

Catalog of ecologically and educationally significant sites

General guidelines for field trip based environmental education.

Consejo de Educación Ambiental para las Californias

CEAC



EECC

Environmental Education Council for the Californias

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Catalog of Sights of Ecological and Educational Interest. 2005

A Publication of the Environmental Education Council of the Californias (EECC)

The EECC is a binational network of environmental research, policy, outreach, advocacy and grassroots organizations dedicated to advancing a culture of sustainability through environmental education in the California/Baja California region. The EECC has quarterly meetings, open to all members of the council and the general public, with the purpose of sharing information and supporting environmental education organizations and projects in the region.

For more information:

<http://www.eecc.net/>

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Introduction

The current global environmental crises, combined with the influx of environmental information, have caused a dramatic increase in the number of people interested in the protection and care of the natural environment. Used as a resource, environmental education carried out in various educational facilities has succeeded in raising awareness and increasing interest for the conservation and care of precious natural resources, and advancing overall environmental health. However, lessons derived from textbooks and formal classroom instruction alone are not sufficient for teaching environmental education. Environmental education, as well as in-class and textbook instruction, is most effective when components of learning through direct, hands-on experiences with nature are incorporated into the curricula.

At a global level, this region is one of the most important for the conservation of biodiversity. In the "Floristic Province of California" (what this area is often called) a high abundance and diversity of flora and fauna species exist, and a significant number of endangered and endemic species are present.

With diversity as its principal characteristic, the region offers a plethora of natural sites that are invaluable to those interested in learning about nature and the human-ecosystem relationship. Because of this, there are unlimited opportunities available to educators wishing to

complement their environmental education programs with field trip-based learning.

The Environmental Education Council for the Californias (EECC) has designed this catalog of ecologically important, easily accessible sites to serve as a resource for educators who aspire to utilize the unique natural places within our region for experience-based learning. We hope this will lead to an increase in the occurrences of educator-led student and group field trips, in turn raising public awareness of important conservation issues and practices.

The principal objective of the catalogue is to assist teachers in the planning and execution of field trips that will allow students to gain a better understanding of nature, as well as an appreciation for and a desire to protect the natural spaces of our region. This is the ultimate contribution that an educator can make in the protection of the environment.

At the same time, the Council has created this curriculum to serve as a guide to help teachers during these field trips by offering them different activities that they can use with their classes while in the field.

The Council believes that this catalog and curriculum will motivate educators to take their students into the field, reinforcing the idea that *what we know and what we love, we take care of.*



All environmental education field experiences should contain three components: Activities before, during and after the field trip.

Activities before the field trip

Preparations in the classroom:

It is essential that sufficient information and educational materials are available in order to plan and prepare a field trip that, in the end, will result in successful learning.

Planning by the educator.

1. If possible, visit the site ahead of time to familiarize yourself with the area. If there is an employee or volunteer available at the site, ask about the public facilities, services and outreach materials such as brochures or field guides.
2. Investigate the availability of a guided tour (by an employee, site volunteer, ranger, etc.). If that service isn't available, prepare to lead the entire field trip without assistance from any onsite staff.
3. Create a checklist of important items that need to be completed before the field trip takes place. Examples include, but aren't limited to:
 - a) Develop an agenda for the trip.
 - b) Secure/reserve any special equipment like video camera, 35mm or digital camera, magnifying glasses, bags, binoculars, etc.
 - c) If necessary, ask a few parents to assist during the field trip as chaperones and be

sure to adequately inform them of the required responsibilities and activities.

- d) Create a list of emergency contact information for all of the participating students, and have it on hand throughout the field trip in case of an emergency.
- e) Bring other emergency phone numbers such as Fire and Rescue, Lifeguard, Police, etc.
- f) Prepare identification badges for everyone, students and adults – including chaperones and educators- to wear the entire field trip.
- g) Send a letter home to parents that includes the following information:

- Date, length and location of the field trip,
- Transportation arrangements,
- Academic goals of the field trip,
- Precautions for students with special needs,
- Associated cost(s), if any (buses, entrance fee, etc.),
- Clothing recommendations,
- Arrangements for a snack or lunch,
- Field trip agenda,
- Authorization and liability forms that may need to be signed by the parents.

IMPORTANT THINGS TO BRING

- First Aid kit
- Sun block
- Extra water bottles
- Extra caps or hats
- Extra food
- Extra paper and pencils
- Cell phone, if possible



Preparing students for the field trip:

1. Go over the field trip agenda, objectives and activities with your students so they can prepare:
 - ⊙ The field trip site and location,
 - ⊙ Review of the objectives,
 - ⊙ Logistics: agenda, time schedules, suggested appropriate clothing, food and drinks,
 - ⊙ Materials: what they need to bring from the classroom into the field, such as paper, pencils, notebooks, crayons, magnifying glasses, etc., and/or containers such as bags, boxes, etc.,
 - ⊙ Expectations, of both what the educator will expect from the students and what the students can expect to get out of the field trip,
 - ⊙ Topics and subjects that will be covered during the field trip,
 - ⊙ Appropriate field trip behavior, and any safety issues of your particular field trip site - let the students help you identify the guidelines.
2. Go over the site background information
 - ⊙ Review the field trip site and show photos, maps and/or brochures of the area.

- ⊙ Describe the ecosystem(s) and type of environment(s) they will observe, as well as the intrinsic values of the site.
- ⊙ Discuss observation techniques and how to formulate investigative questions from their observations to learn more.
- ⊙ Introduce the subjects that will be covered during the field trip, including the natural history of the area, ecosystems, and the environmental impacts of human activities.
- ⊙ Prepare a field notebook and go over proper note taking skills. You can also prepare a question/drawing worksheet that your students can complete during or after their field excursion.

Behavioral Rules

- ✎ Always wear your nametag.
- ✎ Stay with the group at all times.
- ✎ Do not leave the path or site area.
- ✎ Listen well.
- ✎ Raise your hand if you have a question.
- ✎ Ask questions that begin with words such as :
Who, what, why and how.



General policies for field trip-based learning

Activities during the field trip

1. Plan activities so the students can perform them in pairs or groups. Activities can include:
 - a) Completing the prepared worksheet.
 - b) Documenting their observation and experiences in their field notebooks.
 - c) Drawing their observations instead of, or in addition to, their written observations.
2. Have the students document (by drawing and/or writing) the flora and fauna (if it was visible), their similarities and differences, and relationships among them.
3. Analyze with your students the relationships observed or assumed between the flora and fauna and humans, and discuss what affects our presence and activities have on that particular environment.
4. Aim to carry out activities where your students can use their five senses. For example, having them close their eyes and draw what they hear around them; touching plants and trees – not just looking at them; safely tasting some of the fruits or seeds, but always under your supervision.



Enjoy Nature Without Harming It

- ✘ Bring everything we take into the field out with us again, thus avoiding leaving trash.
- ✘ Observe the flowers and other natural objects in their natural state and location, without picking or moving them.
- ✘ Be mindful to walk only on designated paths through the site, to avoid destroying the vegetation.
- ✘ Observe the fauna from a respectful distance and in silence, to avoid scaring or disturbing them.
- ✘ Do not feed any of the animals.
- ✘ Listen to the natural sounds – don't allow your students to bring in any unnatural noise (music, cell phones, etc).



Activities after the field trip

1. Complementary activities -

Go through exercises that will recall the observations and activities completed in the field by your students. For example:

When back in the classroom, talk to your students about the trip and do a brainstorm of ideas. Ask questions like: What did we do during the field trip? What image do you remember most? What did you like the best? What new thing did we learn? Did you talk to your family or friends about the excursion?

As a group, go over and answer any questions that came up during or after the field trip, and/or anything that wasn't fully understood.

Ask your students to finish a 'project' based on the site they visited. It could be a short composition, a drawing or a song.

2. Teacher's evaluation -

Which can be made up of questions like:

- ☉ What was the educational value of the field trip?
- ☉ Were the planned objectives met?
- ☉ Did you have enough time for all of the activities?
- ☉ Was there adequate supervision from the educator(s) and the chaperone(s)?
- ☉ What can be changed or adapted to make a future field trip better?
- ☉ What topics or aspects should you remember to emphasize in future excursions?

- ☉ What problems arose and how can you plan for them, or avoid them, next time?
- ☉ What other general improvements can be made to make the field trip stronger?

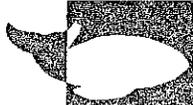
3. Student's evaluation -

By reviewing the field trip topics, you will be able to evaluate to what extent the field trip facilitated learning, and if the experience-based learning was successful in teaching the desired subject material.

A questionnaire asking your students for feedback on their field trip experience will also be useful to you. The following questions could be helpful in creating both:

- ☉ What is the most important idea or lesson you learned during the field trip?
- ☉ What are the differences you noticed between the plants you observed at the field trip site, and the plants you see at school or at home?
- ☉ Why are the wild plants and animals important to us?
- ☉ Draw a picture of the place we visited as you see it now, and another picture as you imagine it will look in the future if houses and business buildings are built nearby.
- ☉ Do you think it is important to protect the native plants and animals living in the site?
- ☉ How can you help protect the site?
- ☉ Would you like to return to the site someday?

Punta Banda Estuary



What is the Punta Banda Estuary?

Punta Banda estuary, located near the Maneadero Valley, 28 km south of the Port of Ensenada, is a coastal habitat protected by a sandbar, and is comprised of a vast area of seawater and a series of muddy plains that are inundated during high tides.



Why is the Estuary Important?

The estuary is a place of great importance because of its natural beauty and the recreational opportunities it provides, as well as serving as a residential area for some individuals. Punta Banda estuary is also very ecologically significant because it is home to a large and diverse number of marine and terrestrial flora and fauna, and acts as a nursery for a variety of aquatic animals that reside in the Todos Santos Bay and become food for other organisms, including us. Thus, destruction of the area would have an impact on all of the plants and animals living in the region, as well as the humans benefiting from the important functions of the estuary.

