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The Dirt on Soil with Nathan Basiliko

By April McCrum

A follow-up to Nathan Basiliko's presentation Nathan came to talk to the Nipissing Naturalists in June to share his knowledge on soil. First things first, soil should not be considered the same as dirt. Dirt collects on your floor; however, soil is much more complex. Soil contains gases, liquids and living organisms. Soil is very important to us as it provides a rooting medium for plant growth while also supplying plants with nutrients. Soils also supply plants a steady amount of water in dry periods and helps to filter water. Another very interesting fact is that soil contains billions of living organisms.

There are various factors that lead to soil formation, which includes the parent material (rock), climate, biota, topography and time. As soils form they create a different soil layer, which is referred to as a soil horizon. Each horizon is usually observed to have a slight difference in colour, indicating a change in soil type. Different soil textures are also found throughout soil horizons and you may have very fine particles like clay or more course materials such as sand. This is when those studying soils will refer to the soil texture triangle. Another way that soil scientists examine soil is by using the monsal soil chart, which is a colour chart that helps to tell more about the parent materials of the soil.

Another vital point about soil is the fact that nutrients exist in soil act as anions or cations. Anions have a negative charge, whereas cations have a positive charge. Most soils have a negative charge and



the amount of charge is dependent on the soil texture, such as silt, clay or sand content. The cation exchange capacity indicates the amount of negative charges in soil. High sand soils normally have a low cation exchange capacity, and those with clay or silt have a higher cation exchange capacity. Since soil particles are negatively charged and plant nutrients can be positive and negative, some attach to soil



while others do not. Those with a low cation exchange capacity (soil containing sands) will therefore move more quickly through soil. compared to those with high cation exchange capacity (loamy/ silt/clay soils). Those soils that contain loam (mixture of sand, silt and clay) are therefore considered the best for plant growth.

Nathan also touched on how soil continues to be removed from our earth at an alarming rate, referred to as soil deqradation. Soil degradation is when there is a loss of quality of soil from human activities, which leads to decline in soil fertility and soil nutrients, loss of organic matter and erosion. This can result in the loss of agricultural productivity and impairs the microbial communities, which are essential to cycle nutrients required for plant growth. Nathan has been actively working on a few projects to examine soil degradation in the forest industry and working to determine various ways to help retain soil nutrients during these activities and examine microbial activity. As a team member working on Soil for Youth, with other soil scientists across Canada; Nathan has been active in this program, and very passionate about getting the word out to those in schools to learn about the importance of soil. The goal is for high school teachers to use soil for youth as part of their curriculum. For more information check out: http://soilweb.landfood.ubc.ca/promo/raisingawareness/soil-4-youth,

Nathan really helped me think more about soil and how we really do take it for granted, although it is essential for all living things. Thanks Nathan for sharing your time and knowledge with us!

Nathan currently holds a Ph.D. from McGill University and works at Laurentian University as an Assistant Professor and is part of the Canada Research Chair program.

Enjoy Nature !

Ticks and their Ecology

September's speaker was Dr. Katie Clows a veterinary doctor working on her PhD through the University of Guelph. Her research is aimed at determining site factors that predict the probability of ticks infected with bacteria that cause Lyme disease. She has plots in conservation areas and provincial



parks across southern and central Ontario. Some of her plots are in our local conservation areas and parks. The three most common ticks in southern Ontario are the large American dog tick, black legged or deer tick and groundhog tick. All ticks go through egg, larvae (very small), nymph and adult development stages. Ticks progress from each stage after a blood meal. The larval stage tick has 6 legs while the nymph and adult have 8 legs. Dog ticks carry Rocky Mountain spotted fever, Tularemia and tick paralysis. Groundhog ticks carry Powassan fever. Blacklegged ticks carry Human babesiosis and also Lyme disease and Powassan fever. The names of the latter two diseases are derived from the towns where each disease was first described. Yes, Powassan fever is named after the town just south of North Bay where the first incidence of the (rare) fever was diagnosed. Lyme, Connecticut is the location where a large number of children were diagnosed with juvenile rheumatoid arthritis. Further investigation by Dr. Burgdorfer showed that these children were infected with Borrelia burgdorferi, a spirochete bacteria that causes Lyme disease. Blacklegged ticks have a 2 year life cycle (see figure 1). Eggs are laid in the spring, and hatch into larvae. The larvae must have a blood meal and if they survive the year grow into nymphs the following spring. Both adults and larvae overwinter in the leaf litter in the forest. The following summer nymphs that have had a blood meal develop into adults that will lay their eggs the following spring. The ticks are infected with Borrelia burgdorferi when they

have had a blood meal from an infected host. The most prevalent host are rodents in particular white footed mice. This means that the transmission of the bacteria is most likely to occur in spring and early summer.



