

Living Lab Exploration Trip

Timing:

	Group A	Group B	Group C	Group D
12:45pm	Welcome (Watershed Plaza)			
12:45 – 12:55pm	Pre-Reflection (Plaza)	Pre-Reflection (Plaza)	Pre-Reflection (Plaza)	Pre-Reflection (Plaza)
12:55 – 1:40	Canyon -> Amphitheater	Amphitheater -> Canyon	Eco Lab	Sci Tech
1:40-2:25	Eco Lab	Sci Tech Lab	canyon -> Amphitheater	Amphitheater -> Canyon
2:25-2:55	Eco Lab and Amphitheater	Sci Tech Lab and Achievement Alcove	Courtyard and Ocean Alcove	Plaza del Sol and Watershed Plaza
2:55-3:05	Believe Survey			
3:05 – 3:15	Depart			

Engagement (5 minutes):

Watershed Plaza

- Hello and welcome to the Living Lab! (Have students sit in the Watershed Plaza.)
- Welcome to the Living Lab, Ocean Discovery’s home right here in City Heights. Have any of you visited the Lab before? *Yes, No.* (If yes, can ask what the students did on their visit to the lab).
- The Living Lab is a place where you and other students from City Heights can come to visit after school to explore and learn about science, the ocean, and careers.
- Before we get started, let’s take a few minutes to review our community agreements. Who remembers what these are? *Be your best self, Be safe, Be respectful, Be curious.* Yes. This means that we will be responsible for ourselves, make good decisions that keep us safe here in this new building, be respectful of the teachers, each other, the materials, and of the other staff working in the building, and ask questions that will help us all learn!
- In your last activity out on the field trip, you collected data about two plant communities.
- What communities were those? *Coastal sage scrub and chaparral.* Yes!
- Today, you will be analyzing the data you collected on those transects, and determining how you want to communicate that research to the community.
- Now we’ll be heading inside the Living Lab! Has anyone noticed the little fish that is on Ocean Discovery’s logo? His name is Odi and he is our mascot! The Living Lab is Odi’s home, and we have a statue of Odi right here! Whenever we come into the Living Lab to learn, we give him a



high five to get us ready to learn. Give Odi a high five as you go past him, and pick up a pencil and clipboard on your way downstairs

- (Point out some of the highlights as the students walk down to the Sci Tech and Eco Labs.)

Pre-Reflection (10 minutes)

Plaza

- How many of you have had Ocean Discovery since third grade?
- If you've been with us that long, you know that we have become all different types of scientists over that time. You have been scientists this week as well – the other day you conducted your own scientific research at Cabrillo National Monument.
- Today, we will be continuing the scientific process by analyzing our data we took at Cabrillo, and learning more about how Cabrillo and our community could be affected by the changing climate.
- We know that things are changing on Earth, and they are changing quickly. We want our community to be resilient to any changes in climate that could be happening to us.
- What does the word resilience mean? (Take a few student answers, then give definition).
- The definition of resilience is: The ability to recover from or adjust easily to adversity or change.
- Today, I want you to be thinking about the specific ways that our community could be more resilient as you learn more about how our climate is projected to change in the future.

Station 1: Data Analysis & Rainfall (45 minutes)

OL Video (5 minutes)

- Scientists, we are so lucky today because we actually received a video message former Ocean Discovery Institute student and scientist, Vanessa!
- Let's hear what she has to say. (Play video for students)
- (Review key points of Vanessa's video with students: what kind of scientist she is, where she went to school)

Part 1: Data Analysis (30 minutes)

Purpose: To determine which plants were most abundant at Cabrillo National Monument and determine if these plants are drought-deciduous or evergreen.