One of nature's most important functions is that it acts as a natural filter, cleaning the water coming from land before it reaches the sea. Additionally, during the winter the estuary provides refuge for hundreds of migratory birds of various species that travel, or migrate, from distant places throughout the United States and Canada. The estuary is a place for these birds to rest and feed, and in some cases it serves an ideal location for reproduction.

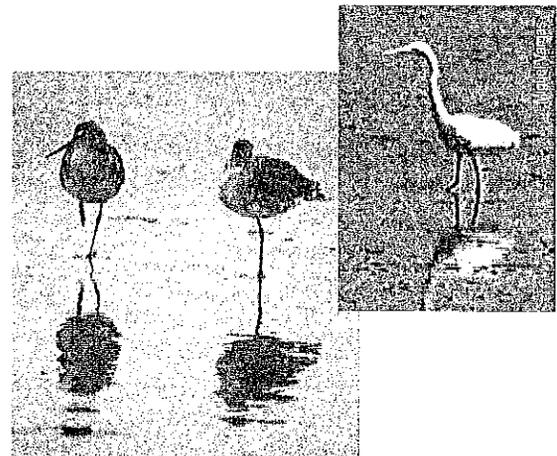


Impacts and Threats to the Estuary

Punta Banda estuary is very important environmentally and socially; however, it is seriously threatened by human activities. In addition to the dwellings that already exist, there are a great number of houses currently under construction. In addition to the actual houses, the inevitable development of public services, such as water, sewage systems and electricity, needed for this increased development threatens to pollute the soil, bay and ocean. More over, the destruction of marine and terrestrial vegetation, and the introduction of invasive plants and fauna, all affect the fragile estuary environment. However currently, the activity that has been discovered to have the biggest ecological impact is the use of jet skies and motorboats in the channel and motorcycles in the dunes.

Fortunately, some environmental organizations exist that are protecting the area of Punta Banda and working to keep it in its natural state. It is important to acknowledge the effort of organizations such as Pro Esteros, Pronatura Noroeste and the State of Baja California, all of which are working together to formally create an ecological reserve that will encompass the sandbar and a large portion of the estuary's marine environment.

We invite you to learn about the Punta Banda estuary in the company of your family, friends, or school group.



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Catalog of Regionally Important Sites





Site Information



Location

Between coordinates: $31^{\circ}42'$, $31^{\circ}46'$ N, and $116^{\circ}31'$, $116^{\circ}40'$ W, Punta Banda estuary is situated at the Southeast end of Todos Santos Bay, on the Pacific coast of Baja California, 13 Km south of the city of Ensenada (approximately 30 minutes from downtown Ensenada).



Level of Environmental Protection

Official conservation plans for the marine and terrestrial areas of the estuary have been proposed (with a limited amount of low impact use) through the Program for Urban Development of the Center of Ensenada, and the La Bufadora- Punta Banda Estuary Micro Region Ecological Regulation Plan. Additionally, there is a proposal to make the estuary a State Ecological Reserve, but the official decree has not yet been issued. All terrestrial zones within the area are private property.



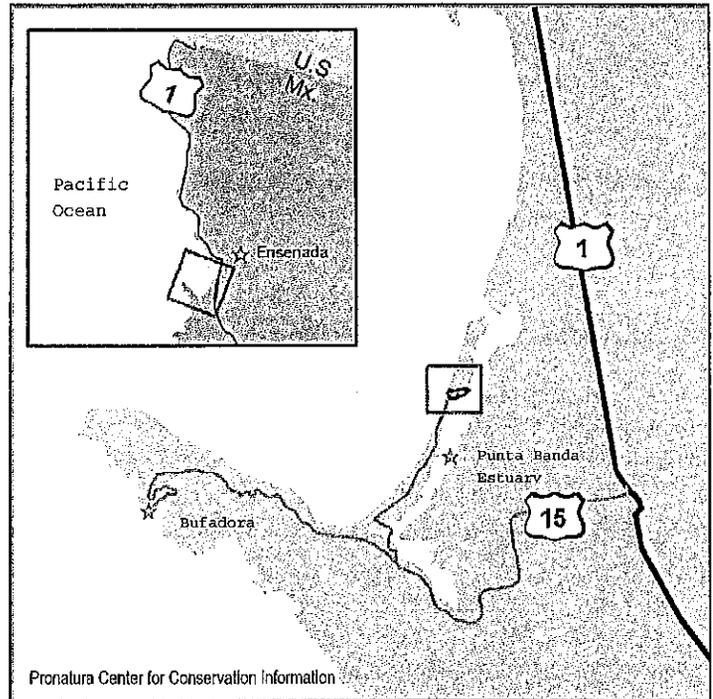
Ecological Significance

Punta Banda estuary is considered a regionally important site due to its high biological productivity, the level and importance of the environmental services it provides the community, the presence of endangered migratory and resident birds, the presence of archeological remains, and its high landscape value.



Cultural Values

Located within a region once inhabited by the Kumiai natives, the estuary has been used by humans for at least the last 2,000 years. Throughout history, natives found a great variety of plants and animals that they utilized as food and/or raw material. Today it is possible to find traces of those activities, particularly mollusk shells and stone pieces that were transformed into tools. Sites containing these types of remnants are called *concheras* in Spanish.



Recommendations



Suggested time for visit: year-round, preferably during low tide (a higher number of birds feeding on the marshes can be found during low tide).

Public services: Parking, clearly marked trail with interpretative signs (no bathrooms available)

Access: Free with authorization given at the entrance booth.

Administration: There is no official administration of the area, however there is an entrance booth that controls access to the site.

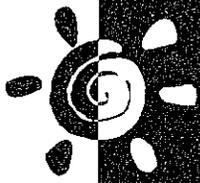
Planning educational visits: The non-profit organization Pro Esteros has educational material and a field trip program.

Contact: Pro Esteros phone ++ (646) 178 60 50 and 178 01 62, E-mail: proesteros@telnor.net.

Other contacts: Pronatura Noroeste, Conservation Board in Baja California. Phone (646) 175-34-61.

Other sites in the area: Ten minutes from Punta Banda estuary, along the same road, is La Bufadora, a geophysical phenomenon that attracts thousands of visitors annually. It emits a characteristic sound due to the collision of the water against the crevice shaped rock, producing a waterspout 20 to 30 meters high.





What Can You See?

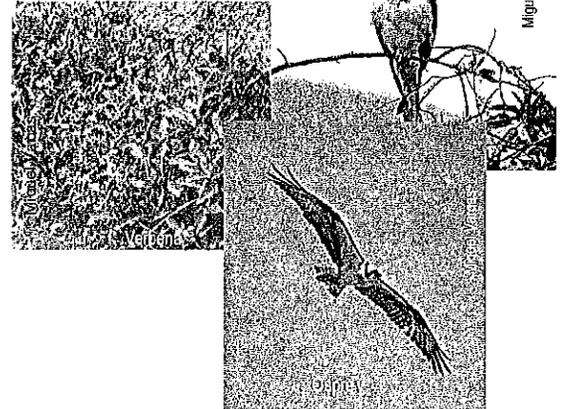
At Punta Banda estuary you can observe three kinds of natural environments: the marine environment on the western edge of the estuary, the terrestrial environment on the sandbar; and the coastal environment inside the estuary, which is protected by the sandbar.



Within the marine environment you see how wave action has created huge extensions of sandy beach in which fish, clams, crabs, and birds live and feed. Also, with a little bit of luck and the aid of binoculars, you can watch dolphins and sea lions swimming behind the wave break zone.



The coastal area, protected by the sandbar, is a very important habitat that serves as home to a variety of fish and sea birds. Most importantly, the coastal area acts as a nursery for all of the larvae and small, young organisms that are born in the area. In this environment you can also observe marsh zones, which are areas that are exposed during low tides, leaving long muddy sections where a great number of diverse plant and animal species thrive. Here you can find, among many other things, aquatic plants, insects, small rodents, clams and crabs, all of which are sources of food for many resident and migratory birds.

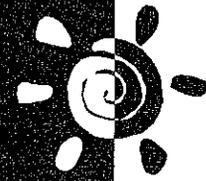


On the sandbar you will follow an interesting and educationally interpretative road, where you will have the opportunity to observe the different types of plants and birds inhabiting the estuary. The plant life found on the sandbar is composed of coastal dune vegetation and coastal brushwood. Some species found here include: sand verbena (*Abronia maritima*), pickleweed (*Salicornia bigelowii*), and the spiny rush (*Juncus acutus*).

Important: Some birds nest in the vegetation and on the sand, please be careful not to destroy or disturb their nests. Keep in mind loud noise can also be a disturbance.



Educational Possibilities



On either side of the interpretative road you will see Spiny Rush plants and Sand Verbena

Punta Banda estuary offers many educational opportunities; most importantly it shows us the ecological importance of a small wetland threatened by the impacts of human activities in a sensitive semiarid environment.

The themes highlighted in this catalog, best taught outdoors, follow the Natural Sciences curriculum at the elementary school level and Biology at the Junior High level, as well as include activities which could be used in High School science curriculum.

It is important to develop an in depth field trip program, following proper safety and cautionary procedures, in order to ensure a successful and informative trip, and not a mere tourist visit. For that very reason, the Environmental Educational Council for the Californias has created this manual for all grade levels with activities that can be carried out before, during, and after an educational field trip.

Endangered Species

Endangered Species: Several birds use the Punta Banda estuary as a migratory refuge or permanent habitat. Due to human influences in the area, several species are considered at risk. Four species that are particularly sensitive to human presence and are protected by Mexican and American Ecological Regulations include: the Lesser S tern (*Sterna antillarum browni*), which nests at the end of the sandbar as well as in the Northeast marsh of the estuary; the Light-footed Clapper Rail (*Rallus longirostris levipes*); the Snowy Plover (*Charadrius alexandrinus*); and the Savannah Sparrow (*Passerculus sandwichensis*).

