



Biodiversity and Contaminants

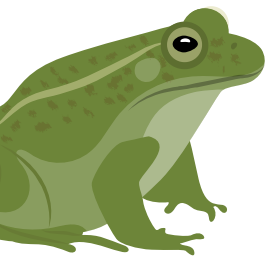
Study: Patterson, S. A. (2019). The toxic effects of oil sands contaminants on developing amphibians [Master's thesis, Queen's University]. QSpace Library.

Canadian oil sands contain bitumen which is a form of natural oil, and it is a sticky, black, thick liquid. It is extracted in these areas, and also transported through pipelines across North America. These researchers were interested in the impacts that bitumen has on certain species, specifically wood frogs. These frogs can be exposed directly to it by being in contaminated areas in and around the Canadian oil sands, and especially when in proximity to contaminated melting snow that enters into vernal pools, which are temporary, or seasonal pools, that are the areas where wood frogs lay their eggs.



During their research, they found that when frog embryos are exposed to bitumen contamination, they:

- Can express different genes that are required for normal metamorphosis, which is the development and growth of a frog through stages
- Can experience a decrease in overall development
- Can develop malformations
- Can express different behaviours that aren't usual in frogs not exposed to the contaminant



This research is important because frogs, like all species, contribute to the function and balance of an ecosystem. Frogs:

- Help control insect population
- Are food sources for many animals
- Filter water as tadpoles
- Eat pest species
- Are bioindicators, which means that they can indicate any environmental concerns because they are sensitive to their surrounding environment (different habitat requirements and skin type)

Therefore, this demonstrates that contaminants do affect the growth and development of species and it is important to understand how contaminants can affect other species within an ecosystem, and its overall biodiversity. Below is an activity that provides the opportunity to visualize biodiversity, and research how contaminants affect some members of an ecosystem and what this can mean for the overall function and balance of that ecosystem.



Step 1: What does a biodiverse ecosystem look like?

Materials:

- Ecosystem Infographic
- Species cut-outs

Display the picture of the healthy ecosystem on the board. One by one, students will pick a species cut out and place that species in the ecosystem, as it displays on the board. As students pick and place a species, they should explain how that species fits into the ecosystem, and what might its role be in that area.

When all species are placed, students will then get to see just a small sample of what a biodiverse ecosystem should look like. The second slide in the provided infographic shows a simplified graphic of a polluted ecosystem, which can be switched to when all animals are displayed on the board. Here, students can be asked to reflect on what changes they see in the polluted environment, and how might this affect the species that they see there.

Step 2: How is each of these species in that ecosystem affected by contaminants?

Students will now do a small research activity focusing on the animal that they chose to place in the ecosystem. Students will answer question "What sort of contaminant is this species affected by? How is it affected by that/those contaminant(s)?"

A brain-storming discussion about what a contaminant is, and the different kinds of contaminants (chemical, physical, biological, etc...), as well as how to find reliable sources online should occur, before students start researching.

Step 3: Sharing

Once students have found sufficient research, students can communicate their information in any way they would like, such as a small poster, blog, ecosystem model, or PowerPoint.

