Invent the Ideal Aquatic Invader

Activity

Students learn and discuss key adaptations that give invasive species the upper hand over native species and invent their own Ideal Aquatic Invader.

Grade level: 6-8 (adaptable for all grade levels)
Subjects: Art, Ecology, Science
Setting: Classroom
Duration: 1-2 class periods
Key Terms: adaptations, habitat, invasive species, native, non-native, organism

Objectives

- Students evaluate how adaptations enable a species to live within a specific environment or habitat.
- Students learn how physical or biological adaptations allow invasive species to thrive new environments.
- Students invent a completely unique aquatic invader.
- Students explain how adaptations of fictional invader would enhance its survival and enable it to outcompete native species.

Materials

- New Zealand mudsnail poster
- Paper
- Drawing utensils (pencils, crayons, markers, etc.)
- *Ideal Invader worksheet*

Background

All organisms whether native, non-native or invasive, possess specific **adaptations** – or characteristics that enable them to live in a particular environment or habitat. All adaptations have a purpose such as helping the organism avoid predators, acquire food, reproduce, or survive in an ever-changing environment. These adaptations are what make an organism successful in a specific habitat. Invasive species (including aquatic nuisance species) often have physical traits or biological adaptations that enable them to live in a wide variety of habitats, reproduce and spread rapidly, and outcompete native species for important resources such as food and preferred habitats.

Common characteristics of aquatic nuisance species – Not all aquatic nuisance species will have all of these traits, but most have one or more of these traits.

- Have few or no natural predators.
- Can live in many different aquatic habitats such as ponds, lakes, rivers, streams, ditches, estuaries, reservoirs, or puddles. Also known as a habitat generalist.
- Tolerate a wide range of aquatic conditions (e.g., water temperature, salinity, water velocity and substrate types).
- Can physiologically adapt to changing environmental conditions.
- Eat a wide range of food types. Also known as a food generalist.
- Produce MANY offspring.
- Grow rapidly, mature quickly, and reproduce frequently.
- Unique modes of reproduction (e.g., fragmentation (small piece starts a new plant), asexual reproduction (offspring are from a single parent only)).
- Populations have multiple dispersal methods (e.g., wind, water current, volitional movement, hitchhiking on cargo ships or recreational gear).
- Can live out of water, or travel on land for a period of time.
- Able to colonize disturbed habitats before other species.

Preparation

- Make a copy of *Ideal Invader Worksheet* for each student.
- If necessary, quickly discuss characteristics of different freshwater aquatic habitats to get students thinking about what is required to live in them.

Directions

- Ask students to think of a plant or wild animal that is able to live in many different habitats (e.g., seagulls, ducks, raccoons, squirrels).
- Choose one of these species and have the students discuss the adaptations that make it successful in its environment. Remind students that different adaptations can help an animal acquire a specific type of food, move faster, avoid predators, or live in a specific habitat.
- Place the New Zealand mudsnail poster on the board. Discuss its key adaptations.
- Next, discuss the adaptations aquatic nuisance species have that give them an advantage over native species (see background information).
- Hand out drawing materials and ask each student to invent and draw a never-before-seen aquatic nuisance species. It can be a plant, animal, or microbe.
- Using the *Ideal Invader Worksheet*, ask students to list the invaders special adaptations, provide a brief description of their purpose or function, and explain how the adaptation helps their organism to successfully invade.

- Use the following list of questions to aid in the creative process:
    - What is your organism's name?
    - Where did it come from (i.e., where is it native to)
    - Where does it live now (e.g., pond, river, lake, etc.)?
    - What are the characteristics of its habitat?
    - What does it eat?
    - What eats your organism?
    - How does it avoid being eaten?
    - How does it reproduce?
    - How does it get around and how is it spread?
    - How does it compete with native organisms for food and space?
    - Does your ideal invasive have any special adaptations?

- When finished, have each student briefly describe the special adaptations of their Ideal Aquatic Invader and explain how these characteristics would enhance the organism's survival and enable it to take over an aquatic habitat.

Evaluation

After students have presented their Ideal Invaders to the class, discuss the following questions:

- Why are adaptations important?
- How do invasive species use adaptations to displace native organisms?
- What could happen to a community of species and/or the aquatic environment if a new Ideal Invader moved in?
- Can some invaders be too successful for their own good? For example, the invader may reproduce at such a rapid rate it eats itself out of house and home. Is this a good characteristic of an ideal invader?

Extensions

- Ask students to write a paragraph explaining how their Ideal Invader will be doing in 10 years. Will it still be living where they originally thought it would? Did it have to find new food sources? What does its habitat look like now?
- Describe the process by which a native species could evolve to live with your Ideal Aquatic Invader.

Source

This activity is an adaption of "Design the Ultimate Invader, Aquatic Invasions! A Menace to the West", Oregon Sea Grant. Contact: Tania Siemens, AIS and Watershed Health Research Assistant, tania.siemens@oregonstate.edu

Washington State Science & Environmental Science Standards:

6-8 LS3E – Adaptations are physical or behavioral changes that are inherited and enhance the ability of an organism to survive and reproduce in a particular environment.

ESE Standard 1 - Students develop knowledge of the interconnections and interdependency of ecological, social, and economic systems. They demonstrate understanding of how the health of these systems determines the sustainability of natural and human communities at local, regional, national, and global levels.

Ideal Invader *Worksheet*

Name: _____

Ideal Invader's Name: _____

Instructions: Fill out the following table according to your Ideal Aquatic Invader.

Special Adaptations **(e.g. can breathe fire)**	**Function in the environment**	**How it helps your invader to successfully invade**