*Listed on the United States Endangered Species Act.



California State Parks

California State Parks



Field Trip Curriculum

Included in the Catalog of
Ecologically and
Educationally Significant
Sites



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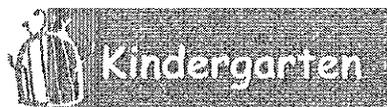
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Subject: The living and non-living

It is important to teach what characteristics we have as living creatures that make us different from non-living objects in the early stages of childhood development. This lesson helps children acquire the ability for scientific thought. A preschool-age child, who lives in an adaptive stage, is able to best identify and discover these characteristics through observation and deduction. Therefore, completing outdoor activities or scientific experiments with preschool-aged kids helps them recognize the world around them and how they fit into the larger picture. It also encourages them to participate in finding solutions to problems, leading to a better world for all.

Objectives

1. The students will observe their surroundings and draw conclusions.
2. They will observe the characteristics of living things and non-living objects in their immediate surroundings
 - The living (plants, animals, humans)
 - The non-living (objects)
 - Characteristics of the environment: objects, animals, and plants.
3. They will be able to distinguish the characteristics and general differences between something living and a non-living object.

Background

Almost everyone knows that a tree and a dog are alive, but a stone is not. However it is very difficult to define what life is.

It is easier to observe and define which characteristics living creatures possess, and then differentiate them from non-living objects.

All living things are "*born*", *grow*, *reproduce* and *die*, these functions are called vital functions.

Throughout their life living things perform other life-functions such as *nutrition* and *reproduction*.

Through nutrition they obtain energy from food. In order to survive they interact with the environment in which they live. Through reproduction, living things create or generate other living things similar to them. All living things perform these functions and thus they differ from non-living objects that do not carry out these functions.



Activities in the classroom

Before the visit

1. Read a children's book to the kids. Identify some of the vital functions that the characters of the story have such as being born, growing and developing (nutrition, relationship with other living things), reproducing and dying. Immediately after, ask the children to point out the vital functions they have that are similar to the characters in the story. We suggest reading the story *A New Little Brother*. You can check your school or local library for a copy.
2. Create a mural or poster depicting different things: objects, plants, animals, and human figures. Ask the children to identify the things included in the mural that they believe to be living, and which they believe to be non-living. Encourage them to share the reasons behind their answers.
3. After creating the classroom mural, talk about the differences they identified between the living things and non-living objects, and subsequently give additional examples using objects and living things they can see and observe in the classroom.

After the visit

1. Ask the children to name two different living animals they observed during their visit performing one or more of the following activities: feeding, grooming, building a shelter, flying, taking care of their babies, walking, running or swimming. What are the similarities between these two animals?

2. Ask the children to name two non-living objects they observed during their visit, and what role that object played in the environment surrounding the living animals. For example, perhaps the objects are used by the animals in some way (shelter, protection, etc.).
3. Ask each child to draw a picture of the place they visited, depicting the living things and non-living objects they observed during their visit.

Encouraging positive conservation attitudes

Include the following activity to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

Ask the students to describe three non-living objects they observed that did not naturally belong at the site, and are damaging to the environment in some way. How are these three objects negatively affecting the living things in the area? What solutions can the students offer that could stop or change the destruction those non-living, non-natural objects are having on the field trip site? Ask each child: What can you do to help?



Activities during the visit

Subject: The living and non-living

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on observing living and non-living things, and distinguishing the general differences between them during their field trip. Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe... Explore... Discover

1. Once on site, lead the students through an exercise that tests all five senses (only experiment with taste if there is something safe to try, such as salt water, or a harmless plant or fruit, always under your supervision). This exercise should take place in a wide-open space, with all the children standing or sitting in a circle. Invite the students to sense EVERYTHING around them and encourage them to BE a part of the environment; invite them to have an attitude of admiration and respect towards the environment.
2. Ask the children to scan their surroundings, looking for three living animals. Encourage them to observe what the animals are doing, what activities they are

performing. What vital functions are they carrying out?

3. Ask the children to observe a plant; ask them to decipher what vital functions the plant is performing at the moment. Encourage them to share the reasons behind their answers.
4. Ask the children to observe three non-living objects. Invite each student to tell the rest of the group about his or her findings. Encourage the children not to repeat what others have found, so more non-living things will be discovered and identified that aren't immediately obvious. Examples include the sun, the air, water vapor, etc.
5. Encourage the students to observe their surroundings so they can discover both the living things and non-living objects and their interactions... how they are ALL sharing the same space, the same planet.
6. Ask the students to explore the site for things that do not naturally belong in the area, such as plastics, glass, paper, aluminum, etc. Take a moment to review all the items the students have observed. How did they get there? Is their presence good or bad? Why? If time and circumstances permit, you can organize a cleanup activity at the field trip site and have the students pick up the objects that have a negative impact on the area (trash).

Know where the students are at all times.

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.



1st Grade

Subject: Compare and contrast

Objectives

1. The students will make observations and draw conclusions.
2. The students will identify differences and similarities between plants and animals.
3. The students will investigate the following concepts from the Natural Sciences Program for basic education of the Public Education Department:
 - Living creatures
 - Plants and animals
 - Differences and similarities between plants and animals
 - Plants and animals at home and in the immediate surroundings

Background

A plant is a living thing that is anchored to the soil by its roots, which means they cannot move in order to obtain food, like animals do. In fact, they produce their own food by taking nutrients from the earth, air, water and sun, which in turn classifies plants as autotrophic creatures. There are many different types of plants. Some are easily recognizable as plants because of their familiar, yet complex, structures, such as trees, ferns, grass, flowers, etc. There are other types of plants that have very simple cellular structures, making it harder to identify them as plants, especially to a young person, such as bacteria and fungus. The kind of science that studies plants is called Botany.

An animal, on the other hand, is a living creature that many times has the ability to move to some degree. To obtain their food, animals can change locations to find or follow their food. Some animals migrate, or travel great distances, to move to a location where food is plentiful. Animal feeding is heterotrophic, meaning they need to feed on other animals, plants and living things. Similar to plants, there are also animals that have very simple cell structures, again making them difficult to identify. Sometimes these simple-celled animals are mistakenly identified as plants. Animals commonly confused for plants are sponges, corals, and anemones.

Activities in the classroom

Before the visit

1. Read the students the story, *The King of the Animals*. You can check your local or school library for a copy. When finished, discuss the similarities and differences between the different animals in the story with your class. Ask the students to also compare and contrast themselves, understanding they are a living animal, and the animals in the story.
2. Supplement this activity by comparing and contrasting different kinds of living things using pictures, stamps, drawings, and newspaper clippings, discussing a variety of animals and plants. You can also bring live or preserved specimens to the classroom, so that the students can see, hear, smell, feel (when possible) plants and animals.
3. To further this activity, divide the blackboard into two parts. On one half of the board write the word PLANTS, and on the other write ANIMALS. Ask the



students to give as many examples as possible for each of the categories, and write the examples on the board accordingly. This exercise serves as visual support for the students' discussion.

4. Now prompt the students to identify some animal characteristics that make one animal different from another. Some examples include their size, their shape, how they move, how they feed, what they feed on, and what covers their bodies as a form of protection from their environment. Have them complete the same activity for plants, by identifying the many different characteristics of a plant and what makes them different or unique from another plants. Examples include what color they are, their shape, their leaf structure, their stems and how they grow. Instruct and guide them through this exercise.
5. Finally, allow time for the students to reflect on the characteristics that make plants and animals similar or different. Divide the blackboard into two parts: **DIFFERENCES AND SIMILARITIES**, and write down the characteristics of each concept in the corresponding section. Examples include:
SIMILARITIES - both living creatures live in the same place/area, have the same necessities (water, food), etc.
DIFFERENCES: they feed differently, live in different places/areas, most animals are mobile, most plants are not mobile, different body structure, etc.

After the visit

1. Divide the students up into pairs. Ask each pair to discuss their observations

during the field trip and which animal they each liked the best. During the discussion have the students verbalize what makes the two animals similar, and what makes them different.

2. Once assembled again as one large group, ask the students to recall which of the animals had a beak, webbed feet, sharp teeth, ears, hair, feathers, claws and other interesting parts of the animal's anatomy. Ask them to use the drawings they made during the visit. Using the drawings, pictures, and information the students have learned during the lesson, make a collage or mural highlighting the interesting features of the different parts of animals.
3. To extend this lesson, ask the students to collect leaves from some of the plants growing in their yard or neighborhood. When the students bring the specimens into the classroom, ask: Are these plants similar to those you saw during your visit? What makes them different? Invite each of the students to think of one reason that makes each plant important.
4. To continue this lesson further, you can jointly create a classroom poster with the different types of leaves found in plants, using the student's specimens.

Encouraging positive conservation attitudes

Include the following activity to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.



Ask the students to walk around their neighborhood in order to observe plants and animals. What types of living things can they find? Can they identify the plants and animals by name? What similarities do they see between the plants and animals of their neighborhood and those found at the field trip site? What are their differences? Invite them to think about what would happen if the plants or animals were moved from that place? Could they survive? Which plant or animal would be most affected by changing their environment?



Activities during the visit

Subject: Compare and contrast

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on comparing and contrasting during their field trip. Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

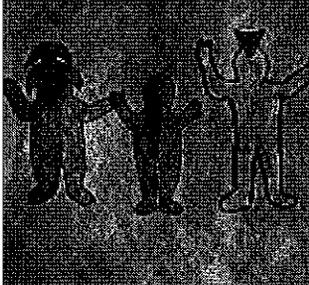
1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Ask the students to continue observing their surroundings and to specifically look for an animal. What kind of animal is it? Ask them to draw it. What makes the animal different from you (remember, humans are animals too)?
3. Encourage them to look for many different kinds of animals. What are the similarities between them? What are the differences?
4. Ask them to observe the legs of some of the animals. What are the differences seen between the legs of the different animals? Do you think the type of legs have a relationship with where they live? Ask the children to explain their answers.
5. Ask the students to observe the behavior of some animals. Are they all doing the same activity? What other behaviors of various animals did they observe during the visit?
6. Ask the students to observe one specific animal. Can they name the different parts of its body?
7. Ask the students to observe one specific plant. What parts of the plant can they name? Ask them to draw the parts they can name.
8. Ask the students to count all the different plants they observe around them. How many different types of plants can they see?
9. Ask the students to consider the similarities and differences between the plants. What type of soil are they living in?
10. Ask the students to think about how the animals benefit from having the plants in the area.

