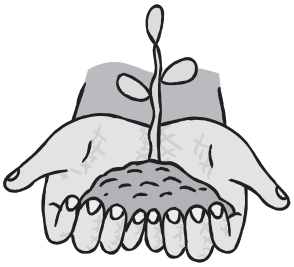


Muddy Hands

Soil and Water Information for Educators Brought to You by the Lake County Soil and Water Conservation District

Spring 2009

Forecasting Facts, Myths and Folklore

If grass is dry at morning light, expect rain before the night.

If the rooster goes crowing off to bed, he will rise with a wetted head.

We have been predicting weather for centuries, based on the order of cows entering the pasture, the color pattern of caterpillars, popping logs on the fire, knots in ropes, cricket chirps, flowers opening or closing, or any other bit of the world around us. Weather prediction has always been a way to try to know the unknowable. Humans are subject to the whims of the weather, for our safety, comfort, food, and water. It is natural to try to decipher what to expect. It is also natural for us to seek out patterns, even if there aren't patterns present. And if a prediction turns out to be right once, we tend to remember that more than the four times it turned out wrong, reinforcing our beliefs.

While weather prediction and forecasting has gone from folklore to science, it is still far from perfect. Every one of us can remember when that picnic was damped by unpredicted rain, or a camping trip got buried under a foot of snow that wasn't in the forecast. In some ways, our ready access to weather predictions day and night has made us more vulnerable to weather. Our forecasters are right (or close enough) so often that we sometimes forget that they are indeed guessing based on computer models, and that those models are based on past observations. (This is a good reminder to your students that they can make educated guesses in science, and it is OK if those guesses turn out to be wrong). If the forecast goes wrong, an unexpected snow can leave us without groceries, whereas 100 years ago, people put up food for the entire winter, and they only needed to head down to the root cellar for dinner. How many times has your school had a 'snow day' with weather that was better than days where you were in class?

Weather calamities have also shaped the history of our country and our communities. Shipping on the Great Lakes starts and stops based on ice formation. Entire communities along the Mississippi and Ohio rivers have relocated to avoid being flooded again, while others build structures on stilts. Many communities in southern California have strict fire standards to protect homes from wildfires when the hot, dry Santa Ana winds blow.

I'm sure your students pay close attention to the weather occasionally - when there is potential for a snow day! They also notice (and probably complain) when rain keeps them inside for recess. Take advantage of this with your students. Inside you will find instructions for several simple weather instruments. With these tools, have your students measure the weather. See if they can deduce a pattern for predicting if they will be kept in a recess the next day, or the likelihood of school being cancelled for snow or temperature reasons.

Inside this Issue:

Weather

Did you know that Lake SWCD offers numerous **classroom programs** tailored to the Ohio Standards in science and social studies?

Our programs are **free** and can be scheduled anytime from October through April.

Correlation to Earth and Space standards:

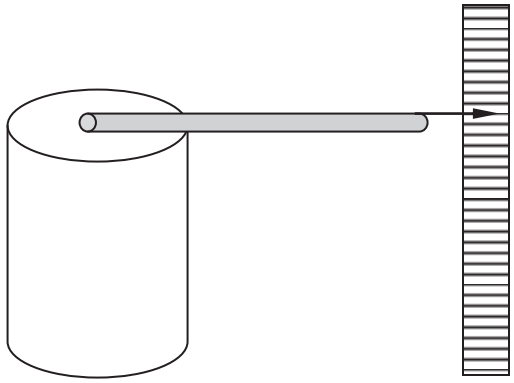
K - 4, 5
2 - 4, 5
4 - 2, 4, 5, 6, 7
7 - 5, 6, 7, 9
10 - 2
11 - 3, 4, 5, 10,
12 - 5

Make Your Own Weather Instruments

Make your own Barometer - measure air pressure

Appropriate for 4th grade and up

You will need (per barometer):
A large coffee can (plastic should work)
A large balloon
A large rubber band (the ones that come on lettuce would be great)
A straw
A pin
A ruler (or paper with increments marked)
Glue (not hot glue)



Cut the neck off of the balloon and stretch it over the open end of the coffee can. Use the rubber band to hold it in place. Make sure there are no leaks, using glue if necessary.
Glue the pin to one end of the straw (the pin and the straw should be parallel).
Glue the straw horizontally to the balloon. Set up the ruler so that the pin can be read against the lines of the ruler.

