**Activity Overview**

In this investigation, students venture outside for a teacher-led, plant investigations walk in their own schoolyard. This activity is offered as an alternative field investigation for classes unable to visit the Desert Botanical Garden. The purpose of this activity is to get students outside and involved in real, hands-on field investigations about plants and their uses. It is suggested that classes first conduct the *Plants and People Inquiry Stage 1* – Introductory Activity in preparation for this investigation. Although that introductory activity is primarily for classes visiting the Desert Botanical Garden, it provides foundational concepts which are further explored in this investigation.

**Teacher Preparation**

The purpose of the plant investigations walk is for students to see plants in nature that are or can be used by people. It is suggested that teachers first scout the school grounds before taking the students outside. Decide on a route which would be good for a plant investigations walk. The route should include a variety of plants including trees, shrubs, cacti (if possible), and small herbaceous plants. Plan to divide the walk into three portions focusing on “ethnobotany,” “habitats” and “plants in our lives.” For each portion of the walk, select one or more stops along the route to convey the specific *Teaching Points*.

**Materials**

- Pictures of Sonoran Desert habitats from *Plants and People Inquiry in the Garden– Stage 1*
- *Teacher's Guide to Sonoran Desert Habitats and Plant Uses*
- Pictures of an Akimel O’odham roundhouse (olas ki) and kitchen (ko:sin).
- Optional depending on selected activities: clipboards, paper, pencils, colored pencils/markers, objects for making models, objects made from plants
- *Student Study Guide– Results and Conclusion*
Alternate Field Investigation

General Procedures
Guide students on an outdoor walk following your pre-planned route. During your walk and at each stop, conduct an inquiry to convey the Teaching Points presented for that portion of the walk. Following each discussion, conduct one or more of the suggested activities. When the class is back inside, review the entire investigation by reviewing the General Teaching Points and walking students through the Student Study Guide—Results and Conclusion Concluding Activity, which replaces Stage 3 of Inquiry in the Garden. Provide students with the opportunity to post their findings online at the DBG website.

Schoolyard Plant Investigation

General Teaching Points
- Ethnobotany is the study of people’s use of plants.
- Plants can provide for human needs such as food, building, fuel, medicine, fiber, tools, etc.
- Many plants can provide for more than one need.
- Different habitats have different plants which may be used by people.
- Most basic human needs can be met using natural resources found in one’s immediate environment.

Ethnobotany Stop

Description
The ethnobotany portion of the walk should cover a large part of the schoolyard in order for students to see the greatest variety of plants. If possible, the walk should include views of trees, shrubs, cacti (if possible), and small herbaceous plants. Several stops (identified in advance) may be incorporated into the walk where specific teaching points are best addressed.

Teaching Points
- Ethnobotany is the study of people’s use of plants.
- Humans have needs for food, building, fuel, medicine, fiber, tools, etc.
- People historically used and still use plants for various purposes.
- Some plants can be used for a variety of purposes.

continued
Alternate Field Investigation

**General Procedures**

**Discussion and Activity Suggestions**

Along your walk and at your pre-planned stops, conduct inquiry discussions using the teaching points as your guide. Questions to help students arrive at the key points for this stop could include the following:

- **What is ethnobotany?**
- **What are human needs?**
- **Which plants in the schoolyard might help you meet those needs?**
- **What are the different parts of plants? What parts of plants might be used?**
- **Are there some plants that have multiple uses?**

After students have had a chance to observe and discuss ethnobotany, choose and conduct one or more of the following suggested activities.

Have students…

- Observe and draw several plants in the schoolyard that might be used by people. Label the parts of the plants and what they might be used for.
- Play a game similar to “I Spy” in which a student describes a plant by its use and other students have to guess the plant.
- Think of a need and consider how a plant could be used to meet that need.
- Collect a plant part from the schoolyard (or bring it from home) and describe its possible use. (Be sure to discuss safety issues with students.)
- Collect and build objects from schoolyard plants.
- Find examples of plants being used by humans around the school campus.
- Bring an item from home that was made from a plant and describe its use. If possible, name the plant, describe what part of the plant was used, and how it was prepared.

