Cabrillo Beach Alternate Site Activity

(3720 Stephen M White Drive, San Pedro, CA 90731)

The purpose of this activity is to introduce you to a variety of concepts in oceanography: sediments, tides, ocean life, coastal erosion, ocean pollution, etc.

**Directions**

1. Take the Harbor Freeway (110) south towards San Pedro.
   - Keep going until the freeway ends.
2. At the end of the freeway, turn left (south) onto Gaffey Street.
3. Turn left onto 22nd Street.
4. Turn right onto Pacific Avenue.
5. Turn left onto 36th Street.
6. Park on the street and walk down to the aquarium.
   - **OR**
   - Turn left onto Stephen White Drive, and park in front of the aquarium. You will pay $1 per hour for parking.
7. Meet at the entrance to the aquarium.
   - If you are late, go to the wetland at the north end of the parking lot (see the map).

**What to Bring**

ASA Handout
- $3 for Parking ($0 if you park on the street)
- Pencil
- Shoes with good traction for walking over wet rocks and sand, and in tide pools.
- Sunscreen and Hat

Bathrooms are available.
Coastal Wetlands
(Salinas de San Pedro, a salt marsh)

1. What does a wetland look like at high tide?

2. What does a wetland look like at low tide?

Over 90% of California’s wetlands have been destroyed by humans for coastal development like houses, ports, bars, etc. Sometimes there are real economic gains from destroying wetlands. For example, over $100 billion in goods moves through the ports of Los Angeles and Long Beach each year. Combined, they are the busiest port in the United States and the 8th busiest in the world. The ports are related to 260,000 jobs in the local economy worth $8 billion in wages.

3. Salinas de San Pedro is a made-made wetland. Why was it created?

4. What signs of life can you see in the wetland?

5. There are a lot of animals in wetlands, but you cannot see many of them because they are hiding. Where are they hiding? Why are they hiding?

6. Why is life so abundant in wetlands?
7. What benefits do coastal wetlands provide to humans?

- __________________________ for juvenile fish and other organisms:
  
  *There is lots of ____________________ for the baby animals and places for them to hide like _____________________________.

  How do humans benefit?

- __________________________ out pollutants before they enter the ocean:
  
  *Some ____________________ who live in wetlands can break down toxic chemicals! Wetland plants and algae absorb _____________________________.

  *If too many enter the ocean too quickly, they can cause

  *harmful ____________________________ (poisonous phytoplankton) and ____________________________ (animals die from lack of oxygen).

  How do humans benefit?

- __________________________ reduce coastal erosion: plants’ roots “catch” sediments washed off the land by rain and resist erosion by waves

  How do humans benefit?

  *Wetlands keep the ocean from expanding onto the land; wetlands prevent waves from eroding the land beneath our homes, business, and roads. In fact, wetlands help sediments build up along the coast so that land can expand into the ocean!

- __________________________ flood control: good at extra absorbing water. Storms cause flooding in two ways:

  * (a) ____________________________ (b) sea surface ____________________________

  How do humans benefit?

  *Wetlands protect our homes and business from water damage due to weather events.
8. Look at the waves in the harbor and those in the ocean. Where are the waves largest, inside the harbor or outside the harbor? _______________

The Port of Los Angeles is the largest man-made harbor in the Western Hemisphere (i.e., on this half of the world).

9. Why was the breakwater built?

10. Many people fish on the nearby pier. Which fish are probably healthier to eat, those caught in the harbor or those caught in the ocean? __________________________ Why? (Consider the effect of the breakwater on the movement of water between the ocean and the harbor.)

11. Which picture below best represents the waves at the shoreline?

Waves change direction as they approach the shore, bending so that they “match” the shape of the shoreline. We call this “wave refraction.”
12. Where is most of the life on a sandy beach? Why is it there?

13. What do the animals living in the beach sand eat?

Notice that the beach over by the tide pools is a rocky beach.

14. Which is the more natural condition for this shoreline, a sandy beach or a rocky beach? _______________________

15. Why was the groin built along the shoreline?

16. Are most of the sediments at the bottom of the cliffs ON LAND (far from the ocean and beach) sharp or smooth? _______________________

17. We are now entering a marine life refuge. What are the rules? How should we treat the animals that we will encounter? Why? Can we take anything (e.g., shells) home with us? Why or why not?

Note erosion due to water draining from the shower as we walk along the beach.
Storm Drain Pollution, Cliff Erosion, Beach Sediments, and Tides

The large tubes running from the top of the cliffs to the beach are “storm drains.”