Know where the students are at all times.

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.





2nd grade

Subject: Basic needs and life functions of living things

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. This lesson will cover the following concepts:
 - Life functions of plants and animals: Feeding, circulation, respiration, excretion, and reproduction.
 - Basic needs of living things: plants, wild animals, and human beings.

Background

Through the years, the basic needs for survival of living creatures have not changed. Food, water, shelter, and a place to take care of their offspring are needed now as much as they were a thousand years ago. It is in the wild (nature) where all living creatures find the resources to satisfy those indispensable needs. It is important to keep in mind that if we do not take care of our environment, the survival of all is at stake. We need to take care of the resources offered by nature with a conservational attitude and an environmentally responsible conscience.

Activities in the classroom

Before the visit

1. Read the book *La Jacaranda* to the students. Talk about what the plants and animals needed to survive throughout the story.
2. In a large group have your class come up with a list of all the things they would

pack inside one bag if they were going camping for a whole weekend. Go over the list and classify the things that are *necessary* to bring, and those they *want* to take, but may not be a necessity. What things on the list are really *necessary* to survive? Why? Which are important but not absolutely necessary to survive? Why? And which things would be nice to have, but are not necessary to bring on a short camping trip?

After the visit

1. Ask the students to remember the natural environment of the site they visited.
2. Divide the students in small groups and ask them to create a mural, exhibit, or model that replicates the site. Be sure they include the plants and animals living there, and the availability of their basic necessities (water, soil, sun, shelter, etc.). Remind them to look back at the drawings they made during their field trip.
3. Bring samples of plants, potted flowers, and small animals such as fish, turtles, frogs or mice into the classroom so the students can experience taking care of them for a few days. Divide the students up into small groups and assign each group a plant or animal to look after for a specific time period. After the designated time, discuss what special attention and care a plant and an animal need to survive, and to be healthy and happy. Was it more or less than they expected?
4. The students can also grow plants (ex. beans, corn, or lentils) from seeds under two different conditions:



- a) Put the seeds in a glass jar with cotton. Add water every day and give the plant light and protection. They will be able to watch the healthy growth of the plant if they give it the necessary attention.
- b) Put seeds in another glass jar with cotton, but only add water every few days and put it in a dark place. What happens in each of the treatments?

Why?

5. Make birdfeeders with your students for the birds living near your school. Provide cardboard tubes from toilet paper rolls and give the following instructions:
 - a) Cover the outside of the tube with glue.
 - b) Roll the tube in a plate filled with birdseed.
 - c) Using a piece of string, secure one end to the tube, and tie the other end to a tree.
 - d) Over time, observe birds arriving to feed and discuss their behaviors.

necessities. What do you think will happen if the place where a plant or an animal lives was destroyed? What can you do in your school and in your home to protect the life and homes of the plants and animals close to you? What would you and your family do if your home were destroyed?

Encouraging positive conservation attitudes

Have the following conversation with your students in order to promote respectful attitudes towards the environment they have just observed. This will encourage your students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as your students grow.

Animals live in different places that meet their needs for finding food, water, shelter, and a home where they can take care of their offspring. Plants also grow in places that can provide them with their basic life



Activities during the visit

Subject: Basic needs and life functions of living things

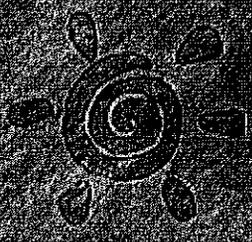
Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus your students on basic needs and life functions of living things during their field trip.

Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe... Explore... Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Ask the students to explore and observe the entire site. Where do they think the animals could find water? Where could they find shelter? Encourage them to draw their observations in their notebooks.

3. Ask the students to look for an animal eating a plant. Ask: What part of the plant is the animal eating? What plants do you include in your diet?
4. Try to find a nest or a shelter an animal has built with plants and/or non-living objects, like a burrow or a spider web. How many things in your house are made of plants? (Examples: wood furniture, cotton fabrics, bamboo containers, and woven baskets).
5. Ask the students to look for a plant (or a bush, or tree) and explore it to see if there are animals in or on it. What are the animals doing on the plant? Do you think that the animals that live on the plant get everything they need to survive? Ask the students what part of the plant would they choose to live in and why.
6. Ask the students to look for an animal in the water. Do you think the animal is in the water all the time? Would it need to move somewhere else to obtain what it needs to survive? Name an animal that stays in the water all the time, what does it find there?
7. Ask the students to observe a plant and ask: How do you think this plant satisfies its needs in order to survive?
8. Ask your students to observe the type of soil at the site and its characteristics (sand, rocks, orifices, hard packed, soft, small holes, etc.) and ask: How can a living creature use this type of soil as a shelter?



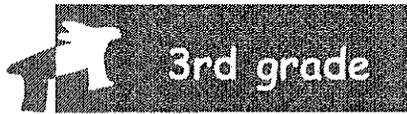
Know where the students are at all times

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.





Subject: Food webs

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. This lesson will cover the following concepts:
 - Food chains and herbivores, carnivores, and omnivores
 - Elements of the food web: producers, consumers and decomposer
 - Consequences of the elimination of one or more elements of the food web

Background

Living things depend on one another to survive. Animals eat other animals, fruits, plants and seeds. Some animals are classified as *predators*: those animals that hunt other animals to eat. And other animals are classified as *prey*: those animals that are typically hunted by the predators. This is how food webs are formed - various animals eating other animals and plants. Each plant or animal makes up a section of the web, and all the sections are intricately connected - similar to a web of a spider.

Plants self-produce the energy they need to grow from the sunlight, carbon dioxide and water, as well as other minerals and nutrients found in the soil. At the same time, plants provide food for some animals. For this reason, plants form the foundation of the web and are called *primary producers*.

Animals are consumers and cannot self-produce their own food. There are be classified as three different classifications of consumers, depending on what they eat. The three classifications are: herbivore, carnivore,

and omnivore. Animals that only consume plants are *herbivores*. In turn, herbivores serve as food to other animals that only eat meat, called *carnivores*. Some animals eat both plants and animals, and they are called *omnivores*. When living things die, they become food for the microbes, tiny organisms such as bacteria, protozoa, viruses, and fungi, that help decompose the dead matter into nutrient soil. The nutrient soil is then useful to plants - so there is an entire circle of life within the food web. The microbes, or microscopic organisms, are classified as *decomposers*.

Activities in the classroom

Before the visit

1. Read to the students the following stories: *The little house of the snail* and *The dog and the wolf*. Discuss with them the predator-prey relationship in the two stories. Ask the students to identify the herbivores, carnivores and omnivores.
2. Ask each student to make a personal list of at least twenty different meals that they normally eat. Then ask them to answer the following questions: How many types of animals do you eat? How many types of plants you eat? What do you eat mostly, animals or plants? Afterward, as each student to create a food web based on the meals on their lists.
3. Give the students some used magazines, newspapers, brochures, stamps, etc. for them to cut out figures of animals and plants and ask them to create a terrestrial and a marine food chain.

After the visit

1. Divide the blackboard in three parts and write the words: Herbivores, Carnivores,



- and Omnivores. Ask the students to read their field notes and classify what type of producer or consumer each one is; let them put the name under the corresponding word according to what the animals eats. Check the list to ensure each name is under the right classification and make changes if necessary. Ask the students what type of producers or consumers are the most abundant? What type was the least abundant?
2. Draw a food pyramid on the blackboard. Are there more producers than consumers? More herbivores or omnivores? Ask them to recall the natural environment at the field trip site. Were there more plants than animals? Why does the food web need more plants than animals?
 3. Ask the students: If you were a wild animal, would you like to be an herbivore, a carnivore or an omnivore? Why? Ask them to draw a picture of the animal they would most like to be.
 4. To further explain the role decomposers play in nature and in the food web, lead the students through the following experiment:
 - a) After eating an apple, take the core outside and place it in a grassy area.
 - b) Have the students check on the core everyday and record the changes taking place in their notebook. They will probably see insects in the core eating it or taking away small pieces to eat. How are these little animals helping? (They are helping to breakdown the core and get rid of it. They are cleaning up and recycling the material).
 - c) Talk to the students about the role of decomposers in nature. Discuss the importance of their role in the food web?
 5. To reinforce the idea of connectedness in the food web, we suggest completing the following outdoor activity with the students so they can better see the food web relationships. Choose a place: in the school yard, a park, under a rock, etc.; ask the students to draw and name a living thing on an index card. After they create several index cards, spread the cards out on the floor and with a string join the inter-related cards, eventually forming a web. Once the web is complete, have the students reflect on what would happen if one of the cards, or pieces of the web, were removed. How is food provided for the animals and plants? How do they obtain the food? What other things do they need to live? You can also classify the cards as producers, consumers, predators, preys, or decomposers.

Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

What do you think the world would be like without carnivores? Without plants? Without decomposers? What would happen in nature if any of the sections of the food web were missing?



Activities during the visit

Subject: Food webs

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on food webs during their field trip.

Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect toward the surrounding natural environment.

2. Ask each student to observe three animals and say what type of producer or consumer each one is: carnivore, herbivore, or omnivore.

3. Ask the students to explore and observe the entire site.

a) What are the most abundant living things?

b) What are the second most abundant living things?

c) What are the fewest?