*continued*
Alternate Field Investigation

General Procedures

Habitats Stop

Description

Many schoolyards are landscaped with a variety of ornamental plants not native to the area. If possible, this stop would best be located in an area of native vegetation.

Teaching Points

- Different habitats have different plants which may be used by people.
- Landscaped habitats can be different from native habitats.
- Native habitats are naturally occurring given an area's climate and geography.
- In some cultures, plants provide for most human needs. Even today in the Sonoran Desert, people use plants.
- Plants can be used to meet most human needs (food, building, fuel, medicine, fiber, tools, etc.)
- Many plants can provide for more than one need.

continued
Alternate Field Investigation

**General Procedures**

Discussion and Activity Suggestions

At the habitats stop, conduct an inquiry discussion using the teaching points as your guide. Review the different Sonoran Desert habitats using the pictures from *Plants and People Inquiry Stage 1 – Introductory Activity*. Use the *Teacher’s Guide to Sonoran Desert Habitats and Plant Uses* to discuss the plants in each habitat and how they meet human needs. Next, observe the schoolyard habitat. Questions to help students arrive at the key points for this stop could include the following:

*How is your schoolyard similar to or different from the surrounding native habitat?*

In what kind of native habitat is your school located?

Are there any plants with special uses in your native habitat?

*How is the schoolyard similar to or different from the five habitats discussed?*

Are there any plants in your schoolyard that occur in one of the five habitats discussed?

After students have had a chance to observe and discuss different Sonoran Desert habitats as well as their schoolyard and native habitats, choose and conduct one or more of the following suggested activities.

Have students…

- Observe and discuss the plants that are in the schoolyard and also in the surrounding native habitat.

- Locate three plants that are likely landscape plants and three plants that are probably native to the area.

- Close their eyes and imagine what the area looked like before it was developed. Have them think about specific plants they would see.

- Select and draw one of the habitats discussed. Consider including humans using plants in the drawing.

- Complete their *Ethnobotany Predictions Table* by filling in the “Actual Uses” column from *Plants and People Inquiry in the Garden – Stage 1.*
Alternate Field Investigation

**General Procedures**

**Plants in Our Lives Stop**

**Description**

This stop should include the greatest variety of plants with many potential uses. It would be best if students could sit on the ground for the guided imagery activity and discussion.

**Teaching Points**

- An Olas Ki is a traditional roundhouse of the Akimel O’odham.
- Ko:sin is a food preparation space with a fire ring, open ceiling to let smoke out, and mortars and pestles.
- Olas Ki and ko:sin are typically built from arrowweed, willow, and mesquite.
- Native people traditionally use native plants in their habitat as building materials.
- Most basic human needs can be met using natural resources found in one’s immediate environment.

*continued*
Alternate Field Investigation

General Procedures

Discussion and Activity Suggestions

During this stop, conduct an inquiry discussion using the teaching points as your guide. Show students the pictures of an Akimel O’odham house and “kitchen” with items and tools and discuss its features. Have students look around the schoolyard and imagine building and living in a house using only the resources in the habitat around them (similar to what the Akimel O’odham do, as well as what their Hohokam ancestors did). Questions to guide students in their guided imagery could include the following:

Could you build a house similar to the Olas Ki using the plants and other resources around you?

What would you have in your house?

Which plants would you use for food, building, fuel, medicine, fiber, tools?

What part(s) of the plants would you use? How would you use them?

What plants/resources would you need that aren’t found in the schoolyard? How would you obtain them?

After students have had a chance to describe and discuss their “imagined” houses, choose and conduct one or more of the following suggested activities.

Have students…

– Draw their “imagined” houses.
– Create 3D models of their imagined houses using plant parts or objects collected in the schoolyard and/or brought from home.
– Share their models with other students explaining how plants are being used to meet human needs.
– Compare how the homes they live in are similar to and different from their imagined houses.
– Compare how the homes they live in are similar to and different from the Olas Ki.
– Compare how human needs are met today with how those needs were met before modern society.

continued
Completing the investigation back in the classroom by completing the *Student Study Guide– Results and Conclusion*. (This replaces *Inquiry in the Garden– Stage 3*)

