




Human Impacts on the Environment	
Short Descriptions	Students will visit Whittier Narrows Natural Area and learn about human impacts on the environment, as well as native plant and animal species. They will discuss direct impacts on wildlife from human impacts on the environment; visit a human-made water fixture and discuss its purpose as well as impacts; and design sustainable communities.
Grade level	6th grade (middle school)
Standards (NGSS)	<p>MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*</p> <p>MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</p>
Learning Objectives (Goals)	<p>By the end of the field trip, students will be able to ...</p> <ol style="list-style-type: none"> 1. Identify and distinguish positive and negative impacts that humans have on the environment 2. Practice and value "Leave No Trace" etiquette when visiting the outdoors 3. Identify native and invasive species 4. Identify a human-made water feature and understand its purpose as well as its impact on its environment
Duration	3.5 hours
# students	<100
Location	Whittier Narrows Natural Area Rosemead Blvd, South El Monte, CA 91733

	 <p>The map shows the Whittier Narrows area with several key features: Legg Lake at the top left; San Gabriel River Channel flowing through the center; Whittier Narrows Dam at the bottom left; and various roads including Rosemead Blvd, Durfee Rd, Santa Anita Ave, Pomona Freeway, and San Gabriel Freeway (605). Other labeled areas include Park Headquarters, Nature Center, Picnic Area, Raptor Management Area, Overflow Area, Horse Trails, Equestrian Area, and a '600' Area. Multiple 'Gate' markers are shown along Durfee Rd, and an 'Entrance' is marked near the Nature Center. A 'Pond' is also indicated near the Nature Center.</p>
Logistics	<p>The Whittier Narrows area is free and open to the public during daytime hours and its parking lot is open for school bus drop-off and pick-up.</p>
Materials and Equipment	<ul style="list-style-type: none"> ● Pencil/eraser for each student ● Field guide/scavenger hunt for each student (attached) ● Name tags for each student ● Trash bags ● Popsicle sticks with printed human impacts/native species (attached) ● Poster board and markers ● First aid kit ● Hand sanitizer large jugs ● Paper wristbands (4 colors)
Accessibility	<p>The Natural Area/Nature Center is accessible to students with disabilities. The hike is not accessible to students with certain disabilities.</p>
Safety Awareness	<p>If raining/hazardous weather, the reservoir could fill. Students should be careful not to enter the reservoir/dam/water features. Fast mountain bikers and crowded trails can</p>

	<p>potentially be a concern at Whittier Narrows. Additional hazards may include:</p> <ul style="list-style-type: none"> ● uneven ground, potential trip hazards & slippery rocks near water ● stream-related safety (near water) ● poisonous & sharp plants ● wildlife (includes rattlesnakes, mountain lions) ● bee sting hazard
--	--

<p>GO-Outdoors Missions</p>	<p>At GO-Outdoors, we emphasize the following missions</p> <ul style="list-style-type: none"> ● Instructor/Caltech volunteer will incorporate 10 Essentials of hiking and Leave No Trace etiquette into the trip and encourage students that they can do these things themselves, to make these concepts approachable. ● We are looking forward to tailor our trips to student interests. At the start of each of our trips, we will ask each student to share what they hope to learn and we will try to incorporate them into the field trip. ● All of our field trips will feature a safety scavenger hunt, “Escape from Danger”, in the booklet that will raise students’ awareness on hazardous plants and wildlife in nature to build confidence in exploring the outdoors.
------------------------------------	--

Field trip activities

9:50 am – Arrival and Welcome

Busses should park in roundabout near Nature Center or on Street adjacent to the Center.

- Bring students to large amphitheater area for introduction to GO-Outdoors people as well as Leave No Trace principles
- Provide name tags to students
- Explain the history/context of the area
 -
- Describe the goal of the field trip, which is to see evidence of human impacts on the environment, theorize the specific ways certain impacts can affect species, and propose solutions to negative impacts.
- Divide into 4 groups (~20 students, ~2 school chaperones)
 - Red-tailed hawk
 - Yellow Bumblebees

- Green Prickly Pear Cactus
- another one

10:20 am – Block 1

- Group 1: Activity 1
- Group 2: Activity 2
- Groups 3 and 4: Hike

11:05 am – Block 2

- Groups 1 and 2: Lunch
- Group 3: Activity 1
- Group 4: Activity 2

11:50 am – Block 3

- Group 1: Activity 2
- Group 2: Activity 1
- Groups 3 and 4: Lunch

12:35 am – Block 4

- Groups 1 and 2: Hike
- Group 3: Activity 2
- Group 4: Activity 1

Activity 1: Nature Center Visit and Human-Animal Interaction Activity (45 min) (impact and species cutouts attached in Provided Handouts/Materials)