4. Ask the students to observe:

a) A herbivore, preferably eating- Is it *grazing* (eating grass) or *foraging* (eating bushes)?

b) Some flowering plants - What animals are feeding on the flowers? (Insects, birds, spiders). How do these animals help the plant?

c) The soil, preferably where there is organic matter decomposing, like leaves, wet branches, or a dead animal. Are there decomposer animals in action? (Ants, spiders, earthworms). Why are the decomposers there? What benefits are they receiving?

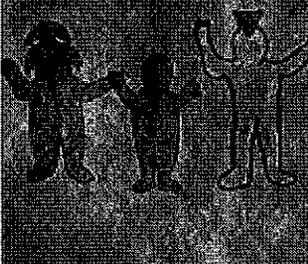
5. Have the students create a visual food web with the organisms they observed at the site.

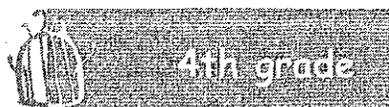
Know where the students are at all times.

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.





Subject: Adaptations

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. The students will investigate the following concepts of the Natural Sciences:
 - Living things and their environment
 - Adaptations
 - Ecosystems

Background

Organisms depend on one another, and on the physical environment in which they live. Living things group together in certain areas to form populations - like a cluster of flowers, a herd of elephants, an army of ants, etc. Populations interact with each other and their physical environments (soil, air, light, and humidity) to make up an ecosystem.

Therefore, we define an *ecosystem* to be the various groups, or populations, of living organisms, the environment in which they live, and the relationships formed through the food web.

Each ecosystem maintains a balance. All of the species in a certain ecosystem use a different series of resources and adapt to the given conditions, all of which determines each species role in the ecosystem - this is called an *ecological niche*. *Adaptations* are changes that some organisms make in order to survive adverse environmental conditions. Being able to adapt to their surroundings helps a living organism survive in its habitat. If it cannot make the appropriate changes, or adaptations, it will either have to relocate, or it will die. Some common adaptations (which can be physical or behavioral) living organisms have are the shape of the mouth or the beak,

the shape of the extremities (legs, wings, and flippers), the color of the skin or fur, the position and size of the eyes, the shape of the bones in the spine, feeding habits, and so on. In plants, some common adaptations include the shape and color of leaves, or photosynthesis functions. The characteristics of each organism are adapted to fit its life. For example, the shape of the beak and the body characteristics of a woodpecker have been adapted so it may live in a tree. In humans and other animals, almost all structures of the body are adaptations that have been developed over time to fit our way of life. Human hands are adapted to take or hold various objects of different sizes and shapes, the legs to sit, kick, walk and run, the eyes to see in varying degrees of light, and the stomach to digest many different kinds of food. All of these adaptations contribute to our survival.

Activities in the classroom

Before the visit

1. Define adaptation (any characteristic that helps a living organism to survive in the environment).
2. Read the children the following lessons from the Spanish reading book for second grade, SEP: *Turtles in danger*, page 178; and *Frogs and toads*, page 100. Or, if this is not available, another book that depicts animals adaptations and survival in the wild. Ask the students to identify the adaptations of the turtles and the toads that help them to survive in their different environments.
3. To illustrate the idea that the mouth of an animal is an adapted feature that helps collect certain food, ask the students to test different "mouths" using objects



that simulate the mouths of various types of animals (birds, fish, mammals). For example, use chop sticks, straws, spatulas, hanging hooks, and pincers to pick up "food" like cookies, different types of pasta, stones of different sizes, powdered milk, and different types of cereal.

Additionally, have the students experiment with different situations, for example picking up food over the table, hidden inside a crack, in the bottom of a tube or a small can, in a water recipient. Which mouths are more appropriate to pick up food in different situations?

4. Ask the children to think about some physical adaptations people have developed to survive in our environment and make a list of those adaptations. Afterwards, let the students choose one of these adaptations and describe how life would be without it.

After the visit

1. Ask the students to look back at their field notes and as a class create a list of the adaptations they observed. For animals, talk about the adaptations observed according to what each animal eats, how they move, how they defend themselves, how they take care of their offspring, etc. For plants, urge them to think about how they reproduce, how they store water, how they defend themselves, etc.
2. Lead the class through two fun games that will reinforce their learning of adaptations:
 - a) Ask some of the students to imitate different animal movements; while they are doing this, ask the rest of the group to guess what animals they are portraying and where it lives. For example: jumping like a frog, rabbit or cricket; flying like a butterfly, bee, or bird; walking like a penguin, bear, monkey, etc.; swimming like a fish, frog, dolphin, etc.
 - b) Play "find the objects". Hide ten different objects in an enclosed area, like the schoolyard, near a garden or shrubbery. Hide three green things among the plants, and two brown things in the soil. Hide five other brightly colored things (red, orange, blue, yellow, pink, etc.) among the same plants and soil. Generally the bright colored objects are found quickly because they jump out of the environment and are more easily seen than the camouflaged items.
3. After playing the games, ask the students to talk about their experience and ask: What can we learn from the game we just played? (The color and the shape of living organisms are characteristics that may help their survival, enabling them to hide from their predators, making them less visible in certain environments - this type of adaptation is camouflage).
4. Teach the students that habitats, as well as animals, can be damaged by human activities (hunting, deforestation, erosion, development, pollution, etc.). What happens to the animals and plants living in damaged habitats? Would they need to develop new behaviors to help them survive in a deteriorated environment? Can you give an example? The adverse conditions of some damaged habitats force the animals living there to alter their behaviors in order to survive, for example their feeding habits: hunting or fishing animals that find themselves



surrounded by garbage resort to eating discarded food and packaging that people have littered, and they do not hunt or fish as much. Sea gulls and raccoons are a good example, or even bigger animals such as bears. Also think about the change of behaviors in caring and protecting their offspring: some animals turn an abandoned car into a den where they can take care of their offspring, instead of constructing one themselves the way they would typically do in a healthy and un-impacted environment. Some birds have resorted to building their nests on top of light posts, in abandoned building structures, or in the crevices of roofs or ceilings if they can no longer build them in the sand or trees. When people invade wild terrain, they rapidly force the wild plants and animals residing there to make new homes among the paved streets and town buildings that replaced their natural habitat. Wild things therefore must try to satisfy their basic survival needs like food, water, shelter, and a safe place to protect their offspring in a foreign and unnatural environment. For a variety of reasons, people soon start hunting or displacing them to other areas that provide environmental conditions very different to what they are accustomed. People may find an animal to be a pest, or a plant to be unattractive, or a predatory animal might be considered a threat to human life. Who should have to leave those places, the native plants and animals, or the invading humans?

Plants adapt to an altered environment too. An example are the plants that survive at the edges of the highways, streets or city sidewalks that are able to survive and withstand the toxic gases

emitted by hundreds of cars constantly passing them by.

5. Gather disposable material like cardboard, paper, aluminum cans, plastics, etc. and invite the students to construct animals and/or plants with "trash." Ask them to describe where their animal and/or plant lives, and what physical characteristics they have that helps them to survive in their environment.

Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

Discussion topic: The plants and animals observed during the field trip have adapted to living in a particular place and have been successful in making it their home. What do you think would happen to those plants and animals if that place were destroyed? Could they be relocated to another habitat? Do you think they could survive in a different environment? Why do they think is important to take care of the site they visited?



Activities during the visit

Subject: Adaptations

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on adaptations during their field trip.

Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Ask the students to observe and take notes on the birds at the site. What shape are their legs? (Examples: webbed feet, claws, thin, thick, short or large legs). If they observe a bird with webbed feet, ask: Is the bird on the grass? On the water? On a tree or a bush? Why do you think it is there? Have the students search for a bird in a tree or a bush. What are the differences between its legs and feet

compared to the birds with webbed feet? After making more observations on the legs of the birds, ask: Do you think the shape of the legs is considered an adaptation that helps the bird survive in its environment?

3. Have the students observe a bird feeding. What shape and size beak does it have? How is it using its beak? What other beak shapes and sizes can you observe when looking at other types of birds found at the site? How should carnivorous bird beaks look? Why? After making more observations on the beaks of birds, ask: Do you think the shape of the beak is considered an adaptation that helps the bird survive in its environment?
4. Try to find a small carnivorous bird and, if possible, a large carnivorous bird. How do you think their body shape and size helps them hunt their prey? Ask them to comment on some of the advantages they think animals with small bodies have, and advantages that animals with large bodies have. What about the disadvantages?
5. Have the students observe a plant. What is the significance of the leaf size? What about the leaf shape? The texture? The color of its leaves and the stem? The color of its flowers? If it has thorns, how do you think they help the plant survive? If it is an aromatic flower, what purpose does the aroma have? Ask the students: If you were a plant what adaptations would you like to have? Why?
6. Ask them to observe the soil at the site and ask: What adaptations could the species inhabiting this place have according to the characteristics of the soil?

Know where the students are at all times.

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.