**Post Your Findings on the Internet!**

As part of the Inquiry Process students may share their work with others by visiting the DBG Journal of Student Findings at [http://www.dbg.org/index.php/digital/students/journal](http://www.dbg.org/index.php/digital/students/journal). Here, students can submit investigation findings, poems, or original art inspired by their *Inquiry in the Garden*. For more ideas on art projects that tie into Garden themes, go to the Additional Resources section of the Digital Learning website.
Inquiry in the Garden

Alternate Field Investigation

Ko:sin
**Teacher’s Guide**

*Use this guide and the pictures of Sonoran Desert habitats from Plants and People Inquiry Stage 1–Introductory Activity to guide a discussion on Sonoran Desert habitats.*

**Saguaro / Desert Habitat**

- saguaro cactus with fruit – fruit can be used for food (the O’odham make jams, candies, syrups, and wines)
- dead saguaro with ribs – ribs can be used for building and tools (O’odham harvesting poles are built to help collect fruit from the top of the saguaro)
- cholla cactus with buds – buds can be used for food when roasted and dried (provide calcium)
- prickly pear cactus with cochineal – young prickly pear stems, pads, and fruits can be used for food; prickly pear can be a host plant for cochineal, an insect that can be harvested for its dye (white, fluffy material found on prickly pear pads is secretion from the cochineal for camouflage and to prevent desiccation)

**Riparian Habitat**

- arrowweed – branches can be used for thatching, large storage baskets, shelves, and arrow shafts
- cattail – cattail pollen, stalks and roots can be used for food; leaves can be used for mats; dried flower stalks can be used in baskets
- yerba mansa – roots can be used for medicine (can be chewed or brewed into tea for respiratory ailments; tea can also be used as a wash for wounds)
- cottonwood tree – timbers can be used for construction; pliable branches can be used for baskets
- willow tree – saplings can be used for buildings; pliable branches can be used for baskets; leaves and bark can be used to brew a fever-reducing tea

*continued…*
Alternate Field Investigation

**Teacher’s Guide**

**Chaparral Habitat**

- agave – leaves provide fibers for making cloth, mats, rope, brushes; some agave hearts can be used for food (when roasted)
- desert spoon – leaves provide fibers for making mats and baskets
- juniper – berries can be used as a spice; wood can be used for tools, fuel and shelter

**Mesquite Bosque Habitat**

- mesquite with bean pods – beans can be used for food (when ground into flour); hardwood can be used for tools, fuel and shelter; pitch can be used as pottery paint; sap can be used for “cough drops”
- field of desert grass under a bosque – stems or roots can be used to make brooms, brushes or baskets

**Yucca / Grassland Habitat**

- soaptree yucca – yuccas provide fiber to weave baskets or to make brushes for painting pottery; pounding the roots in water makes soap–like suds for cleaning
- field of desert grass – stems or roots can be used to make brooms, brushes or baskets
Part A – Results and Conclusions

Instructions: Use the information from your Student Worksheet – Ethnobotany Predictions Table to answer the questions below.

1. What were the key plants you studied in your desert habitat?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

2. What predictions did you make about the use of those plants?

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_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

3. What evidence did you gather (what did you see or do) during your Schoolyard Investigation that involved your plant? Did the evidence support your predictions about how the plant is used?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

4. What conclusions can you make about ethnobotany in your desert habitat?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
Part B – Questions for Discussion

Instructions: Answer the questions below and be prepared to discuss them with the class after everyone has completed their presentations (Part C).

1. In what ways do people use plants? List as many uses as you can.

2. If you had a specific need (for food, medicine, tools, etc.) and all that was available were the desert plants around you, how would you determine which plant would be best to help you meet your need?

3. Now that you know about the uses of some desert plants, list at least one question and make at least one prediction about the use of another desert plant you saw during your investigation.

