

Part 2: Macroinvertebrate Card Sort

2.2 Lesson Sequence



Wenk Associates

Engage

1. If using the worksheet, hand out **2.2c Macroinvertebrate Card sort Worksheet** now or have students record their thoughts in their scientific notebook. Begin the activity by asking students what living and nonliving things exist in streams and rivers.
2. List student responses on the board in two columns: living and non-living (but do not label the columns as such). Then ask students, "What are the differences between the two columns?" Once students have determined that one side is living and the other side is non-living, introduce or reinforce the terms **biotic** and **abiotic**. If the class has not defined the terms before, have students do so now.
3. If students do not come up with insects, you can ask them if anyone has fly-fished and what type of lures they used. Let students know that while there are many living organisms in rivers, scientists are often really interested in the macroinvertebrates. Today they are going to look at some macroinvertebrates.

Explore

1. Divide students into groups of 2-4. Distribute to each group a set of the **2.2a Macroinvertebrate ID Cards**. Allow some wait time for them look them over. See if students begin to group the cards; if not, suggest they do so and to be prepared to explain the criteria they use. Allow students to come up with their own grouping methods based on the images & data on the cards. Possible grouping categories: size, air breathers vs. gill breather, visible legs/no legs, wings/no wings, food source.
2. Have each group explain how many categories they came up with and their reasoning for the categories. If you have whiteboards, students can write their categories and reasoning on this. This will allow them to modify as they go. Otherwise, students could write down their groups reasoning using chart paper and notebooks.
3. As a class, discuss:
 - Similarities & differences between classifications.
 - What grouping systems seem to be stronger, or tell you more about the relationships between the organisms?

- What characteristics do the students think are the most important for grouping, and why?
- How might classifying macroinvertebrates (or any group of organisms) be helpful for scientists?

Tell students there are many reasons why scientists classify organisms, including:

- To understand how they are related (like a family tree)
- To understand their role in the food chain/web (trophic level)
- To understand how they to adapt to changes and stress caused by human impacts (generalist/specialists)

Elaborate

1. Have students read **2.2b Indicators: Benthic Macroinvertebrates**. Not for EL students you will want to front load some vocabulary like benthic, indicator, and biological condition.
2. Think/Share/Pair/ the following prompts after reading:
 - Define “Biological Indicator.”
 - What are some reasons macroinvertebrates are good biological indicators?
3. Record student sharing on the board, and as a class, come to a consensus. Provide students a copy of the [Michigan Clean Water Corps Macroinvertebrate Scoring Sheet](https://micorps.net/wp-content/uploads/2021/08/VSMP-Macro-OrderLevel-Datasheet-2020.pdf) (available at <https://micorps.net/wp-content/uploads/2021/08/VSMP-Macro-OrderLevel-Datasheet-2020.pdf>) or show students the three groups by which they will classify biological indicators.
4. Have students regroup their cards by these categories (note: the cards are ID'd as group I, II, and III in the corners.) Have students determine:
 - Characteristics common to Group 1: Sensitive
 - Characteristics common to Group 2: Somewhat Sensitive
 - Characteristics common to Group 3: Tolerant

Explain

Have students share out the common characteristics, and discuss why having a common characteristic would make you more or less tolerant. For example, many sensitive species have gills, while tolerant species either breathe surface air or through their skin.

Evaluate

Ask students to respond to the following question, either orally or in writing:

Given what our stream habitat is like and what we have learned about macroinvertebrates, how would we create a trap to capture macroinvertebrates from our stream? What are some ways we could build a trap that would attract the most macroinvertebrates?

Extend

Have students create a dichotomous key to get to any organism in the cards.

Consider assigning an article from *Nature* which includes additional information about additional bioindicators. It can be found [here](#): Citation: Holt, E. A. & Miller, S.W. (2010) Bioindicators: Using Organisms to Measure Environmental Impacts. *Nature Education Knowledge* 3(10). Available at: <https://www.nature.com/scitable/knowledge/library/bioindicators-using-organisms-to-measure-environmental-impacts-16821310>

Note: If you don't have time to do complete card sort activity, you could have students practice matching the front side of the cards to an Aquatic Macroinvertebrate Sorting and Identification Guide, such as the one available at: <https://stroudcenter.org/wp-content/uploads/StroudWebsiteMacroKeyFNL.pdf>.