IN THE SHED

Outcome: To have an authentic understanding of your local watershed and how to monitor the health of it through *biosurveys.*

*\*Suggested vocabulary words are noted through italics*

ENGAGE

Turn on the faucet and ask where the water is coming from and where it is going. Have a discussion about where your local water is stored.

Instructional Note: By upper elementary children generally have a fairly accurate grasp and understanding of the actual water cycle. However, their ability to directly apply this knowledge of where fresh water is located and where it comes from could use some strengthening.

Resources:

* Find your local watershed [here](http://water.usgs.gov/wsc/map_index.html)
* Brief background on water storage [here](http://water.usgs.gov/edu/watercyclegwstorage.html)

EXPLORE

Give kids a *topographical map* of your local *watershed*. Have them highlight all the creeks, rivers and streams that they can find. If you have the time, building salt dough representation of these topographical maps is a fulfilling and a meaningful sensory experience.

Instructional Note: It is important to point out how topo lines work to represent landforms. A fun way to explore this is to have kids draw concentric circles on their knuckles while they make a fist. Then, have them flatten their hand out. Help them make the connection that those concentric circles represent hills and mountains of different elevations.

Resources:

* Find *topographical maps* of your local *watershed* [here](http://nationalmap.gov/ustopo/)
* [Salt dough recipe](http://www.dltk-kids.com/crafts/recipes/clay1.htm)

EXPLAIN

Ask what discoveries they made during the explore phase. Hopefully they will see that creeks and streams ultimately end up in a common body of water. This is a *watershed*. Introduce the word, “watershed”.

Resources:

* Definition of a *watershed* [here](http://water.usgs.gov/edu/watershed.html)

EXTEND

Start a discussion about why a healthy *watershed* might be important. Ask about how they might look for signs of healthy water in a river, creek or stream that they saw on their maps. If it is not brought up, suggest that finding living things in a body of water would be a good start. These are called *biosurveys*. Tell them that they will be conducting their own *biosurvey* of one of the rivers, streams or creeks that they highlighted on the map. Ask them about what types of living things they might expect to find in their chosen *ecosystem*. Explain that they will be focusing on the bugs, or *macroinvertebrates*, for their *biosurvey*. At this point, building background knowledge on these *macroinvertebrates* would be advised. This could be done through internet research or field guide perusal. Ultimately, the discovery of *intolerant* and *tolerant* species is the goal. For the majority of North America, at least, the presence of *stoneflies*, *mayflies,* and *caddisflies* are indicators of healthy streams and river as these are *intolerant* species.

Instructional note: Depending on the time of year, topography, and location, run off could be very high and therefore dangerous. This is one of the unique constraints of place-based education and it will really be up to you and your own level of confidence around water. You can always collect samples and bring them back home or to the classroom if you feel unsafe about having children near the water.

Resources:

* Life in the River ID guide [here](http://midmichigannatureandscience.blogspot.com/2013/04/aquatic-ecology-and-mother-earth-week.html)
* A great macro field guide [here](http://www.amazon.com/Guide-Common-Freshwater-Invertebrates-America/dp/0939923874/ref%3Dsr_1_1?ie=UTF8&qid=1425748892&sr=8-1&keywords=a+guide+to+common+freshwater+invertebrates+of+north+america)
* Definition of a *macroinvertebrate* [*here*](http://extension.usu.edu/waterquality/htm/whats-in-your-water/aquatic_macroinvertebrates)

EVALUATE

To the river! But, before you go….make sure you have:

* A white ice cube tray
* A dip net (either homemade…which can be as simple as cutting a pair of nylons and lining a kitchen strainer with it or [purchased](http://www.acornnaturalists.com/store/STANDARD-D-STYLE-AQUATIC-NET-P399C0.aspx))
* [Pipettes](http://www.acornnaturalists.com/store/PLASTIC-PIPETTES-pack-of-20-P1247C0.aspx) or eyedropper
* A white dishpan
* A macroinvertebrate identification guide (found in the resources portion of the Extend piece of this lesson plan)
* A pencil
* A pair of waterproof boots or waders
* A copy of the Holy Macros! printable included with this lesson to record the findings of your biosurvey

Once at the water, fill up your dishpan about halfway with some river water. Next, collect a sample of *macroinvertebrates* by stirring up the water upstream and then get your dip net downstream to collect the sample. Take your net and invert it into the water in the dishpan. Hopefully there will be some life in there wriggling around. If not, go back and get another sample until you have a satisfactory amount of life in the pan. Finally, get those pipettes out and start sucking up the macros and sorting them out into the icecube trays based off of your identification guide. Don’t forget to record your findings!