Down by the Tidepools

Average Program Length: 1 hour
Meeting Location: Theater
Total material list:

--Mini composition journals
--Magnifying glass
--Thermometer
--pH strips
--Data Sheet (Park Provided)
--Atom, Ion, and pH poster (Park Provided)

*Must be strategically organized for low-tide
** all groups over 10 people and under a 0.7 low tide must have a permit

Activities by Scout Level

Girl Scout

Daisies and Brownies- pick at least 3 of the steps below
Juniors and Cadettes- pick at least 4 of the steps below
Seniors and Ambassadors-pick at least 6 of the steps below

Boy Scout

Lions, Tigers, Wolves, and Bears- pick at least 3 of the steps below
Webelos, Scout Rank, and Tenderfoot- pick at least 4 of the steps below
Second Class, First Class, Star Scouts, Life Scouts, and Eagle Scouts-pick at least 6 of the steps below

*Step One required to give appropriate fbackground

Tidepools harbor an amazing amount of life, but can be very sensitive to changes. On average, tidepool conditions are as follows:
--**Temperature** between 50 degrees to 75 degrees, depending on the season (winter being the cooler temperatures)
--Abundance of **biodiversity** (types of different animals living here)
--**pH** of about 8.1, which is the global average--the pH will range between 7.8 and 8.1, depending on the tide
--No **invasive** species (At Cabrillo, sargassum currently present)

Everything in the world is made up of little tiny building blocks called atoms. Atoms have positive protons at the center are surrounded by a cloud of negative electrons, circling the middle of the atom, called the nucleus, in an orbit. In order to be “happy,” atoms want to have their outer orbit filled (think of an orbit like a shelf, and the atom wants to fill it’s shelf with electrons). To fill their shelves, they react by sharing, giving, or taking electrons with other atoms. Because electrons are negative, this gives the atoms a charge. Charged atoms are called ions (cation if positive, anion if negative). All acids have hydrogen ions (H+) and all bases have hydroxide ions (OH-). pH is a measure of how acidic or basic a liquid is (how many H+ or OH- ions it has). pH is measured on a scale, with 0-7 being an acid, and 7-14 being a base. Water is 7, right in the middle. Pure distilled water is neutral.

The animals in the tide pools are specially adapted to their environment, but the ocean is changing faster than they can adapt. Right now, our seas are undergoing ocean acidification. Since the industrial revolution, the global average pH dropped from 8.2 to 8.1, becoming more acidic. While this doesn’t seem like much, it’s a 25% increase in just the last 2 centuries!

How is the pH changing? Using fossil fuels releases more carbon dioxide (CO2) into the atmosphere. Twenty two million tons of CO2 is absorbed every day by the oceans. Dissolved carbon dioxide in the ocean reacts to produce acidic hydrogen ions. Since we are using more and more fossil fuels, we are adding more and more carbon-caused acid to the seas. This is correlated to the increasing acidity in the pH.

Why is this a problem? There has been increased disorders in fish, as well as a report of inhibiting shell growth in marine animals (corals, oysters, shrimp, lobster, many planktonic organisms). The increased acidity also disrupts fish neurological pathways, making the unable to locate the safety of their homes. Moreover, the ocean may reach its limit as a carbon storehouse, further aggravating climate change.

Matching Badges

Ambassadors-Water

BSA-Environmental Science

Correlates to Next Generation Science Standards for MS.Human Impacts & HS.Human Sustainability

Program Activities

1. Watch the tide pool video in our theater. The film plays at 11:00am and 1pm. Pay special attention to the different animals that live in our intertidal community.

2. Take an observation journal and a magnifying glass down to our tide pools at low tide. Draw the animal you see, and write down observations about it.

What does it look like? What colors does it have? What did it feel like? What was it doing? Remember that you may only touch gently with two fingers.

3. Make a tally of all the species (types) of animals you see, and how many of each you saw. This will record the biodiversity of the tide pools.

4. Take the temperature and pH of the water in the pools. Use a thermometer to get the temperature of the water, and pH strips to obtain the pH. Match the color change on the strip to the equivalent pH on the color chart. Record all your data.

5. Recall (from the film) all of the adaptations of animals from different zones and connectivity between the zones. Predict what the affects may be of ocean acidification and climate change on this ecosystem, and record predictions in your journal.

6. Get a Cabrillo National Monument Stamp in your new journal to certify that you are a Cabrillo scientist.

7. What can you do to combat ocean acidification? Invasive species? Climate change? Make a public service announcement in the form of a poster, brochure, or pamphlet to educate the public (Canva.com is a great resoruce for this). Bring it to your community to help educate your neighbors and friends.

*Be careful about any cellular or electronic devices in water!