5th Grade

Subject: Biological diversity

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. This lesson will cover the following concepts:
 - Living organisms
 - Biological diversity
 - Representative biological diversity of the country
 - Species extinction
 - Conservation strategies for plants and animals

Background

Any given environment creates a set of conditions, and it only allows well-adapted animals to survive. This is the way life has emerged and thrived. Initially, a series of inorganic molecules gathered together in a marine environment, and they bonded to form a small organic molecule - the ancestor of all living things. Living organisms were forced to alter their physical characteristics and behaviors to their environmental and the conditions imposed on them. The result of all of these different adaptations is the great diversity of living organisms we know today. Biological diversity is illustrated by all of the different living organisms that have unique characteristics, allowing them to adapt to the environment in which they live. For example, plants and animals of the jungle are different from those of the desert, and those from the desert are different from those living in the woods. Each ecosystem is represented by its own

diversity of living organisms. The more diverse a habitat, the more biological diversity can be found there. Biological diversity, or biodiversity, has been recognized as an important measure of the health of an ecosystem. The more diverse an ecosystem, the greater the chance a species will survive changes caused by climatic change. One way of measuring biodiversity is by counting how many *different* species are in a certain area. Humans have always had the power to introduce changes to terrestrial ecosystems due to the increased use of technology. However, never before at the rate and scale we've seen over the last century. This is due in part to the dramatic increase of Earth's population, and the unsustainable and uncontrolled use of the limited natural resources on the planet. In Earth's history, numerous species have disappeared due to natural evolution. However, today extinction has increased considerably, and species are disappearing at an alarming rate. Earth's biological diversity is horribly threatened by human activity - one fourth of the current existing species are in danger of extinction due to human impact. There are several reasons; some species will be affected by habitat destruction, some by the contamination of soil, water, and air, and others by uncontrolled commercial development and natural resource exploitation. Many plants, large animals, insects, and other ecologically important species are disappearing at such an alarming rate, the world literally changes every day. To lessen the degradation of biodiversity, some



governments have implemented various policies and laws to protect certain species, hoping to prevent extinction.

An encouraging example of how large areas of land and numerous plants and animals can be protected are all of the national parks and protected areas that many governments have established in some of the most biologically diverse areas of the world.

These protected areas preserve habitats and prevent the occurrence of threats such as habitat loss, resource exploitation and pollution.

Biological Sampling

Sampling is a careful measure of a small sub-section of a larger area, enabling scientists to later apply those measures mathematically to draw conclusions for the larger area. Though it is not always precise, like counting every organism in a certain area, it saves time and money, as well as provides an accurate estimation of the characteristics of the larger area.

Scientists measure biological diversity and abundance in an area using quadrants to count how many different species, and how many individuals of each species, live there. A quadrant is a known area and can be from one square meter to 100 square meters, depending on what you are studying and how you are conducting the study. It is important to know the exact size of the quadrant you are using in order to calculate the biodiversity of an area, and later be able to compare it to a different location of the same size. A quadrant can be a square, a rectangle or even a circle, as long as the area of the sample size is known.

Activities in the classroom

Before the visit

1. Talk about the concept of biodiversity (the variety of different organisms found in one place, or on a larger scale, found on Earth).
2. Present the students with figures of different animals (try to have representatives of different ecosystems: desert, forest, jungle, ocean, tundra, etc.); it could be with stamps, drawings, pictures, etc. Ask each of the students to choose an animal and explain why they chose that particular animal. The students could write a story about the life of the animal and illustrate it with drawings; afterwards they can share their stories with their classmates. Point out the variety of ecosystems represented by the different animals.
3. Ask the students to observe some plants and animals near their home and draw what they see. Ask them: Do you think there is a lot of diversity in your community?
4. Introduce the concept of sampling (use the provided background information as support).
5. Practice in the classroom a very simple and basic way to measure biodiversity in a small area so they can replicate the technique during the field trip. Here's an example: separate the class into groups and give each group various non-living objects that will represent the different plants and animals they will find at the field trip site. Objects can include rocks of different color and shape, soda caps, pasta shells, clothespins, etc. Ask them to give each



object the name of the plant or animal they will find at the site, for example, the white soda caps will be ants, the clothespins will be grass, etc. Each group can create an ecosystem with the objects (which represent the plants, animals and habitat).

To practice sampling, first they need to define the sampling area. Give each group a 2-meter-long piece of string to form a $\frac{1}{2}$ square meter quadrant (you could also use a hula-a-hoop ring as a sampling area). Tell them to record on graph paper all of the different types of plants and animals found in their quadrant. They must focus on the number of different species, not the number of total organisms.

Discuss your results as a class. Which team calculated the highest diversity per area?

After the visit

1. Compare the biodiversity calculations that each group did during the field trip. Were the calculations all the same? Why or why not? Was there an irregular distribution of organisms?
 2. According to the results, and the student's general perspectives, ask them to answer the following question: How much diversity was there at the field trip site? A lot? Not much?
 3. Ask your students to make a similar calculation of biodiversity in a different local habitat (could be the schoolyard), and compare those results with the field trip results. Which habitat has greater biodiversity? What are their reasons? Then ask: Why do you think there are more animals and plants in some ecosystems compared to others?
4. What does the field trip habitat offer to the living organisms in it? Organize a forum where the students can talk and think about the importance of conserving the place they visited.
 5. What threatens the field trip site? (Loss of land, provoked fire, deforestation, erosion, introduced species, etc.) Talk to the students about how human activities can sometimes harm ecosystems and the wild plants and animals that live there.
 6. Encourage them to draw on what they learned before and during their field trip to construct an informative mural or exhibit that informs the rest of their classmates, teachers and administrators about the importance of knowing, conserving, caring about, and protecting natural habitats, based on the importance of biological diversity.

Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

Lead the following discussion: Perhaps some of the plants and animals observed during their field trip are in danger, and their survival is threatened. What are some of the reasons why the plants and animals could be in danger of extinction? (Examples: over exploitation, habitat destruction, contamination, erosion, provoked fire, scarce food and water, etc.). Ask the students:



What can each of you do to help endangered species? (Examples: recycling, conserve energy; create green areas, reforestation, etc.). Have the students brainstorm and create a list of their ideas on the blackboard. Pick an idea from that list and create an ongoing class project to protect a local habitat! You could also plan a short, medium, and long term project involving not just you and the students, but the rest of the school's students, staff, and even the community. This project can be worked on throughout the school year.

Encourage students to continue, on their own, to learn as much as possible about plants or animals - or even just one specific organism, or kind of organism. They can go to libraries to read books or search the Internet about life and habitat of the organism they choose. They can regularly visit a zoo, aquarium, greenhouse, or state park near their home to continually observe the organism. They should try to stay well informed about the organism so they can find ways to help protect it into the future.



Activities during the visit

Subject: Biological diversity

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on biodiversity during their field trip.

Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. Taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Invite the students to observe the field trip site and ask: At first sight, how much diversity is in this area?
3. Involve the students in a very basic measure of the site's biodiversity, following the same method practiced in the classroom. Randomly assign each group to a different area of the site.
4. Once in their research area, ask them to lay out a $\frac{1}{2}$ square meter quadrant. The students should focus first on the different plants observed in the quadrant. Ask them to draw and identify each plant, and record their findings on graph paper. If the students do not know the name of a plant, ask them to draw a more detailed picture so they can look it up in a plant guide later. Have them practice naming organisms, creating a proper name for any plant they can't identify, highlighting the more visible features of the plant.
5. After finishing the plants, have the students look for and count the different insects, spiders, and animals (they can also consider footprints). Ask them to draw and identify each animal and record their findings on graph paper. If they do not know the name of an animal, ask them to draw a more detailed picture so they can look it up later. Again, they can invent names for animals they do not know. Since some insects are very small, they might need to use a magnifying glass, if available.
6. Last, have the groups calculate the estimated size of the field trip site, and determine how many $\frac{1}{2}$ square meter quadrants would fit in that area. Help them apply their quadrant data to complete a biodiversity calculation for the entire site (multiply the number of species found in the quadrant by the number of quadrants). Express biodiversity as the total number of species in the area.

Know where the students are at all times

Ask questions to keep students engaged

Be open to the students' ideas and questions

Enthusiastically encourage students to learn through observation



6th grade

Subjects: Man and the environment: interactions, ecosystem changes, and habitat loss

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. This lesson will cover the following concepts:
 - Protecting the environment
 - Man and the environment: interactions and ecosystem changes

Background

If humans continue to alter natural habitats by invading terrains, building structures, draining the water, creating roads, uprooting plants, or contaminating the soil, water and air, then we are at risk of losing all the elements of a habitat that allow plants and animals to successfully grow and be healthy. If this degradation continues indefinitely, certain plants or animals could not only lose their place in their native habitat, but also their place in the world. Such is the case of the thousands of species that have disappeared, or gone extinct, throughout history - which scientists have attributed mostly to habitat loss. In the last fifty years the world's terrestrial landscapes have been transformed due to human activities, including the development of houses, roads and cities, agriculture, extraction and exploitation of resources, pollution, and excessive hunting. Additionally, marine ecosystems are being devastated around the world, also attributed to the irresponsible actions of humans including pollution, disposal of nuclear waste, garbage, inadequate

treatment of organic waste, resource extraction, destruction of reefs, mangroves and coastal lagoons, excessive fishing and hunting, etc. As human populations keep growing, more and more natural areas are being fragmented, developed or turned into farmland to satisfy the increasing human needs for shelter and food.

The human impacts are evident: Development alone, with the construction of houses, streets, highways, commercial plazas, and other buildings, is the main cause of habitat loss. Building on wild lands destroys and seriously degrades the wildlife habitat. Turning wildlife habitats in farmlands, an increasingly common phenomenon done with the intention of satisfying the high demands to feed an ever-growing human population, drastically changes the habitat. Runoff from farms into rivers, streams and lakes contains fertilizers and pesticides. This causes problems due to the excessive amounts of nutrients, which inevitably change the physical environment, that are then transported to downstream habitats. This in turn provokes an oxygen reduction that can seriously damage or kill the inhabiting wildlife. Pesticides also damage other animals, such as birds and insects. Birds can suffer horribly since any animal they consume might have a small amount of the toxic substance, and the birds are therefore indirectly consuming contaminants that accumulate in their bodies over time. Human need for natural resources has led to an unsustainable extraction of wild habitats. This has serious impacts that lead to other problems, such as soil erosion and pollution. While most of the ecosystems have the ability to recuperate after a natural event, like a flood, a fire, disease, extreme weather, and climatic changes, some changes



can be too intense, like the climate change of the last ice age that permanently altered the group of species able to survive in their habitat. Human activity can also change ecosystems irreversibly. For example, when a new species is introduced into a habitat, the entire food web can change indefinitely. Habitat fragmentation resulting from development or other uses of land can result in loss of native animals because the size of the habitat is affected, creating a "marginal effect." This then isolates other populations of species that are not normally isolated. Some fragments are too small to satisfy all the needs of the species living in that area. The division of any habitat into smaller areas affects the quality of the habitat and creates barriers affecting the movements of populations or individuals. The following studies demonstrate that the smaller the fragment size, the lower the biological diversity.

