Watershed Walk

SANTA CRUZ MUSEUM
of natural history

Watershed Walk Program Overview

Grades: 5th

Topic: Through scientific assessments, this field trip at Neary Lagoon helps students build an understanding about their role in maintaining the integrity of their watershed. Combining field observations with water quality testing and data analysis, this field trip gives students the opportunity to not only develop skills but to experience and enjoy a unique habitat, inspiring stewardship of a local natural setting.

Why is this a relevant and interesting topic? Every city exists within a watershed where rain collects and drains to the ocean via a system of rivers, lakes, and streams. This means that every action we take on land, whether it is building a factory or washing our car in the streets, affects the ocean through this system. Through scientific assessments, this field trip helps students build an understanding about their role in maintaining a healthy watershed. Students measure, collect, and synthesize data out in the field, building a baseline from which they can draw conclusions about the many interacting components within our watershed and how they may be affecting organisms (including ourselves). Combining field observations with testing and data analysis gives students the opportunity to not only develop skills but to experience and enjoy a unique habitat, inspiring stewardship of a local natural setting.

Stewardship Goal: Students observe and test the health of an important water body and, through their findings, discover their role in both improving and maintaining the integrity of their watershed. Students will be prepared to:

1. Make choices that demonstrate an understanding that impacts to one part of a watershed affects its entirety, including the ocean
2. Find ways they can help mitigate negative effects on their watershed's water quality
3. Take action to educate and inspire others to have a positive effect on their watershed

Objectives: *By the end of the program, students will:*

1. Measure water quality and assess different measurements for what it may indicate about the ecosystem
2. Analyze their data to answer a hypothesis and discover the health of Neary Lagoon
3. Make connections between how living organisms are impacted positively or negatively by water and the water cycle
4. Understand how water moves through a watershed as well as its ability via rainfall to collect and deposit man-made pollutants into our water supply

The items in this list assume that a class uses the Classroom presentation and kit in addition to attending the field trip. **Click here** for a more detailed look at the standards and how this program supports them.

Next Generation Science Standards

5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2 Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, and motion, and to maintain body warmth) was once energy from the sun.

Science and Engineering practices

Developing and Using Models

Analyzing and Interpreting Data

Engaging in Argument from Evidence

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

ESS3.C: Human Impacts on Earth Systems

Crosscutting Concepts

Systems and System Models

Stability and Change

California Environmental Principles and Concepts

Principle II: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

ELA/Literacy

SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Mathematics

5.MD.2: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

5.G.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Watershed Walk Field Trip Outline

Pre-Trip Preparation:

Neary Lagoon is an exciting place to explore, located in the heart of downtown Santa Cruz. Note that parking can be fairly limited, so it is best to consolidate space as much as possible if your group is carpooling and arrive 5-10 minutes early. There are bathrooms at the beginning of the trail, but nowhere else along the route, so you may want to have students use the restroom before leaving school or as soon as they arrive. You may also want to go over trail safety (stay together and on the trail, don't pick or eat plants, etc) ahead of time with your class, although our experienced outdoor education team runs through a safety talk on these subjects at the beginning of every field trip. **Students should wear comfortable shoes with good traction, bring a jacket, water bottle, snack, hat (optional), and sunscreen.** Our field trips run rain or shine as long as the weather is safe. Please have students dress appropriately for the weather.

Watershed Walk Meeting Location: 110 California St, Santa Cruz, CA 95060

There is very limited parking in the marked spaces in the parking lot next to the bathrooms. Please do not park on the dirt. If the parking spaces are full there is ample street parking. There is a gate that leads into the wastewater treatment plant that is only for the Wastewater treatment plant and there is no additional field trip parking beyond the gate. We recommend buses drop off on the street rather than pulling into the parking lot as there is not really enough space for them to turn around in the parking lot.

Field Trip:

We will do our best to adhere to the following outline. Please let our staff know as soon as possible if your class has specific needs with respect to timing, such as an early departure time. Late arrivals or early departures may result in the exclusion of some parts of the program.
Total program time: 3 hours *(including a 10 minute snack break halfway through)*

Greeting/Introduction

Time: 15 minutes
Location: Picnic Table near playground
Objective: Students spend time observing the lagoon and use observations as evidence to formulate a hypothesis about the health of the water
Vocabulary: Watershed, Turbidity, pH, Dissolved Oxygen, Hypothesis

Station 1: Ph, Dissolved Oxygen, Turbidity, and Temperature

Time: 45 minutes
Location: Deadend Pier
Objective: Students will learn how oxygen is dissolved in water and how organisms utilize that with their gills. We measure the oxygen levels to see if it is high enough to support a healthy

ecosystem. They will also measure the turbidity or clarity of the water and form conclusions as to how that might affect the things that live there. Students will also learn how turbidity and dissolved oxygen correlate with the water temperature. Students will learn how temperature and pH affect organisms in Neary Lagoon and measure both variables. They will use thermometers and pH strips to measure the water temperature and pH and predict whether or not the temperature is suitable for sustaining a diversity of life.
Materials: turbidity tube and dissolved oxygen kit thermometer and pH strips
Vocabulary: Ph, Dissolved Oxygen, Turbidity

Station 2: Plankton Biodiversity & Food Web

Time: 45 minutes
Location: Bench circle next to start of floating walkways

Plankton Objective: Students will collect, study, and identify different types of plankton found at Neary Lagoon using magnifiers and microscopes. They will learn about the concept of biodiversity and how it relates to measuring watershed health and productivity.
Plankton Materials: plankton nets, magnifiers, microscopes
Plankton Vocabulary: plankton, biodiversity

Food Web Objectives: Students will understand how the plants and animals of Neary lagoon form a food web which connects the terrestrial and aquatic habitats
Food Web Materials: Food web cards, ball of yarn
Food Web Vocabulary: omnivore, carnivore, herbivore, predator, prey

Water Cycle Game

Time: 15 minutes
Location: Lawn next to path down from playground
Objectives: In a wrap-up game, students move as water droplets through a model of the San Lorenzo watershed. They use this model and its results to determine ways to help keep the water clean at Neary Lagoon.
Materials: Dice, station cards, roll instructions
Vocabulary: Evaporation, precipitation

Conclusion:

Time: 15 minutes
Location: Bench circle next to start of floating walkways
Objectives: Students regroup to discuss the results and form conclusions and follow up questions.
Vocabulary: Stewardship

Watershed Walk Classroom Kit

Why do we provide the Program Kit?

