in the garage, and bring livestock to shelter**.

## **Extreme Weather Events:**

* "In the fall of 1991, the "Andrea Gail" left Gloucester, Mass. and headed for the fishing grounds of the North Atlantic.
  + Two weeks later, an event took place that had never occurred in recorded history...  **A powerful storm** was developing off the northern Atlantic coast.
  + The collision of **three potent storms at one moment in time.**
  + The dynamic power of that collision would be propelled by winds of 190 km/h, **creating waves ten stories high**."
* In fact, extreme weather captivates people.
* We watch the awesome power of the storm captured by television cameras and we **witness the destruction on the news.**
* Thanks to modern forecasting people affected by severe weather usually get **fair warning of the weather to come**.

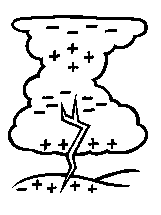
**🡪 We will look a several extreme weather events considering how they form, the effects to be expected and some precautions we can take to keep safe.**

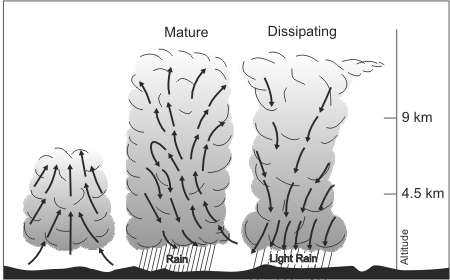
### **Thunderstorms:**

* Thunderstorms are the **most common storm** in the world.
* They **generally occur during the summer** when you have very hot, moist air.
* The warm air rises to high altitudes rapidly (**up-drafting**).
* At such high altitudes the **air cools rapidly forming clouds and rain**.
* The cool dense air now plunges downward (**downdraft)** only to be pushed up again by more hot moist air.
* This cycle continues causing **dark turbulent cumulonimbus clouds to form**. (Thunderclouds)
* This cycle of updraft and downdraft **produces large amounts of heavy rain**.
* If the updrafts are strong enough the rain drops rise up with the air and **freezes**.
* This can continue in which layer after layer freezes creating **hailstones**.
* Once these hail stones become too heavy they come crashing down to earth!

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**The life of the thunderstorm has three stages: developing, mature and dissipating.**

* In the developing stage **the tower of clouds begin to grow** and develop.
* The clouds get higher and darker and the anvil head of the cumulonimbus cloud begins to grow.
* The air ahead of the thunderstorm is usually quite warm and very humid.  It is **hot and sticky**!
* The mature stage brings **heavy rain, hail and thunder and lightning**.  Conditions are usually quite stormy as the thunderstorm releases it tremendous energy.
* The dissipating stage follows as the thunderstorm passes.  **Light rain showers, cooler temperatures and clearing skies** follow as the storm moves away.



##### **Thunder and lightning:**

* With the violent updrafts and down drafts static electricity builds as the cloud particles begin to separate into **positively and negatively charged regions.**
* The charge builds up and eventually the electricity discharges (jumps) to another cloud or to the ground.
* When this happens **we see a bolt of lightning**.
* This flash of light is so intense that it creates a **quick temperatures change** up to 27,760oC.
* Such intense heat and energy is enough to **blast through steel or exploded a tree trunk**!
* The bolt of lightning suddenly heats the air around it to such an extreme; the air instantly expands, sending out a vibration or shock wave we hear as an **explosion of sound, thunder**.

##### **Thunderstorm alert:**

* Lightning wants to get to the ground as fast as it can so it **goes through the tallest objects**.
* If you are caught outside in a thunderstorm do not get under an isolated tree or near tall poles or communication towers.
* Your car is a safe place since the car is not in **direct contact with the ground**. The tires are **insulators** and will not conduct electricity.
* If you are out in boat you should get to shore as quickly as possible because **strong turbulent winds** will come with the storm.

### **Tornadoes:**

* Tornados form during the **most severe thunderstorms**.
* The fast rising air begins to spin creating a **funnel cloud**.
* As the air rises and cools **the spinning increases**.
* If the funnel cloud spins out of the thundercloud and **touches down it is called a tornado**.
* **Tornado's** are extreme low pressure areas that act like vacuum cleaners sucking up and tossing away just about anything in its path.
* Winds inside the funnel have been estimated as high as 500 km/h.
* The big problem with forecasting tornadoes is that it is very **difficult to know when and where they will happen**.  Tornado's can last for a few seconds to a few hours.
* Tornados are rare in Newfoundland but they have been recorded. Why are they rare?
  + We do **not receive warm enough temperatures** here to cause a tornado because of the moderating effect of the ocean

##### **Tornado Alerts:**

* Tornado alerts are issued anytime there is a threat of severe thunderstorms.
* It is suggested to **move to a basement area** or at least to a room in the house with **no windows**.
* Oddly enough it is recommended to open a window on the opposite side of the house.
* A tornado is an extreme low pressure and will suck the air out of the house either through a window or by ripping the roof off!