5 min: look at Survery123
5 min: Categorize plants
5 min: Learn about pie charts
10 min: Make pie chart
5 min: Summary

- Today, we collected transect data on the plants in Cabrillo. Can someone please summarize for me how we collected that data? *Transect tape, iPod, plant ID books, etc*
- We recorded our data on the app Survery123 so that we could analyze it here today (Show Survery123 website)
- (Spend a few minutes showing the different aspects of the website – point out a few different kinds of graphs that it makes. Answer any questions, and then end with the Plant Diversity graph)
- We are going to focus here on this graph called Plant Diversity. What do you think this graph is showing us? Take a few minutes to discuss with a neighbor what you think. (Take a few ideas when done).
- Yes, this graph is showing us all the different plant species we surveyed during our time at Cabrillo National Monument. Do you recognize any of these? *Sunflower, lemonade berry etc.* Yes, as you might have noticed in the field, some of these are the plants we looked at in class.
- We have learned that most plants we find in San Diego are either evergreen or drought-deciduous. In order to understand what could happen to these two groups of plants in the future, we first need to understand how many of them are here now!
- To do this, we are going to group all these plants into the two categories.
- (Use plant guide to help group the plants. Let students figure out the ones they know from the first class, and can pull up pictures of a few other common ones if you want to see if they can figure it out. Keep track of which plants are where using large chart paper. Write down the number for how many of each plant next to the name).
- There are many different ways to represent data. As you can see, Survey 123 used a bar graph to show how many of each plant species we have. Now that we have grouped the data, we are going to use a pie chart to represent evergreen and drought-deciduous.
- Has anyone seen a pie chart before? (Show example) A pie chart is a way that we can visualize how much of certain categories we have. In our pie chart, what do you think the categories will be? *Drought-deciduous, evergreen, unknown, other* (if needed)
- We will use a different color to represent each. In order to make a pie chart, we need to know the *percentage* of each category. Does anyone know how to calculate the percentage?

- You need to start with the total of all the groups. For our data, that would be the total number of plants that were observed in all of the transects. Then, you need to know how many are in each group, like the drought-deciduous or evergreen group. Then you divide the group number by the total number, and multiply by 100 to get your percentage. Once you have all your percentages for all the categories, they will always add up to 100%.
- (If the class is not comfortable with pie charts) Let's do a quick example. Let's say we ordered a pizza. This pizza arrives and we have 8 slices. But some slices are cheese and some are pepperoni. If 5 slices are pepperoni, how can we find out what percentage that is? Let's do 5 divided by 8. Then, we will times that by 100. This tells us that this pizza is 62.5% pepperoni!
- (Go quickly through math for actual data. Give students their own calculators to follow along with you.)
- Now that we have our percentages, we need to fill in our circle. Just like how your quadrats had tape to help you visualize what percentage of the ground the plants were covering, we have drawn in guidelines to help you divide your circle.
- (Depending on level of class, let them work on charts on their own, or guide them through on the board. They should color and label the chart as well).
- Now, we can use these pie charts to visually see that there are currently more (drought-deciduous/evergreen) plants at Cabrillo National Monument!
- (Facilitate resiliency TPS) In the future, with our climate becoming both warmer and drier, what type of plant do you think will survive the best?
- (Once they pick a plant/type of plant) Now, how can we use this plant to help our community? (Quickly share ideas, can revisit later)

Part 2: Rainfall Models (10 minutes)

Purpose: To compare the current rainfall averages in San Diego with how climate scientists project rainfall will change in the future.

- Can someone remind of the three things that are necessary for plants to survive and photosynthesize? *Sun, water, nutrients.*
- We have been learning about how plants in San Diego are adapted to a climate with little rainfall. But just how little rainfall do we get in San Diego?
- We know, though, that our climate is changing. As the climate changes, what will that mean for rainfall in San Diego?
- Climate scientists use computer models to help us project what is going to happen in the future.
- This climate model has 6 different computer models of Earth, and the colors represent the amount of rainfall. I am going to play this model 3 times for you. The first time, I want you to just watch. The second time, I want you to write down one thing that is similar between all 6

earths. The third time, I want you to write down one thing that is different between them. (Play video 3 times, reminding students what they should be doing for each. Allow them to come up with what they think is happening, as opposed to explaining the colors and numbers yet).

