

Marine Biotechnology and Bioinformatics

for Teachers

Adaptations and Invasive Species: an Ecology Field Experience — evaluating and changing students' perceptions and attitudes toward nature and science.

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Introduction/Background/Context

Sixth grade inner-city students will spend all day in Newport Beach, CA and study the ecology of the area—the different physiological adaptations of the plants and animals that live in the coastal sage scrub, estuary, and tide pool habitats, the impact that invasive species have on the native species, and current population and molecular ecology research. Students will sample native and invasive sea urchin populations found in the estuary using transects and interpret the data found. Biochemical adaptations versus morphological adaptations (external anatomy) will then be discussed (i.e. how related different species of animals are is based on DNA not morphological similarities. How would you tell where the source population is, and if it is introduced? The question of the ice plant and how one would find out where the plant came from and when, ice plant is native to S. Africa and then went to Chile, and then to California at about the time the Spanish arrived but there may be multiple introductions)

CA Standards

Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept:

Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organisms to organisms through food webs.

Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment. Students know populations of organisms can be categorized by the functions they serve in an ecosystem.

Students know different kinds of organisms may play similar ecological roles in similar biomes.

Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept students should develop their own questions and perform investigations.

STEM Connection

Careers tied to this activity include ecologists, park and forest rangers or researchers, wildlife technicians, refuge managers, environmental consultants, teachers and professors.

Instructional goal

- Engage students with hands on field activities
- Promote nature and science
- Learn the all life life science (ecology) and investigation and experimentation standards for the sixth grade

Method

Plant kit (photosynthesis and how plants are affected by abiotic factors) and plant scavenger hunt

Using preserved organisms—explain a food web and how it works, classify organism by functions served/role in ecosystem and by phylum (characteristics)

Move to the three ecosystems and discuss differences and similarities (different kinds of organisms may play similar ecological roles in similar biomes) and talk about the adaptations of organisms we see and how they are related.

Students ask questions, make hypotheses and investigate bird adaptations using binoculars and the populations of species (native and noninvasive) using transect squares.

Left: Students taking through the coastal sage scrub estuary. Right: Students studying their organism.



Left: working with binoculars at the estuary

Left: some points observers, coots and sea gull. Right: Denver Egret

Preliminary Findings—nature and science

Do you like to play indoors or outdoors?

"I like to play indoors to play my gamboy, playstation 2, and play tag inside."
"I like to play videogame. I like to watch movie."
"I like to go outside and play baseball. I feel not comfortable in nature (nature)"
"I never been hiking or spearfishing (experience) nature"
"I never seen ducks."

Would you like to be a scientist?

No...
"It might be hard."
"It is hard work."
"I think it is boring."
"You work too much."
"People do too many experiments."
"I will make a mistake."
"I might die." "It is too dangerous."
"I might blow up the lab."
"I don't like science."
"I am not a nerd."

Right: Children are shown and are interested in the life and ecosystem of the tide pool estuary.



Materials/Resources

- Numbered cards with clothes pins and sheet with plant adaptations and descriptions for plant scavenger hunt
- Science Vocabulary Cards and related photographs
- Transect squares
- Binoculars for each student

Conclusion/Findings after lesson

What do you think about nature/ the outdoors?

"nature is very important."
"being outside is fun."
"ducks are beautiful."
"I would come back so I can see willets, pelicans, herons. And more. I felt like I wanted to go to the wetlands like a million times."
"I would come back and see everything again. I am going to come back to see ducks and Heron birds." (heron)
"It is so peaceful out here."
"Thank you for letting us come to the Upper Back Bay. Because we had a great day and we all enjoyed all the things you showed us like the fishery song and I enjoyed every thing thank you for every single thing you helped us and we did fun stuff you know what I mean."
"Thanks again for the best time in my life. You're friend."

Would you like to be Scientist?

Yes...
"I love discovering things."
"I like making experiments."
"You get to do things you never done."
"I thought that science was not fun but now I think its fun."
"I am smart and I listen very good."
"It is cool."
"I learn stuff."
"I have changed my mind of not being a scientist because its fun studying different animals."
"Scientists go outside and do smart stuff."
"If I were a scientist I would take pictures of people getting bit by snakes and coyotes."