Lichens Bioindicator Activity
Field Ecology

Because lichens absorb so much of the substances they need to survive from the air, they are good indicators of air quality. It has been found that they are sensitive to many common pollutants that are released into the air. These pollutants can be a result of natural sources such as volcanoes, but the main source is result of human activities. These include automobile exhaust, the burning of fossil fuels and industrial processes.

To answer the following questions, you will need to work with a partner. Start by grabbing a couple small (1-2 foot) branches that have as many lichens as possible on them. Do not go too far from the classroom to get your branch – 5 minutes is about all you'll have. Answer the following questions in a Google Docs document and turn them in on Showbie when you are done (although you will work with your partner to discuss the questions, you should each turn in your own individual set of responses).

1. As stated above, lichens are indicators of air quality. Certain species are more sensitive to common pollutants than others. What do you think it means if you find only highly **pollution-tolerant** species on your sample?

2. What types of lichens do you think you will find on your sample - high tolerance lichens or low tolerance lichens? Why?

3. How many different types of lichens are on your branches? What environmental factors do you think influences the type and amount of lichens present? Why?

4. What two species of lichen on your branches were most **abundant**? What two species of lichen were least abundant?

5. Working with the class, come up with a detailed **methodology** for determining the air quality of Crescent Valley by looking at lichens. This should take the form of a detailed, **step-by-step system** that mathematically combines your data with the tolerance information to come up with one overall numerical rating for air quality. Your methodology should be specific enough that if you gave your data and your methodology to anyone else, they would come up with the exact same result as you would.

Lichen Species	Tolerance Description	Tolerance Rating (1 = very tolerant; 5 = low tolerance)
Ramalina farinacea	High tolerance	1
Ramalina menziesii	Low tolerance	4
Evernia prunastri	High tolerance	1
Parmelia sulcata	High tolerance	1
Usnea subfloridana	Medium tolerance	3
Hypgymnia physodes	High tolerance	1
Lobaria pulmonaria	Low tolerance	5

6. According to the lichens you found on your branch and your methodology, what is the air quality of Crescent Valley? Do think this is an accurate representation of the real air quality?

7. If you were to collect and analyze data using similar methods but in a very polluted location – for example, near a major freeway – what do you think you would see? Create a hypothetical data table showing the possible abundance of the species we have been studying.