- 5 min: prep to go into Nature Center (live animals, delicate items, etc)
 - 10 min: look around Nature Center
 - 5 min: leave nature center, organize students, and explain activity
 - 20 popsicle sticks, 10 are examples of human impacts on the environment and 10 are native plant/animal species
 - Students are randomly paired and must brainstorm ways that their impact will affect their species
 - 10 min: hand out popsicle stick identities and have students randomly pair up (pairs = 1 animal and 1 human impact). Explain that students should discuss ways in which the environmental impact will affect the species.
 - If there is flex time, create another group of pairs
 - 10 min: Bring the group back together and discuss each pair
 - 5 min: transition to next activity
-

Activity 2: Native/Invasive Plant Scavenger Hunt (45 min) (handout attached in Provided Handouts/Materials)

- 5 min: explain activity
 - Students will be given a guide for a scavenger hunt that includes native and invasive species in the area. They will find species and ID them as native or invasive, and will write observations (where were they found, what did they look like, what was around them, etc). Then they will come back to share their findings with the group. Finally, students will get into groups to brainstorm a community where humans can sustainably live alongside plants and animals.
- 15 min: Scavenger hunt
 - hand out sheets
 - show students safe areas to look
- 5 min: Recap, have students share what they observed
- 15 min: Brainstorm healthy community
 - Split students into groups of 3-5
 - handout markers and poster
 - have students brainstorm and draw a community where humans can live alongside plants and animals
 - Walk around and discuss the communities with students, ask which elements will allow positive impacts on the environment
- 5 min: Recap and transition to next activity

Hike and Water Discussion (45 min)

- 5 min: explain activity
 - hike with stops to discuss human impacts around us
- Stop 1: algae pond, discuss eutrophication.
 - Lead discussion: what do plants need to grow, what does algae need to grow (hint: it's like plants), why is there all this algae here (hint: nutrients), where did it come from?
- Stop 2: dam, discuss water management
 - Talk about flood management
 - What are you looking at? (floodplain)
 - Notice where the rocks, trees are. You can point out channels
 - Does the floodplain always look like this?
 - What does it look like during a drought? What does it look like during a rainstorm?
 - Why is the dam here?

- how might the dam affect plant and animal species in the area
 - Talk about Army Corps of engineers
 - Talk about water use in California
 - Where do the water pipes come from?
- Stop: talk about litter
 - Students could count litter, point it out
 - Is it plastic, paper, or metal?
 - How does it affect the environment?

Instructor support

Activity 2:

- *native species*: within its known natural range, and occurs naturally in a given area or habitat; is the result of natural evolution
- *invasive species*: any kind of living organism that is not native to an ecosystem and causes harm. They can harm the environment, the economy, or even human health. Species that grow and reproduce quickly, and spread aggressively, with potential to cause harm, are given the label “invasive.” Invasive species are primarily spread by human activities, often unintentionally.
- *environmental sustainability*: the responsible management of natural resources to fulfill current needs without compromising the ability of future generations to meet theirs

Hike:

- **eutrophication**: environment becomes enriched with nutrients which increases the amount of plants and algae growth; the increase in plant life causes a decrease in oxygen in the environment, which results in dead zones
- *hypoxic*: low oxygen
- *water acidification*: overabundance of algae/plants decompose, produce large amounts of CO₂ (reduces marine life populations)
- *what do plants/algae need to survive?* Nutrients (excess from fertilizer runoff, phosphorus/nitrogen/carbon), sunlight, water
- *where does the algae come from?* The algae population was always there, but with increased nutrients it is growing at a rapid rate.
- The toxins produced by the algae can be harmful to humans and animals