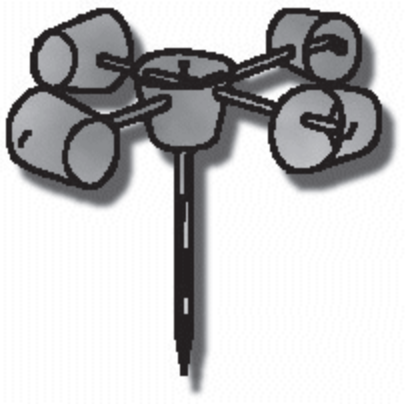
How it works:

A barometer measures differences in air pressure. By placing the balloon over the can, you create a closed volume of air. The air pushing on either side of the balloon is even when this barometer is made. As the air pressure around us changes, the volume within the can will remain the same. If the barometric pressure drops, that means there is less air pressure pushing down on the balloon. This should cause the balloon to bulge upwards and the pin to move downwards along the ruler. If the barometric pressure increases, the balloon will be pushed down into the can, and the pin will move up against the ruler.

Make your own Anemometer - measure wind speed

Appropriate for 4th grade and up

You will need (per anemometer):
5 small paper cups
2 straws
A pin
A pencil with eraser
A hole punch
Glue



Punch one hole per cup in 4 of the cups. Punch 4 holes, equally spaced, around the edge of the 5th cup. Also cut the bottom out of this cup. Slide the straws through the four punched holes so they form a cross. Put a cup on each straw end, and aim them all either clockwise our counterclockwise. Glue in place. Push the pin through the crossing point of the straws and down into the pencil eraser. You have now created a axis cup anemometer!

How to measure wind speed:

Mark one of the cups with a permanent marker. Hold the anemometer in a breeze and count how many times that cup goes by in a set time period. If you want to convert to feet per minute, calculate the circumference of the anemometer (measure between outside edges of opposite cups and multiply by pi). The number of times the marked cup goes around in a minute multiplied by the circumference in feet will give you wind speed in feet per minute. Divide by 88 to get miles per hour.

Historical Weather That Shaped North America

Galveston Hurricane of 1900 - Hurricanes weren't named in 1900, but in the Galveston area, this event is still called "The Storm." In September of 1900, a hurricane formed in the Atlantic ocean, and was forecasted to hit Louisiana and sweep up the East Coast. New York City received a storm warning; Galveston was not. In 1900, Galveston was a major shipping port, and a wealthy town of 37,000. Unfortunately, the town's highest point was only 8' above sea level. The storm surge was 15.5' and washed over the entire island. Not much is known about the exact conditions of the storm, since the weather equipment was destroyed by the storm. Afterwards 6,000 people were dead. Galveston was rebuilt at a higher level, and with a seawall to protect it from storm-pushed waves. However, Houston became the major shipping port of the area, and Galveston never returned to its former glory.

Great Lakes Blizzard of 1978 - While January 2009 was the second-snowiest month on record, January 1978 still holds the record. In January of 1978, a weather system moved through the Great Lakes region. The storm dropped up to 40 inches of snow, and the 100 MPH winds sculpted the snow into even deeper drifts - sometimes completely burying people in their houses or in stranded cars. Wind chills reached -60 F and 51 Ohioans died. Many people were stranded at work, though the weather forecasts caused many schools to close before the storm hit, preventing kids from being stranded at school or on busses. Disruption of utility services left homes without heat, and impassible roads prevented people from getting to shelter. National Guard helicopters were used to deliver food to isolated communities, however it was well over a week before roads were open and the heat was back on across the state.

Xenia and the "Super Outbreak" of 1974 - On April 3, 148 tornadoes ripped through 13 states, killing 315 people. The first tornado of the outbreak touched down about 2:00 in the afternoon. Many small towns were hit, a few were even hit by multiple tornadoes in the same day. Xenia, Ohio lost about half of its buildings, and 36 of its residents in one of the most violent tornadoes of the outbreak. The town was quickly rebuilt, and is now known more for bicycle trails than tornado damage.

Chicago and Peshtigo fires of 1871 - Most people know that Chicago burned. However, simultaneous fires in Peshtigo, Wisconsin, and Holland, Manistee, and Port Huron, Michigan can also be blamed on extreme weather. The Peshtigo Fire remains the deadliest wildfire in U. S. history. Regardless of the source of the spark, this series of fires was set in motion by widespread drought in the upper Midwest. By October, many of the areas that burned hadn't seen measurable rain in months. Forests, fields, and wood-framed houses were all very dry. After the fire, Chicago passed strict building codes which meant more structures were built from brick, and a new material - steel. Many of the famous tall buildings in downtown Chicago are built on areas that were burned in the fire.