(Video: <https://svs.gsfc.nasa.gov/vis/a000000/a004000/a004028/>. Play very first model.)

- (After students are done, ask them to share what they observed (similarities/differences). Based off student comments, guide them to notice the difference in the colors. After they share similarities and differences in the colors, you can explain that oranges are less rain and blues are more rain, and the variation in hue. Once they notice that there are two annuals, springs, summers, explain that B1 represents a world in which we take lots of action to reduce carbon dioxide in our atmosphere. A2 is a world in which we do not take any action).
- This is how rainfall could change throughout the world, but what does that mean for San Diego and each season?
 - (Students should conclude that in San Diego...
 - Rainfall will decrease overall)
 - It will not decrease in the summer)
 - It will decrease a lot in the spring)
 - We can take significant action to reduce how much will be changed)

Canyon (20 minutes)

Purpose: To learn more about the specifics of a coastal plant and analyze how climate change could affect that plant in the future, and to see similarities in Cabrillo National Monument and City Heights and learn how they are connected through the watershed. Students also practice their plant identification skills while looking for drought-deciduous and evergreen plants.

- Alright scientists – now, we are going to go explore the canyon! Please watch your step and stay with the group in order to be safe while out in the canyon.
- (On your canyon walk, address the following. Can be done in any order):
 - Students, as we walk through the canyon, keep your eye out for the plant on your plant card. How often are you seeing it? Is it highly abundant here? Did you see this plant more here or in the canyon?
 - Is City Heights connected to Cabrillo National Monument? How? (We are both part of the Pueblo watershed – all water from the streets and this canyon flow to San Diego Bay. Cabrillo is at the base of our watershed).
 - Plant ID exploration: find 3 plants you know from Cabrillo, find 3 plants you don't know. Predict if it is evergreen/drought-deciduous (use plant ID cards)
 - Sit Spot: Have students find a place to sit in silence for 3 minutes. They should observe any evidence of life/activity in the canyon, and should reflect on similarities and

differences between the canyon and the Cabrillo (plants, temperature, which do they think gets more rainfall).

Communicating What We Know: (Amphitheater – 20 minutes)

- Create connection between canyon and Cabrillo
 - What is similar? About these environments
 - Plants here and plants there need similar things, water, sun, healthy soil, habitat to grow, etc.
- Climate change could change that
 - How can we protect these plant with pressures of less water and hotter temperatures? (If doing this activity first, can let students know that this is what is going to happen in future. If they have learned already, then let them tell you)
- Resilience: how we can take action (teaching people how to take action and think differently).
 - Brainstorm on worksheet with small groups
 - Share with one other group
 - Scaffold ideas to help City Heights adapt to less rainfall due to climate change
 - Talk about how to put them into action

Breakout – Share your Knowledge (30 minutes, various locations)

- Challenge students to share what they know in a 30 second commercial (groups of 4?)
- Outline of commercial. Students will follow along in worksheet and you can help. If big groups, split into smaller groups of 4. They will present their commercial to the other groups.
 - state the problem
 - give a stat
 - propose your solution
 - create a compelling case
 - make people happy or sad

Believe Survey (10 minutes)

Various locations

- Administer believe survey

If time:

- Congratulations Diversity Researchers! You have completed this year’s research project.
- Do you think we have researched everything there is to learn about climate change and San Diego plants? No!
- Science is a continual process – there are always more questions to be answered and things to learn about our world.
- Now that you have started to learn about the affect climate change can have, I want you to come up with one question you would be interested in researching. Perhaps you can research this question in the future as a climate scientist!



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- Take a few minutes to write this question down in your worksheet.
- Thank you for researching with us, scientists! We hope to see you back at the Living Lab soon after school. You can also apply to be in our Ocean Leader program, which is for 8th graders at your school.