

Satellite Image Watershed Exploration

Science and Engineering Practices (SEP) – *Developing and Using Models*

Disciplinary and Core Ideas (DCI) – *Ecosystems: Interactions, Energy, and Dynamics*

Use the boxes as guidelines to arrive at the NGSS standards which are written in **bold**

Objective: Students will explore their watershed through overhead satellite images. They will investigate patterns and make connections between animal habitats, and paved vs non-paved surfaces.

Background:

A **watershed** is an area of land that drains water to a common point, be it a river, the bay, or the ocean. Santa Clara County is mainly in the Guadalupe River Watershed in which rain falls on the hills surrounding the southern end of San Jose, creeks form on those hills and combine into the Guadalupe River. The Guadalupe River runs north through the middle of San Jose into the San Francisco Bay which then drains into the ocean. All living things are a part of a watershed. A healthy watershed is necessary for the plants and animals living there.

In cities, the water which flows into storm drains when it rains flows directly into creeks and out to the San Francisco Bay. This means that any trash, motor oil, fertilizer, or other waste also may be washed down the storm drains – this water is called **runoff**.

On the contrary, water which goes down the drains in our kitchens and bathrooms goes through pipes to waste water treatment facilities. Here, the water is strained of solid particles and bacteria are added to water which eat floating particles. This removes 90% of particles. Then, this bacterial sludge is removed, chlorine is added to kill harmful bacteria and viruses, chlorine is removed through evaporation, and the water is pumped out into San Francisco Bay.

This waste water treatment doesn't make the water completely safe though. Drugs like aspirin and heavy metals like lead and mercury are not removed from the water during the cleaning and end up in the environment.

Activity:

1) Give each student one satellite maps sheet

Explain that these are images of parts of our watershed taken with satellites from above the Earth and point out some of the obvious features:

Blue lines = rivers and creeks

Yellow lines = roads

Green patches = vegetation

Light geometric shapes = buildings

2) Have students individually write down observations about their section of map listing as many different things as they can find

3) As a class, share what was found and differentiate between human-made and natural features. If possible, use a document camera to show certain sections to the whole class.

Develop a model to describe phenomena.

Lay the paper template on the floor and gather the class around it. Have students lay each section of the map down matching the number on the back of the piece with the numbers on the template. There will be overlapping. Point out interesting features as you go:

Top of the Guadalupe River Watershed at Mt. Umunhum
(not on map, but located about 2 inches south of section 29)
Bottom of the Guadalupe River Watershed at the San Francisco Bay
Creek locations near your school
Cities and streets

In what direction does the water flow?

Discuss the difference between water in the sanitary sewer system that goes to a water treatment plant versus that in the storm drain which flows straight to the creeks and the bay.

*What are some examples of things that might end up in the bay due to runoff?
Where on the map is the water cleanest?*

4) Take out the animal photo cards and their matching names. Hand out one card to each student and instruct them to find their partner who has the matching card.

When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

*Have you seen this animal before? Where was it?
Are you more likely to see it in an urban or natural area?
Pretend that you are a wild animal that lives in the Bay Area. How are you being affected by the construction of more buildings and roads?
What are some examples of animals you see around our community more than others? Why do you think this is?*

Then have each pair share their answer and place their animal on the map.

*Is there a pattern to where these animals are located?
Why do you think that is?
Based on the pattern we see on our map, what could we do in our community to provide more habitats for animals?*

Optional extension:

Create a *habitat board* for your students by dividing a poster into 4 sections: mammals, birds, flying critters, crawlers. Leave the board up in your classroom for students to write or draw the creatures they find on their campus at recess or lunch. How many different critters can they find?

Satellite Image Watershed Exploration kit materials:

33 satellite map sheets

1 paper map assembly template

Set of 16 animal cards with 16 labels

Key to animal cards