Killer Smog in Donora, Pennsylvania - In 1948, an inversion formed over Donora, Pennsylvania. This layer of cold air over warm air trapped a pocket of stagnant air in the 400-ft-deep valley. Since Donora was an industrial town, with several zinc and steel works, a great deal of air pollution (primarily sulfur, fluoride, and particulates) was released daily. Twenty people died in the last four days of October, 1948. In 1949, Pennsylvania created the Division of Air Pollution Control. By 1966, Pennsylvania had laws regulating air pollution, and the federal government followed suit with the Clean Air Act, which the U. S. Environmental Protection Agency now enforces.

Mississippi Flood of 1927 - The events that set this flood in motion actually began with high levels of rainfall during the summer and fall of 1926. By spring of 1927, flood protection levees had been breached in 145 places. Over 700,000 people were displaced by flood waters. In the aftermath of the flood, many minority residents who lost everything in the flood moved to northern cities, a factor in the Great Migration of African-Americans to cities like Chicago and Detroit. Herbert Hoover, who was Secretary of Commerce and was in charge of flood relief operations in 1927 later became president, thanks in part to favorable public opinion. In 1928, a new plan ws developed for managing the flood control system on the Mississippi River. Features of the new plan included steering flood water into low-population areas to alleviate downstream flooding, and local responsibility for flood control structures.

Stormwater Sidebar

Our cities and neighborhoods can actually make some weather events worse. Most of us are familiar with the fact that cities are hotter than the surrounding countryside, but did you know they can also make floods happen faster and rise higher?

Development in a watershed typically increases the amount of impervious surface - the roads, roofs, and driveways that don't allow water to soak in. During a typical afternoon thunderstorm, an inch of rain can fall. That means that the roof of a small 1000 square foot house would create over 600 gallons of stormwater runoff. In an undeveloped forest or field, most of that 600 gallons would soak into the soil, or stick to the surface of the plants and evaporate after the storm has passed. However, in many communities the 600 gallons from your roof goes down the downspout, and into the stormwater system. These pipes carry it very quickly to the nearest stream. This means that the stream has to carry more water in a shorter amount of time. This can set up a flash flood, a rapid rising of water that can cover roads and flood basements and low-lying areas.

Urban flooding can also become a problem if debris and litter block the stormwater system. If the storm drain is blocked, flooding can occur on the street and cause dangerous driving conditions. Blockages in the pipes can cause pools of water to form, and these pools are breeding grounds for mosquitoes.

You can help minimize urban flooding by directing runoff to a rain barrel or rain garden. These simple fixes help keep stormwater from causing damage to streams.

Your Lake SWCD Contact:

Beth Landers
Education Coordinator
440-350-2730
125 East Erie St.
Painesville, Ohio 44077
blanders@lakecountyohio.gov
www.lakecountyohio.org/soil

NOAA Web Resources

http://www.noaa.gov/wx.html - The National Oceanic and Atmospheric Administration maintains current weather warnings, and river condition forecasts across the country.

Local weather can also be obtained at http://www.erh.noaa.gov/cle/ from Hopkins Airport. A link on this page will take you to lists of notable weather events for the past few years, and information on regional weather records.

For more information on weather-related disasters, check out http://www.ncdc.noaa.gov/oa/reports/billionz.html

Cross-curriculum Connections.

Combine science class with history and language arts. Have your students interview an adult in their lives about a weather event they lived through. Perhaps their dad remembers camping out in the basement for a week during the blizzard of 1978. Or Mom and her friends watched a tornado pass by their house. Maybe Grandpa was a firefighter and helped evacuate people from a flooded house. Sometimes they've even saved newspaper clippings or photographs about the event. Each student can gather a story, research the history of the event, and write a report, or a fictionalization of the event. The class can then work together to organize the stories either chronologically along a timeline, or geographically on a map.

Fun Weather Folklore

Halos around the moon or sun mean that rain will surely come • When smoke descends, good weather ends • Flies will swarm before a storm • Snow like cotton soon forgotten, snow like meal there will be a great deal • Mackerel scales and mare's tails make a sailor furl his sails • Evening red and morning grey send the sailor on his way • When leaves show their backs it will rain • An open anthill brings good weather, a closed one brings a storm • Year of snow, fruit will grow • Whether its cold or whether its hot we will have weather whether, or not • A sunny shower last half an hour • If birds fly low, expect rain and a blow • Thunder in the morning, all day storming • When chairs squeak, of rain they speak • Seagulls flying backwards tell of a strong wind • If the palm of your hand itches, it will rain