Nature Guides

Snow – The Action Down Under

Late January 2011
Featured Process: The World Under the Snow

It has been cold lately, but there are a lot of active creatures out there who don't mind, as long as the snow is deep enough. They are the denizens of the subnivean, which is not the layer in the drawer below the hand cream, but rather the active world beneath the snow. Subnivean happenings unfold in the space between the ground and the snow that is created as snow gets draped over plants, trees, bushes and other things. We discussed the molecular magic of snow in early December – not only does snow's molecular structure make it less dense than water, but it also makes snow is a great insulator, particularly light, fluffy snow. Just 25 cm of snow can result in constant temperatures a bit above or below 0°C at ground level when surface temperatures plunge to -20-40°C. But don't trust me. Find your own snow bank, dig a pit, and record the results (click here and here for lessons). Solidifying warm gelatin in clear canisters might actually be more fun. Keep in mind that snow thrown by plows or shovels will be denser and provide less insulation.

Top R4R Picks
Resources for extending the learning

Melting Ice
Middle, Secondary

A Teacher's Guide for the Video Sila Alangotok – Inuit Observations on Climate Change
Secondary

Bearly Any Ice
Elementary, Middle, Secondary

Canada's Forest Vol. 2 – A Breath of Fresh Air
Middle

With lots of snow, small rodent populations can explode in winter, since snow increases the habitat where they can move around relatively safe from predators. But not entirely – owls, particularly the Great Gray, are adapted to hear and plunge through 30 cm of snow to capture prey, sometimes leaving perfect marks to tell the tale(of course, they aren't always so elegant about it and may occasionally underestimate snow depth). However, freeze/thaw cycles will result in a hard enough crust that the owls cannot penetrate, jeopardizing their survival. "Chalk one up for the rodents," you might think, but that crust can also limit gas exchange to the point where all oxygen below the crust is used up and the rodents die. Crusty conditions can put other wildlife at risk, too. Global warming may lead to more of these cycles,in some areas. And what would happen if there wasmore winter precipitation, but also warmer weather to melt it quicker? Which species would be the winners and losers? Well, we don't know the answers, or how exactly numerous factors will interplay, but certainly it will lead to cascading impacts and significant ecosystem changes. Everything is connected.

Towards spring, plants in cavities beneath the snow may have their own greenhouse, getting enough sun and humidity to get a leg up on plants either exposed to the elements or buried under deeper snow, even to the point of blooming. Soil microbes, particularly fungi, may actually reach their peak biomass under the snow.

Here's more on the ecology of snow, life beneath the snow, and simple activities for producing subnivean dioramas and studying winter temperatures.

Other Happenings:

- How many different kinds of snow can you find? Here are some from the Inuit:

Pukak (poo-cack) the layer of bonded, granular snow that cover s the ground. Animals travel through the pukak layer,

where the heat from the earth keeps them warm.
Siqoq (see-kok) drifting snow, the kind that makes "snow snakes" drift across the snow or road.
Qali (kal-ee) snow that collects on tree branches and fence posts.
Api (ah-pee) snow on the ground.
Anniu (an-nee-you) falling snow.

Make up your own names. What would you call "snow melting away fro m the exhaust vent", or "snow pounded by many feet on the playground"?

- Having trouble getting across metamorphism? Then take your class and go makesnowballs! Just as you can compress a loaf of Wonder Bread into a 5 cm cube, you can take those fluffy snowflakes and mash them into a dense ball, using heat and pressure. Just as Superman made a diamond out of a lump of coal in his hand, you are changing, ormetamorphizing, the structure of water. Cut the ball open, and dare them to find the snowflakes. Then have fun throwing all those snowballs at….a tree, or a wall, or something else, hopefully inanimate and unbreakable.
- Usually about now, on the coldest day in the dead of winter, I hear my first male chickadee mating song of the season, reminding me that spring isn't really that far off. Keep your ears open for that three note, "Hi, Sweetie!" and dream of warmer times. Or listen up for their "chick-a-dee-dee-dee" calls and count the number of "dees," because dee is for danger! Chickadee communication doesn't stop there and birds see things in ways we can't - in ultraviolet. Apparently, male chickadees that shine the brightest are the sexiest!
- Remember The Great Scaup Mystery from the mid-October guide? Well, if you had a chance to read about the mysterious decline of the Greater and Lesser Scaup(a North American species of duck), here's an update for you: This month, the Long Point Waterfowl (LPW) scaup research program announced that selenium (a contaminant) is probably not a major factor in causing the scaup's decline. This is contrary to LPW's previously hypothesis that ingestion of zebra mussels by scaup's was leading to increased selenium levels in their tissues, which in turn caused reproductive impairment. So, what's causing the decline? The mystery continues….
- Monarch butterflies that migrated south in late August and September are over-wintering in unique habitat on twelve isolated mountaintops in Mexico. Unfortunately, their numbers are at an all time low. This past summer's weather conditions across their U.S. and Canadian breeding and migration grounds is thought to be the main factor behind this new low. However, loss of habitat and its food source, milkweed, due to herbicide use has already contributed to declines.
- Eastern Tent Caterpillars spend the winter in the egg stage, which are easily seen, particularly in the branches of Black Cherry trees. These trees also often have black knot, a viral disease.
- In the water under the ice, bass are dormant while Brown Bullheads and Common Carp(not native to Ontario) bury themselves in the mud, but Walleye, Yellow Perch, Northern Pike, Lake Whitefish, Round Whitefish, Lake Trout and Rainbow Trout (not native to Ontario) remain active. Generally, they can be found in the warmest part of the lake, usually within 15 to 30 cm of the bottom. Occasionally, fish will approach the ice to feed on smaller fish attracted by plankton concentrations.
- The days are finally getting longer and the sun is climbing higher in the sky. Try marking that event by measuring shadow length at noon over several days or weeks, using, of course, the same kids. The shadows will shrink as the sun rises (unless your kid is growing really fast). You can also measure the sun's altitude above the horizon.
- A reminder that in 2011 we are celebrating the International Year of Forests [and we are certainly a nation that depends heavily on forest resources for our way of life. January is a great time to get out and explore our forests on foot, snowshoes, or skis. There is so much to see and learn. Think about what forests mean to you as a citizen of Ontario - did you know that forests provide jobs to approximately 200,000 people in Ontario, and the forest products industry generated $15.3 billion in revenue in 2007 alone? But our dependence on forests goes beyond pure economics. Forests provide essential ecosystem services, which we couldn't live without. Check out the Focus on Forests lesson plans offered by the Ontario Forests Association for ways to introduce forests into your classroom.

World Wetlands Day:
February 2nd, 2011