Activities in the classroom

Before the visit

1. Introduce the students to the subject Man and the environment: interactions, ecosystem changes, and habitat loss. Ask them what human activities could change an ecosystem, and encourage them to explain their response.
2. To reinforce the topics of discussion, present some photos or landscape depictions (from pictures, magazines, etc.) of ecosystems (terrestrial and/or marine) that have undergone changes over time. Try presenting pictures where the negative impacts of human activities are obvious, for example deforestation to create cattle fields, aftermath of provoked fires, construction of houses or commercial plazas, oil spills, a garbage dump, etc. Ask them to identify the changes and try to imagine (or show pictures if available) how the ecosystems were in the past. Discuss the changes.
3. Based on the provided background information and your class discussions, talk to the students about habitat loss. What is habitat loss? How does it happen? What consequences do the plants and animals face from having to live in a damaged environment, specially focusing on their basic needs for survival (water, food, shelter, and a safe place to take care of their offspring)?

After the visit

1. Talk with the students about how a habitat is the entire area where species satisfy their basic needs for survival (water, food, shelter, and a safe place to take care of their offspring). Then ask them to make a drawing or a list of the habitats from the field trip site. Ask: At the site we visited, are all the basic needs of its inhabitants satisfied? Encourage them give their reasons. What would happen at this habitat, or the region, or the country, or the world, if the field trip site disappeared?
2. Aid reflection with these questions: Do you think that in a place like the schoolyard, the plants and animals present can satisfy their basic needs for survival? Can it be considered a habitat?
3. Collect information, including specific statistics, about the degradation of ecosystems around the world (loss of terrain, water shortages, flora and fauna extinctions, etc.), or require the students to search the Internet for similar information; present the information to



the class and talk about it. Tell them that as they have found in their research, many habitats are damaged worldwide. Allow them to offer solutions: How can we restore a habitat? Suggest creating a student or classroom project to restore, care for, and protect a habitat near or around the school so it can become a healthy habitat where local species can reside. The project can be planned for the short, medium, or long term, according to the needs of the habitat or the interest of the students. This requires carrying out the following, or similar, basic measures in the habitat: cutting the grass, providing water, loosening the soil, naturally eliminating harmful insects, and naturally fertilizing. You can also care for the plants (their stems, leaves, and flowers), make sure each plant has enough sunlight, and finally design a strategy for sustaining the area for the entire school. This includes promoting the caring and protection of the habitat into the future.

4. If the school doesn't have green areas, you can create a similar habitat by planting grass, flowers, or other native species that might attract local fauna.

Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

After restoring a habitat near your school with the caring and protection of green areas project, see what else the students can think of to do in order to achieve a positive change in the environment. Are they willing to carry out restoration projects outside of school? What nearby habitats do they think need restoring? Why?



Activities during the visit

Subject: Man and the environment: interactions, ecosystem changes, and habitat loss

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on man and the environment: interactions, ecosystem changes, and habitat loss during their field trip. Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe... Explore... Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Encourage the students to observe the site thoroughly, and if possible organize a hike so they can explore. Ask them to:
 - a) Identify the elements present in the habitat that provide the basic living needs of the species found there (water, food, shelter, and a safe place to take care of their offspring). Is it a natural habitat?
 - b) In silence, each student should determine if there are changes in the habitat due to human activities, for example: destruction of land for the construction of buildings, contamination of soil and/or water, use of wild lands for agriculture, introduced species, etc. Later, each of them will explain their determinations to the class so they can discuss the negative impacts of certain activities that might be causing habitat loss.
3. Some topics to discuss: According to your observations and previous learning, what could the future hold for this place? If the environment seems to be deteriorating, how could this damage be repaired? Reversed? Could the natural habitat be restored? Ask them to write down a solution and approach, they can make a drawing if they prefer.
4. Organize the students to do a site cleanup before leaving (pick-up trash, remove debris, etc).

Know where the students are at all times.

Ask questions to keep students engaged.

Be open to the students' ideas and questions.

Enthusiastically encourage students to learn through observation.





7th Grade

Subject: Introduction to research and experimentation.

Field exercises

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. The lesson will cover the following concepts:
 - Function of field exercises, equipment for field exercises.
 - Examples of field research
 - Methods to study biology
 - Utility of biological studies

Background

In every region of the world environmental deterioration is a problem, on either a major or minor scale. For this reason it is vitally important to raise awareness surrounding possible actions to help resolve this ecological problem.

Guide the students through the following levels of understanding: sensitization, reflection, and awareness.

The level of sensitization refers to the first contact with the problem. General information is provided, and interest is piqued based on the exchange of knowledge and experiences.

The level of reflection requires that students be well informed, as well as generate attitude changes.

Finally, the level of awareness makes reference to an active commitment, conscious and permanent participation manifested in a new, more diligent way of life.

Each educator not required to be an expert in environmental education, but it is recommended that they be aware of the influence they can have on students to have a personal interest in contributing to a better quality of life, as well as be committed to accompanying their students in analyzing environmental problems and searching for alternative solutions.

An educator must support the students' desire to discover and increase their own knowledge through observation, experimentation, and reflection. *

*(Taken from the Mexican National Environmental Education Program, Manual of Didactic Suggestions for Environmental Education for Basic education, SEP, SEDUE, SSA).

The students can practice critical thinking when discussing environmental problems, during field trips excursions and activities, and when participating in the development of community projects, leading to a better comprehension of environmental concepts.

To encourage this, it is necessary to conduct experiments or practical activities to foster student discussions about environmental topics, and to stimulate observations and associations that enhance their analytical capacity. Through field experiments the students will be able to point out adaptations that organisms have developed to survive in their natural environments, and can suggest solutions to specific problems they encounter.

Additionally, these experiments encourage student participation.



Activities in the classroom

Before the visit

1. Carry out the following research activity: Divide the class into teams of 4 to 5 students and give them an object to observe: it could be a rock, feather, leaf, flower, or unknown objects of different materials (wood, metal, clay). Ask the students on each team to:
 - a) Observe the object for five minutes and make a list of all the characteristics they observe.
 - b) Write down a list of questions about their object: What would they like to know about it? Where does it come from? What is it made of? What is its purpose? Who uses it?
 - c) Have the team choose one of the questions and write down all the possible answers. Which is the team's most accepted answer? Explain to them that this is their hypothesis.
 - d) List the methods they will use to test their hypothesis.
 - e) Investigate, utilizing the library or the Internet.
 - f) Have the students present their conclusions based on solid proof and research. After sharing their results with the rest of the class, discuss if they were able to answer their question. Why or why not? Was their hypothesis correct? Talk about how scientists use this method to study the natural world.
2. Talk about the field trip site. Mention some of the plants and animals you expect to find at the site, if possible show them pictures or figures.
3. Explain that you will make copies of the Field Activities worksheet for the field

trip and, once at the site, you will give each of them a copy to fill out during the visit. Explain that they will keep working in teams, but they will complete their sheets individually.

After the visit

1. Review the Field Activities worksheet completed during the field trip. Ask one representative from each team to read out loud the description of the plant or animal they chose. The rest of the students will try to guess the identity of the organism based on the description given by their classmate.
2. What hypotheses did the students propose to research regarding the plant or animal they chose? To answer their question, did they use reference materials from the field trip site (informative materials, maps, brochures, etc.), or did they need to conduct extra research (library, internet, magazines, etc.)? Talk about the results of their hypotheses.
3. Encourage the students to practice the collection of data by creating their own field journals. Explore a local habitat close to your school and ask them to record in their journals all the observations they can make about the plants and animals they see. Encourage the students to include maps, diagrams, tables, and drawings in their journals. Talk about how scientists use this method to study the natural world.
4. Invite a researcher from a local university to talk to the students about how scientists use the scientific method to study the natural world; also ask them to talk about the fieldwork required for their scientific research.



Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

Select any evident environmental problem at the field trip site, or at your school or neighborhood, then discuss the problem with the students. In a round table discussion, ask the students to talk about the possible origins of the problem, the current situation, the impacts it's having on nature, and what is expected in the future. Ask the students to propose possible solutions.

Based on that discussion, encourage the students to develop and carry out a research project following through on one of the solutions they proposed, or at least some form of it, including fieldwork, if possible. Recommend that they ask for the support of a researcher from a local university to carry out their recovery project.



Activities during the visit

**Subject: Introduction to research and experimentation.
Field exercises.**

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on introduction to research and experimentation during their field trip.

Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense **EVERYTHING** around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Give each student their materials:
 - 1 copy of the following sheet: Field Activities
 - 1 magnifying glass
 - 1 pencil

Know where the students are at all times

Ask questions to keep students engaged

Be open to the students' ideas and questions

Enthusiastically encourage students to learn through observation

Report of field activities for 7th grade students

**Subject: Introduction to research and experimentation.
Field exercises**

Student's name: _____

Instructions:

1. Observe the area and choose any plant or animal you would like to study.
2. Make a drawing of the plant or animal you chose. Try to show its distinguishing characteristics.
3. Using your own words, describe your plant or animal. Include its size and shape; if it is an animal, what covers its body? If it is a plant, in what type of soil does it grow? And so on.

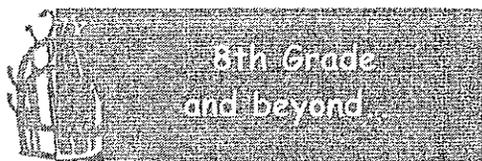
4. Make a list of questions about your plant or animal that might help you propose a hypothesis. Can you answer the questions just by observing the organism you chose? Are there information materials or brochures that might help you answer your questions right away, on-site? If this is the case, write the answers under each question (use both sides of the sheet if necessary).