Oklahoma Tornado, May 20th, 2013

<http://www.youtube.com/watch?v=zHxYuUAGbKk&safety_mode=true&persist_safety_mode=1&safe=active>

### **Hurricanes:**

* A hurricane is a very large, severe low-pressure system that develops over the **Atlantic Ocean in late summer and fall**.
* During this time the water near the equator is at it's warmest and provides a **great deal of energy and moisture to the air above.**
* Hurricanes will only form over water that is above 27oC.
  + For this reason we have **no fear of a hurricane forming off the coast of Newfoundland**!
  + Water off our coast only warms up to about  4oC
* As the low-pressure system builds it begins to slowly move westward **gaining energy and moisture from the warm ocean** as it goes.
* As it develops the storm is classified as **a tropical depression**.
* As it builds it develops into a **tropical storm**.
* When the wind of the storm reaches speeds greater than 119 km/h it is reclassified as a **hurricane**.
* As the hurricane develops it begins to **swirl counter clockwise creating an eye.**
* Oddly enough in the eye of the storm it is very **calm and clear**.
* However, the area surrounding the eye, known as the **eye-wall produces very strong winds and heavy rains**.
* Hurricanes **gain energy when they are over the warm water** but when they hit land or move over cooler water they **begin to weaken**.  However, it takes a few days for the hurricane to lose its energy.
* Most often before the hurricane reaches Newfoundland they have been **slowed down and downgraded to tropical storms or tropical depressions**.  We still see strong winds and heavy rains!
* As a hurricane moves across the ocean the severe low pressure and high winds creates a **storm surge**.
* The storm surge brings higher than normal tides and large waves that could create a **flood problem for coastal areas**.

##### **Hurricane Alert:**

* Hurricanes are tracked by **satellite imaging** once they form.
* Forecasters can generally **pinpoint where the Hurricane will make landfall.**
* Hurricanes travel at a speed of about 25 km/h so forecasters can give at least 24 to 48 hours notice.
* If you find yourself forecasted to be in the path of a hurricane you **will have time to take action**.
* If you stay in your house it is recommend to **board up all windows** to protect you from flying debris.
* People living near the coast will ordered to **move further inland** for fear of flooding.
* It would be a good idea to have emergency supplies since **power and transportation will be affected.**

### **Blizzards:**

* A blizzard is a severe **winter snowstorm with strong winds and low temperatures**.
* In order to be classified as a blizzard wind must be greater than **55 km/h with visibility reduced to 0.2 km**.  Temperatures are generally well below normal.
* Blizzards form when warm **moist air over the Gulf Stream** moves northward and **collide with a cold arctic air mass**.
* The warm moist air gets pushed up **causing rapid cooling**.
* The warm, moist air mass cools **releasing its moisture as snow**.
* The turbulent conditions caused by the collision of the two air masses causes **stormy conditions**.
* The most severe winter blizzards build over the Atlantic Ocean **gaining energy and moisture from the warm water**.
* The winds associated with these intense lows are usually from the northeast and the storms are usually called Nor'easters.
* Occasionally an **Alberta clipper** gets into the mix.
  + An Alberta clipper is an **extreme cold dry air mass that moves down off the Rocky Mountains**.
  + It is a quick moving air mass that makes its way eastward usually dropping only a few centimetres of snow in its path.
* Occasionally, the **Alberta Clipper collides with a warm moisture laden air mass from the south**.
  + The collision of these two air masses quickly develops into a **weather bomb**.
  + A weather bomb is another fancy term used by the media to describe a **severe winter storm that moves in fast and drops a large amount of snow in a short period of time**.

##### **Blizzard Alert:**

* Due to reduced visibility it is advisable to **stay off highways in open areas** where blowing snow can cause white out conditions.
* If you have to travel ensure that you are equipped with safety equipment should you get stuck.
* At home ensure you have **enough supplies to last several days in the event of power outages and blocked roads**.

### **Floods:**

* A **flash flood** is flooding that happens with **little or no warning**.
  + Flash floods usually happen in cities or large towns where **storm sewers cannot handle excess water** from large rainfall.
  + Flash floods may also occur in mountain valleys when **spring run off occurs too quickly**.
  + Often times flash floods in the hills is accompanied by **mudslides.**
  + In these cases the **soil on the sides of the hills becomes soaked and break away**, moving with the water.
  + Occasionally flash floods may happen when a **dam breaks or overflows**.
* A **broadside flood** covers large areas of land and can last for months.
  + These floods happen **in low-lying areas around rivers**.
  + Heavy rains soak the surrounding ground and the rivers begin to **swell and rise up over their banks**.
  + These floods can be predicted giving residents time to take action.
  + Residents usually have time to decide to **either try and protect their property or evacuate** when water levels rise too high.
* In order to prevent floods cities and town living near the rivers can **construct dams** or dikes to keep the water in the river.
* Some cities like Winnipeg have built **spillways that act like giant eaves trough to carry away water** that spills over the riverbanks.
* A more natural way to prevent floods is to **plant more trees**.
  + Large root systems allow the soil to build up and **absorb more water slowing down spring run off**.

##### **Flood alerts:**

* If you ever find yourself in a flood zone you should **stay away from fast moving water**.
* Vehicles should not be driven over **flooded roadways**.
* The roads could be eroded leaving **large holes that are not visible**.
* If you live in an area that may be at risk of flooding you may watch for **signs of thunderstorms**.
* If there is a warning of flood **ensure adequate emergency supplies** in the event of power outages and transportation problems.