Part C. Present Your Results

Instructions: As a team, prepare a skit for a final presentation of your investigation. Your skit should inform your audience about how people use the desert plants in your habitat. You can act out a story, produce a mock interview, present a news broadcast, create a puppet show, etc. Be creative! Use notebook paper to first write an outline; then write the script. Create your own scenery and props using a variety of material either from home or provided by your teacher.
**Related ADE Standards:**

**Visual Arts Strand 1: Create**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1: Creative Process</td>
<td>PO 203: Develop plans for his or her own artwork, (e.g., sketches, models, and notes).</td>
</tr>
<tr>
<td>C2: Materials, Tools, and Techniques</td>
<td>PO 201: Identify and experiment with materials, tools, and techniques appropriately and expressively in his or her own artwork.</td>
</tr>
<tr>
<td></td>
<td>PO 202: Demonstrate purposeful use of materials, tools, and techniques in his or her own artwork.</td>
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</tbody>
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**Visual Arts Strand 2: Relate**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
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</thead>
<tbody>
<tr>
<td>C4: Meanings or Purposes</td>
<td>PO 201: Interpret meanings and/or purposes of an artwork using subject matter, symbols, and/or themes.</td>
</tr>
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</table>

**Writing Strand 3: Writing Applications**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
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</thead>
<tbody>
<tr>
<td>C2: Expository</td>
<td>PO 1: Record information (e.g., observations, notes, lists, charts, map labels and legends) related to the topic.</td>
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<td></td>
<td>PO 3: Write in a variety of expository forms (e.g., essay, summary, newspaper article, reflective paper, log, journal).</td>
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</table>
Alternate Field Investigation

**RELATED ADE STANDARDS:**

**SCIENCE STRAND 1: INQUIRY PROCESS**

<table>
<thead>
<tr>
<th>Concept</th>
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</tr>
</thead>
<tbody>
<tr>
<td>C1: Observations, Questions, and Hypotheses</td>
<td>PO 3: Formulate predictions in the realm of science based on observed cause and effect relationships.</td>
</tr>
<tr>
<td>C2: Scientific Testing (Investigating and Modeling)</td>
<td>PO 5: Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).</td>
</tr>
<tr>
<td>C3: Analysis and Conclusion</td>
<td>PO5: Develop new questions and predictions based on the data collected in the investigation.</td>
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<tr>
<td>C4: Communication</td>
<td>PO1: Communicate verbally or in writing the results of an inquiry.</td>
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<td>PO3: Communicate with other groups or individuals to compare the results of a common investigation.</td>
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**SCIENCE STRAND 4: LIFE SCIENCE**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
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</thead>
<tbody>
<tr>
<td>C1: Characteristics of Organisms</td>
<td>PO 1: Compare structures in plants (e.g., roots, stems, leaves, flowers) and animals (e.g., muscles, bones, nerves) that serve different functions in growth and survival.</td>
</tr>
<tr>
<td>C3: Organisms and Environments</td>
<td>PO 1: Describe ways various resources (e.g., air, water, plants, animals, soil) are utilized to meet the needs of a population.</td>
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### RELATED ADE STANDARDS:

#### Social Studies Strand 1: American History

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
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<tbody>
<tr>
<td>C2: Early Civilizations</td>
<td>PO 2: Describe the cultures and contributions of the Mogollon, Ancestral Puebloans (Anasazi), and Hohokam (e.g., location, agriculture, housing, arts, trade networks; adaptation and alteration of the environment).</td>
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#### Social Studies Strand 4: Geography

<table>
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<th>Concept</th>
<th>Performance Objective</th>
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<tbody>
<tr>
<td>C2: Places and Regions</td>
<td>PO 1: Describe how the Southwest has distinct physical and cultural characteristics.</td>
</tr>
<tr>
<td>C4: Human Systems</td>
<td>PO 4: Describe the cultural characteristics (e.g., food, clothing, housing, sports, customs, beliefs) of Arizona's diverse population.</td>
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<td></td>
<td>PO 5: Describe the major economic activities and land use patterns (e.g., agricultural, industrial, residential, commercial, recreational, harvesting of natural resources) of regions studied.</td>
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<tr>
<td>C5: Environment and Society</td>
<td>PO 1: Describe human dependence on the physical environment and natural resources to satisfy basic needs.</td>
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#### Educational Technology Strand 2: Collaboration and Communication

<table>
<thead>
<tr>
<th>Concept</th>
<th>Performance Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1: Effective Communications and Digital Interactions</td>
<td>POI: Communicate digitally with others by selecting and using a variety of appropriate communication tools.</td>
</tr>
<tr>
<td>C2: Digital Solutions</td>
<td>POI: Contribute to a cooperative learning project and demonstrate effective group behaviors while using digital collaborative resources.</td>
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