- **The Whittier Narrows Dam** is a flood control and water conservation project constructed by the US Army Corps of Engineers. It is a part of the LA County Drainage Area flood control system
- The dam and reservoir collect runoff from uncontrolled drainage areas upstream and releases into the San Gabriel River/Rio Hondo
- Dams are structures built on a river in order to retain water for one or more specific purposes (e.g. hydroelectricity generation, water storage, irrigation structures, flood control). Reservoirs are formed behind a dam. A reservoir is a body of water that has been constructed in some way to store water
- *runoff*: Runoff occurs when there is more water than land can absorb. The excess liquid flows across the surface of the land and into nearby creeks, streams, or ponds. Runoff can come from both natural processes and human activity.
- *flood control*: The dam reduces the risk of flooding for downstream communities by releasing water in controlled amounts.
- *water conservation/drought*: Recharges groundwater which helps retain a consistent supply of drinking water during periods of drought.
- *Army Corp of Engineers*: The Army Corps of Engineers provides public engineering services in peace and war to strengthen national security, energize the economy, and reduce risks from disasters.
- Waterfowl and shorebirds (great egrets, ruddy ducks, etc) inhabit the open water areas of the reservoir. Dry upland areas host common lizards and snakes. The California toad and Pacific tree frog are common in the area as well.
- Native vegetation: sandbar, narrowleaf, coyote willow

- **Leave No Trace 7 Principles:**
 - Plan Ahead and Prepare
 - Travel and Camp on Durable Surfaces
 - **Dispose of Waste Properly**
 - **Leave What You Find**
 - Minimize Campfire Impacts
 - **Respect Wildlife**
 - **Be Considerate of Others**

Common misconceptions about the concepts
eutrophication

- *Opportunities to engage students in planning**
- Bring along some local field guides so that students can look up plants/animals they find that they are interested in

- Answering unanswered questions on the walk back from the trip—follow-up with any that cannot be answered right then!

Provided Handouts/Materials

If applicable to the lesson, list the handouts to be provided for students and/or instructors.

- native plant species scavenger hunt
- popsicle stick species/impacts
- trail map (above)
- handout on dams in LA? (below)
- posters and markers for community design activity

Sediment Management

How do dams help Los Angeles?
Addressing sediment management in Los Angeles County

The Los Angeles region has a series of dams and other infrastructure to reduce flood risk and conserve water. Rain does not occur often in Los Angeles, but when it does, the rain can be intense. These intense storms cause erosion, where rainwater collects and carries loose soil, rocks, and debris (called "sediment") downstream. Naturally, the larger pieces of sediment settle into the flat areas surrounding the rivers, also known as floodplains. The Flood Control District was created to manage this sediment and debris.

What other benefits do dams provide?

- 1 Dam**
A barrier that retains water in a reservoir behind it. This water can then be released and routed to spreading grounds.
- 2 Spreading Grounds**
Porous basins that allow water to percolate into the ground and recharge the groundwater in aquifers below.
- 3 Well**
A structure excavated into the ground allowing access to groundwater, which can then be pumped into the public water system.
- 4 Tap**
A valve that helps control the release of water. Water originally retained by dams in reservoirs can be used for drinking water, irrigation, and other public uses.

Water Conservation
Reservoirs assist in recharging groundwater which helps Los Angeles retain a supply of drinking water. Water from the reservoirs is released, as needed, and moves through a system of open channels into spreading grounds, where it replenishes groundwater basins by slowly percolating, or filtering, into the ground. The groundwater basins are accessed by wells, providing a valuable and reliable source of local drinking water. By conserving water in reservoirs, Los Angeles County relies less on imported water from other areas of California. The flood control system ensures that the greatest amount of water is captured in reservoirs and diverted into spreading grounds instead of being lost to the ocean. Currently, the water in local groundwater basins meets the supply demands for one-third of Los Angeles County households.

Flood Risk Reduction
The Flood Control District is charged with maintaining flood risk management by keeping dams and debris basins operational. The District has provided flood risk management for nearly 100 years. Its system includes 14 major flood control dams and reservoirs, along with 36 sediment placement sites, 162 debris basins, and 27 spreading facilities. The District's vast network of flood control facilities helps prevent flooding where it has a natural tendency to occur and has contributed to the growth of Los Angeles into the region it is today.

Challenges
The Los Angeles County Flood Control District must balance many factors as they address sediment management. Some of these factors include:

- Rain
- Wildfires
- Erosion
- Debris Flow
- Flooding
- Water Supply
- Development

In a natural system, larger sediment materials are deposited at the foot of the mountains, while the smallest sediment materials are carried to the coast. Rivers naturally flood and their paths change from year to year.

For more information, visit our website: www.LASedimentManagement.com



1. Littering
2. Climate Change
3. Soil degradation from agricultural practices
4. water pollution