Know where your professor is at all times.

Carefully observe the plants, animals and the land.

Ask questions to clarify any doubts or learn more about an interested area.

Observe, understand and respect the environment in which you live.



Subject: Student responsibilities for nature

Objectives

1. The students will use their observation skills to aid their deductive thinking.
2. The lesson will cover the following concepts:
 - Responsibilities of the student toward life
 - The importance of respecting living organisms
 - The role of man in the transformation of the planet
 - The future

Background

Environmental problems are the result of several factors. These include, among others, the lack of information regarding the damaging affects certain products or waste have on the environment, the lack of ability to eliminate waste properly, and the lack of motivation to produce energy in a clean way. Additionally, the apathy of those causing environmental problems, and the idea that it does not affect them, leads to a myriad of problems. Environmental deterioration is present in cities, as well as rural areas.

A fundamental part of preventing environmental degradation is having the will to do it, and looking for ways to do it. If all of us participate in solving environmental problems, the earth's environmental situation can improve.

A times we think that environmental problems are too numerous, too big, and too hard to solve. In a way, that is true. However, this is the result of seeing our actions in a solitary way, when what we need to do in order to stop environmental deterioration is to reflect and act together. The sum of efforts will be greater if we agree on how to solve each problem before taking action. Therefore, the way to promote or look for solutions is to build capacity and have the determination to organize ourselves into collective working groups. Activities done in groups during classes are an example of collective work.

Before thinking about all of the world's environmental problems, it is important to think about the needs of the human population, like food, clothes, education and economic livelihood. Additionally, facing difficulties such as drug addiction or environmental degradation make it necessary to organize within our communities. We must remember the phrase, "think globally, act locally." This form of participation leads to changes in attitude. These changes in attitude, and the solutions to environmental problems, take time, sometimes making it hard to see immediate results. However, with actions taken to protect the environment, we have started an approach that can lead to a better future for all.

The challenges are still great and in order to solve them efficiently, sizeable efforts and increased participation are required. To avoid environmental deterioration and the depletion of natural resources, it is important to work together. This makes it possible to find diverse and improved ways to sustainably use natural resources *and*



conserve them, so we are able to satisfy our needs while adhering to sustainable development practices. We must plan production and consumption in order to cover current needs as well as ensure that necessary resources will be able to satisfy the needs of future generations. With this in mind, it is necessary to keep researching options to replace natural resources that may not be available to us in the future. For example, the possible depletion of crude oil has started the research of alternative energy sources such as solar or wind power.

Activities in the classroom

Before the visit

1. Discuss with the students the importance and benefits of working collectively to achieve the goals of a team project. Then ask them to form groups of 4 to 5 to work on the following activities in and out of the classroom.
2. Give each team a different object, either organic or inorganic, for example a fruit, a piece of bread, a piece of leather, a clay figure, an aluminum can, a plastic item, a styrofoam cup, etc. Tell each team to analyze the assigned object and try to answer the following questions: What is it made of? What kind of material, or raw material was used in its creation? How was it made? Who consumes or uses it? What do you do with it once it has been used?
3. Ask each team to present their findings. What is the common origin of all objects? (All come from nature. Even the products that have been fabricated have used natural resources for their production). Based on this knowledge, explain to the students how natural resources are used to satisfy our basic needs.
4. Introduce the concept of sustainable development for adequate and conservative use of natural resources. Emphasize the importance of trying to recycle the byproducts of the things we use in our daily life.
5. As a conclusion, highlight the relationship between humans and nature and how that relationship relates to the conservation and caring of the environment.
6. Highlight the importance and benefits civic participation has through collective work. Using this example, explain that the sum of efforts is larger and the results better, especially when a resolution has been agreed upon before taking action. Explain that during the field trip they will participate in a garbage cleanup that will benefit the field trip site. To ensure the success of the effort, make sure each team coordinates who will do what, so no two people are in charge of the same task. Tell them they will need to take pictures and record their work in their field journal.
7. Find out ahead of time if the field trip site has the proper receptacles, such as garbage cans or containers. If not, plan to take an extra car or truck to transport the garbage collected to a place where it can be disposed or deposited. This is something you could ask the parents to participate in or support.



After the visit

1. Continuing the collective teamwork, making sure all team members know their individual responsibilities, ask the students to develop a formal exhibit (either on the blackboard, in a poster, or power point presentation) to display the job they performed at the field trip site. Ask them to include background information on the site (including its natural, social, and historical importance), its current situation (including current impacts, disturbances, and deterioration), viable actions to restore the area in the short term (garbage pickups, reforestation, irrigation of green areas, placement of interpretive signage, etc.), existence of organized cleanups (benefits of the project), methods for participation of collective working groups in the garbage collection (methods followed by the team), results from the field trip (pictures, drawings, or notes about what the site was like before the visit and its situation after), and recommendations to make the restoration, caring, and conservation of the site more efficient and effective (planning and development of other projects).
2. Try to obtain permission for the students to share their work with other students and teachers at the school. You can use the school's audiovisual room or library, or to go into each classroom. Encourage the students to present their work with enthusiasm, since they will be setting an example of the benefits all students can bring to the region and the world, and the importance of community participation

in the caring, protection, and conservation of the environment.

Encouraging positive conservation attitudes

Include the following conversation to promote respectful attitudes towards the environment they have just observed. This will encourage the students to place value on nature, and help them develop an overall responsible and respectful attitude toward the environment and the preservation of natural resources. This will foster conservation practices as the students grow.

Reaffirm that human actions influence the environment. Discuss with the students the ways, and to what degree, we all create and react to environmental problems, and how this directly relates to the size of the beneficial or detrimental repercussions. If actions are negative, the problems will be harder to resolve.

Ask each of the students to carefully read the following list and write down the two statements that most interest them. Ask them to consider what would happen to the air, water, soil, plants, animals, and people if the statements were true. Encourage them to research in books and journals, interviewing knowledgeable people, or searching the Internet to finish the statements they chose.

What would happen if the following statements were true?

- Cut down trees without planting new ones...
- Excessively fish one particular species...
- Throw garbage in...
- Everyone on earth uses a car for transportation...
- Burn the forest...
- Recycle garbage...



- Conserve water...
- Walk more or share vehicles...

After this exercise, lead a sharing session where some of the finished statements are presented, preferably about different subjects on the list, and talk about how all can participate to make the environment better.



Activities during the visit

Subject: Student responsibilities for nature

Educator: The following exercises can be adapted to include additional questions or activities at your discretion. Please use it to focus the students on Student Responsibilities for Nature during their field trip. Through basic observation of nature, even beyond this field trip, the students will naturally build upon the objectives outlined in this lesson and continue their learning.

Observe...Explore...Discover

1. Once on site, lead the students through various exercises in which they can test their five senses. For example, taste the salt water, or a harmless plant or fruit - always under your supervision. The exercises should preferably take place in a wide-open space, where all of the students can form a circle. Encourage the students to sense EVERYTHING around them and make them feel a part of their environment. Invite them to adopt an attitude of admiration and respect towards the surrounding natural environment.
2. Distribute materials the students will need to collect solid wastes (gloves, large bags, sticks to grab the garbage, etc.). If possible, bring extra

water, oranges and apples to offer the students.

3. Place each team at a different location within the site and encourage them to collect as much garbage as possible during the time you have planned for this activity. You can suggest that they separate the garbage into groups such as aluminum cans, glass, plastics, styrofoam, and non recyclables. Ask them to take pictures of the cleanup location they were assigned before, during, and after their work.
4. If there are garbage cans or containers at the field trip site, ask the students to deposit their collected items there. If there are no containers, take all of the bags with you and transport them to the nearest depository. Encourage the students to look for and collect information on the field trip site like brochures, educational material, posters, etc.
5. Ask them to carefully observe the site and try to detect disturbances caused by human activities, besides the presence of garbage.

Know where the students are at all times

Ask questions to keep students engaged

Be open to the students' ideas and questions

Enthusiastically encourage students to learn through observation



Vocabulary

Adaptation - The different physical and behavioral changes that organisms develop through time in order to survive under a specific set of conditions.

Biodiversity - Refers to the variety of existing life and can be applied to a species level, a genetic level, or an ecosystem level.

Conservation - Protection, preservation, management, or restoration of wildlife and natural resources such as forests, soil, water, and energy.

Ecological Niche - A very specific place that a certain species occupies in an ecosystem. Not only the habitat or physical space, but also the way it lives and its role in the transformation of energy and the cycle of matter (trophic chain).

Ecosystem - A system formed by the interaction of a community of organisms with their physical environment in which they exchange matter and energy (eating and being eaten).

Environment - The combination of external physical conditions that affect and influence the growth, development, and survival of organisms. The complex of social and cultural conditions affecting the nature of an individual or community.

Erosion - Destruction or modification of natural processes, including weathering, dissolution, abrasion, corrosion, and transportation, by which material is worn away from the earth's surface by wind, ice, rain, rivers, and the sea. Erosion can also be the result of unnatural processes such as destruction or modification.

Extinction - Derived from the word extinct, meaning that some thing (plants or animals, for example) is no longer living, does not exist and will never exist again.

Food web - The flow of energy from one species to another through the process of feeding. Also called food or trophic chain.

Habitat - Place where living organisms are able find all the elements to satisfy their basic needs: food, water, shelter and a place to take care of their offspring

Residues - Material(s) or other matter left after a job, operation or process has take place.

Shelter - Something that provides adequate protection.

Species - A group of organisms closely related that can mate and have fertile offspring.

Surroundings - External circumstances, conditions, and objects that affect existence and development; the environment.

Sustainable development - Development that satisfies present needs without risking the ability of future generations to satisfy their needs. Sustainable development aims to improve the quality of life for all Earth's citizens without increasing the use of natural resources beyond the capacity of the environment or planet.