Figure 1: Life cycle of blacklegged ticks. Note that you are most likely to get infected during late spring and summer. Source: Center for Disease Control and Prevention.

Ticks are hardy creatures and can survive being squeezed and being placed in water. To reduce the chances of getting infected we need to:

1) Use an insect repellent with DEET

2) Cover exposed skin with light coloured clothing (ticks are easier to see on light colours).

3) Keep to trails as ticks will congregate on the tips of understory plants.

4) Inspect yourself carefully for attached ticks after spending time in the woods.

5) Have a warm shower to wash away unattached nymph ticks.

6) Place your clothes in a hot dryer for at least 15 minutes and then wash them.

Calendar of Events

Next General Meeting Tuesday, October 14, 2014 Cassellholme Auditorium @ 7:00 pm

Upcoming Speakers

Date: October 14, 2014

Speaker: Don Willis, Professional Forester and manager for Jiffy Products

Topic: Lyme Disease: A Personal Story

Find out what this North Bay resident had to face in order to determine his diagnoses of Lyme disease and how he fought the disease.



Monthly Bird Bash — — Saturday & Sunday

Spend some time observing our local birds and report on how many species of birds you see. Contact Dick Tafel for dates: **rtafel@sympatico.ca** or 705 472-7907.

Birdwing Meeting

Fourth Tuesday of each month at 7:00 pm. Bird watching topics will be discussed. Meet at the library (auditorium). Contact Dick Tafel at 705 472-7907 or email rtafel@sympatico.ca

Date: November 11, 2014

Speaker: TBA

Topic: TBA

Nipissing Naturalists Club has a new Facebook page

If you have a Facebook account, click here to visit our new page: <u>https://www.facebook.com/</u> nipissingnaturalistsclub





www.montrealgazette.com

Photo Contest Announcement

Once again all members are invited to send in by November 11th 2014 a maximum of 2 photos for each category:

- 1. Fauna
- 2. Flora
- 3. Landscape
- 4. People enjoying nature

Members will be invited to vote for the best photos in each category during the December meeting. Prizes to be won.

Send your photos to Kelly Major: kelly.major@gmail.com

Ontario Nature Update

Pollinators

Ontario Nature and its Youth Council have initiated a campaign to protect Ontario's pollinators (both wild and domestic). This has included a postcard asking the Premier to restrict the use of neonicotinoids. This chemical has been linked to severely decrease numbers of bees and is lethal to birds and other wildlife. Apparently 78% of Ontario's population currently wants this chemical banned until more research is completed on its effects. The Youth council has also had an online push to build public support for the protection of pollinators. This helped in exceeding over 250



Our

pollinators are declining due to habitat loss. pesticide

use, climate change, and disease (both wild and domestic). Wild pollinators being wild bees, butterflies, moths and birds and domestic honeybees.

Lost Bay:

Ontario Nature needs help right now to raise \$250,000 to protect the final segment of Lost Bay to be included as the Lost Bay Nature Reserve. Lost Bay is located about 20km NE of Gananoque. It consists of a rich wetland and rugged ancient forest. The section they want to preserve is currently under risk of development, and if not protected would fragment this ecological corridor which provides a north-south migration route for wildlife and is home of 24 species at risk. Any size of donation is welcome; you can have your own share for 75.00, a quarter acre for \$375, a half acre for \$750 or a full acre for \$1,500. Online donation forms are available on Ontario Nature's website. https://

ontarionature.thankyou4caring.org/ YourOntarioNature

Benthic invertebrate sampling outing

1) Organisms are adapted to live and reproduce in certain habitats and within certain environmental parameters such as temperature and pH. Aquatic invertebrates are small,



grow and reproduce fast and have adapted to live in small and specific environments. When environmental factors

change the different populations of aquatic invertebrates also change. They are therefore good indicators of water quality. Here a dragonfly larvae was caught in our net sweep.

2) Adult dragonflies and damselflies look

very similar. However their larvae are quite different. Note the difference in respira-



tory features. Damselflies have feathery gills at their rear end while dragonflies have tubes that look like a drill chuck.



3) Indoors we sorted and counted the invertebrates using low power microscopes. You need to be auite skilled to sort through and classify each animal.