**Sense of Place**  
**Tucson’s Waterways**

*Local arroyo study*

*Fieldwork*

Students prepare a guide to the DVHS arroyo using information they gather from their own fieldwork and from the other Tucson’s Waterways activities. Each group is responsible for writing an arroyo guide, with group members becoming specialists on different features of the arroyo: vegetation, water flow, sediment and shape. All arroyo guides will contain descriptions of the following: the four arroyo features, the arroyo’s role in the rest of the Tucson surface water system and changes in the gully through time. The guides can be posted on the web, turned into posters, made into pamphlets etc….

Each student in a group picks a gully feature to study (vegetation, shape, sediment or water flow). Students match up with others who are studying their feature. Depending on the amount of students who we want to work in the field together there will be several research teams for each feature.

**Goals**

Students:

1. Connect what they see in aerial photographs to their observations on the ground.
2. Collect data on their feature following the provided guidelines and their own ideas.
3. Connect their field data to processes they’ve started to think about in the class exercises.
4. Link the feature they’ve researched to the features their other group members have studied.

**Materials**

1. Field guide to plants of the Sonoran Desert.
2. Large measuring tapes
3. Local precipitation data
4. Digital cameras
5. Rulers
6. Cartoon map of arroyo with local landmarks for students to mark the locations of their observations.

**The Guide**

Class reviews how their study of the local arroyo used the scientific method.

Class defines rubric for the arroyo guide, clearly establishing what each should include.

Clear/Unclear exercise about the arroyos and surface water. A way to get at what the students do and don’t understand up to this point.

Students return to their original groups and assemble the results from their fieldwork. Students put all of their data on one map (perhaps an overlay with the photo). Each
student writes a paragraph describing their feature and how it relates to the other features. All feature write-ups include methods for fieldwork and their results. The reports must include student ideas about how their feature was different in 1950 (given their analysis of the time lapse photos) and how they expect their features to change in the future. The guides can be posted on the web, turned into posters, made into pamphlets etc.…

**Vegetation**

1. Use the attached chart to list the plants present in the DVHS was area. Collect samples, take pictures, draw sketches, and write descriptions for the plants you see. It can be helpful to tape the collected samples into a notebook, and then write your observations next to the sample.

2. Explore how the vegetation is distributed. For each plant, note where you typically find it. Where is it located? In the wash? Towards the banks? On top of the banks? Do you find some plants in certain places but not in others? Mark these locations on the map and your chart.

   Do you notice any patterns in how these plants are distributed?

3. What do plants need in order to be successful and live?

4. How do plants affect the stability of the banks (if they do at all) and why?

5. How does the presence of plants in the wash affect the speed of the wash’s water flow?

6. Are there any common Sonoran desert plants that are noticeably missing from the wash area?

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<tr>
<th>Plant name</th>
<th>Sample</th>
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Sediment

1. Describe the sediments and rocks in the wash according to size, color and shape:

   **Size:** Put the sediment into categories by size first. Perhaps come up with 4 categories (< 1mm, < 1cm, < 10 cm, and < 1m). Take digital picture of each size categories (include some sort of scale in your photo).

   **Color:** Describe the different colors of the rocks. Are they all the same color or different? Any ideas why?

   Could these colors tell you anything about where they come from? Have you seen rocks these colors anywhere else?

   Take digital pictures of the different colored rocks you see.

   **Shape:** Categorize the rocks by shape and define your categories. Are the rocks different shapes? Are they smooth or rough? Are they spheres, ovals or irregular in shape? Use a separate sheet of paper and the digital camera to draw, describe and photograph a typical rock from each category.

2. How does the sediment on the gully bottom differ from that on the sides of the wash and on the banks (at top)?

3. Are the sediments on the bottom, sides and tops of the wash natural? Or put there by humans? If made or put by humans why do you think they were put there?

4. What are the other unnatural features that you notice? Mark them on the map.

5. What kind of sediment in and around the wash is the best place for plants to grow? Mark these places on the map. Why?

6. How high the water would have to flow in order to carry or move the biggest rock that you observe? How high would the water have to be in the wash to move the smallest sediment size that you noticed? Make some guesses.
Morphology (shape)

Measure the morphology of the wash (questions 1-3) for 2 parts of the wash and draw cross-sectional profiles for each. Use local landmarks to note where you took your measurements so you could find these locations again. Mark the locations on the map. Take a digital picture of each place.

1. How wide is the wash from the top of one bank to the top of the other bank? How wide is the wash floor?

2. How deep is the wash?

3. How steep are the wash sides? Are they the same on both sides?

Draw your profiles here
4. Does the shape and size of the wash change depending on where you are along it? If so mark these differences on the map.

5. Is the wash straight or does it curve?

6. Which way is downhill? Mark this on the map.

7. What do you think affects the width and depth of the wash?

8. What affects the steepness of its banks?

9. What affects the shape of the wash’s course?
Water flow

1. Use the arroyo map and the Tucson map that you worked on in Activity 2 (Investigating how water moves through Tucson) to determine the direction that water flows in the DVHS wash. Mark this direction with an arrow on your map.

2. List other ways that you could use to determine the direction of water flow in the wash. Can you find a way to measure this in the field? Hint: what’s the gradient of the wash?

3. Try out some of your ideas. Do you find evidence of water flow direction in the gully? Do your observations match the direction you determined from the photos?

4. What information did you use in the some of the map and data activities to determine water flow in other Tucson waterways?

Do you expect the DVHS wash to have a higher, lower or comparable amount of water flow than the other waterways? Which waterway that we studied is the most similar to the DVHS wash?

5. Look at the precipitation record for the DVHS area. What times of the year do you expect water to flow in the wash?

6. There are no water gages in for the DVHS wash. How could you measure the amount of water flow in the Desert View wash? At what times of year would this be successful?

7. Draw a graph of the expected discharge through the year given what you know about precipitation and discharge in the other parts of Tucson.

8. What time of year should we worry about flooding in the DVHS was?