This activity kit is designed to familiarize your students with topics presented in the "Watershed Walk" field trip, and to provide a depth of experience and opportunity to apply knowledge after the trip. The activities within this kit will give your students a better understanding of such topics as **watersheds, ecosystem connectivity, human influences,** and **data collection** using unique artifacts and hands-on exploration. They are designed to build a strong background for the field trip itself, thereby enhancing your students' outdoor experience.

How does it work?

We provide different activities that will help students build a more comprehensive understanding of relevant concepts. We recommend that these activities are done in the order that they are presented, for a more comprehensive understanding of relevant concepts. These activities can be adjusted to different age or learning groups; you can omit the included worksheets and focus purely on observational activities, and extensional writing prompts help to further understanding and scientific observational skills.

Watershed Kit Contents

1. Supplemental Activity Curriculum Descriptions
2. Materials to support curriculum
3. Visual Aids to support curriculum
4. Artifacts to let students get up close and personal with wetland plants and animals

Teachers will need to provide

1. **An egg**
2. **Vinegar**
3. **A Jar**

List of Activities and Key Concepts Covered

1. **Water the Incredible Journey -** *Water Cycle, watersheds, data collection and connectivity*

   Students race to complete their journey in this active game that takes them through the water cycle as a water droplet.
2. **Water Cycle in a Bag -** *water cycle, data collection, human influences*
   This multi-day activity explores the water cycle through a classroom model as students observe the process and record their observations.
3. **San Lorenzo River Watershed History -** *watersheds and human influences*
   Students use a timeline and maps to identify their watershed at home and school and explore the history of the area from first peoples through modern time.
4. **Water Sources and Sinks** - *data collection, human influences, water use*
   Students look at and analyze their own water usage by examining their water

bill(or sample one given) and explore ways to conserve water.

5. **Water Quality - It's all connected!** - *Water quality indicators*
   Students will learn about the 5 different water quality indicators and how they influence each other and biodiversity. Students will understand how ecosystems and watersheds function as interconnected systems.
6. **Mock Town Hall Meeting** - *water use, human influence, watersheds*
   Students act out stakeholders in an urban development and explore how their assumed roles interest affects water health.
7. **Conservation Commotion** - *human influence and watersheds*
   Students play a game to test their knowledge of the sources of pollution and how they can make a positive impact on water quality.
8. **The Egg and Acidification** - *data collection, connectivity, water quality*
   Students get a look at the effects of pH on the environment through application and testing.
9. **Just Passing Through** - Students investigate how vegetation affects the movement of water over land. They will compare the rates at which water flows down the slopes with and without plant cover and learn conservation principles.
10. **Watershed Student Journal** - the kit includes one master copy of the Student journal that connects all the activities together and ties in the field trip data collection.

The Educational Kit includes the visual aids and materials (excepted when otherwise noted above) for all activities and suggestions for extension activities and writing prompts which encourage deeper understanding.

For a detailed list of NGSS standards that each activity supports please see the kit description page.

Watershed Walk Classroom Presentation Outline

Why do we provide a classroom presentation?

Our classroom presentations use a combination of powerpoint slides, small group discussion, short activities, and simple games to familiarize your students with topics presented in the “Watershed Walk” field trip. It provides background knowledge for the topics we will be studying at Neary Lagoon and it helps students know what to expect and what to bring on their field trip. The Watershed classroom presentation introduces students to what a watershed is and orients them to the watershed of Santa Cruz County. It also explores sources of water pollution and runoff and how it relates to the health of Monterey Bay. The presentation then introduces the scarcity of usable water on earth and the importance of water quality and how water quality is monitored.

List of Key Concepts Covered

What is a watershed - Using diagrams, videos, and a simple game to check for understanding students will learn the definition of a watershed and that all areas of land on earth are part of a watershed

Watershed of Santa Cruz County - Students practice reading maps to locate what watershed their school is in. We compare the size of different watersheds in Santa Cruz and then compare those the the Mississippi River Watershed

Pollution and runoff - Using storytelling and a watershed model students learn about sources of water pollution. They also learn that all local water and the pollution it carries ends up in Monterey Bay which is a special for its biodiversity

Usable water on earth - Through a series of diagrams students learn about earth’s water and how little of it is available for human use. Then the amount of water that it takes to meet various human needs is discussed.

How can we help - Now that we have identified sources of pollution and the amount of water it takes to meet human needs, students discuss water conservation strategies they can use at home or at school.

Is Neary Lagoon Healthy - We introduce the primary question we will be answering on the field trip and provide some background information on Neay Lagoon. We introduce the different water quality measurements the students will be taking and why they are important.

What do students need - We go over what students should bring on the trip and give them time to ask questions about the trip.

Additional Resources

Virtual Resources:

Guide to Exploring Neary Lagoon

Video: Natural Disasters In Santa Cruz County Teachers may find clips from this 2 hour video useful, especially some of the historical photos of flooding.