18. What is the purpose of storm drains?

19. What is in the water carried into the ocean by storm drains?

20. Is the water carried by storm drains treated before it flows into the ocean? __________

21. How can storm drains lead to beach closures? 

Ironically, surfers often like to go surfing after it rains, because the waves are big.

22. What “stuff” have humans put on the cliffs? Why is it there? What is it for?

23. What erodes the TOP of the cliffs? ________________________________

List the 2 major mechanisms of erosion at the TOP of cliffs:

(a) ________________________________

(b) ________________________________
24. Why are there more large rocks piled up on one side of the Spanish wall than the other? What piled them up? 

25. What erodes cliffs at the bottom? 

26. At the moment, it probably does not look like they can attack the bottom of the cliffs. When can they? 

27. Are the sediments on the rocky beach large? small? a mixture of both large and small sediments? 

28. Are the sediments on the rocky beach sharp (angular)? smooth? a mixture of both sharp and smooth sediments? 

29. What are tides? sea level (ocean’s surface) *slowly* goes up and down over a large area each day. How long does it take for sea level to go from high tide to low tide? 

How many high tides are there each day? 

How many low tides are there each day? 

30. What causes the tides? 

31. Is sea level ever higher than it is right now? 

What evidence is there that the sea level was higher earlier today? How or why do these observations support the idea that sea level was higher earlier today? 

- Seaweed Location: Seaweed was found ___________ feet from the water. 

- Location of Wet and Dry Sediments: The beach was wet up to ___________ feet from the water and dry further up the beach. 

- Shape of Beach Sediments: Sharp or Round? 
  Sharp indicates: ___________________________________________________________. 
  Smooth indicates: _________________________________________________________. 

- Bottom of Cliff: Vertical Rock or Sloped Sediments? 
  Vertical rock is produced by __________________ erosion. 
  Sloped sediments are produced by __________________ erosion. 

- The Sun also affects the tides but its effects are weaker than the Moon’s. 

- make tides different from ordinary waves
The Origin of the Cliffs

32. What are the white layers made of?  
____________________________

33. What are the other layers made of?  
(a) ________________________  
(b) ________________________

34. Where did the rock of the coastal cliffs form?  
________________________

Different sediments pile up on the ocean floor at different times. Some are washed off the land (e.g., sand, mud), and others are simply the bodies of marine algae and animals. Over time, the water is squeezed out by the weight of the sediments above. Chemical residues left behind glue the sediments into solid rock called “sedimentary rock.”

35. Why isn’t the rock of cliffs still beneath the ocean?  
What happened?

Note the sperm whale fossil.

What is the name of the island to the south?  
Notice the small holes in some of the rocks.  
What makes the holes?  
Can you see places where the water looks brownish just offshore?

Stamp Box  
(if we cannot visit tide pools)  

Write your name in this box.  

Fossils of marine animals like olive snails and clams have been found in the rocks of the cliffs.
Tide-pooling

Note: If we cannot go tide pooling because the tide is not low enough during our visit, then you will need to complete the tide-pooling questions by looking at the tide-pooling pictures found under topic 14A in the “Labs” portion of the course website. Click on the “slides” and “audio” files for part 2.

36. What is a “tide pool”?  

37. What is “tide pooling”?  

38. List 3 *STATIONARY* animals that you observed. Then, sketch their appearance, and describe how they feed.

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39. At *HIGH* tide, are animals and algae on the dry rocks above the sea surface (out-of-the-water) or underwater?  

40. Could the animals in the tide pool area survive if they were out of the ocean all the time?  

Why or why not?
41. Do most of the animals that are found in tide pools drift in at high tide and settle in new places each day at low tide, or do they live in the tide pools at both high tide and low tide?

42. Where are there more animals & algae, near the edge of the water or far from the water near the cliff? __________________

Write “more life” and “less life” for each arrow in the pictures below:

![High Tide](image)

![Low Tide](image)

43. Where is algae the most abundant, lower on the rocks and in the tide pools or on top of the dry rocks? __________________

44. Where are there more animals, in holes and crevices where water remains trapped when the tide goes down or outside the holes and crevices? __________________

45. Which animals and algae will spend the most time underwater each day, those close to the edge of the water and in the tide pools or those close to the cliffs? __________________

46. Do most of the animals who live in the tide pools prefer to be out of the water or underwater? __________________

How can you tell? In other words, what have you observed (seen) which supports your belief? Explain how or why it supports your belief.

Name: __________________

Section: __________________
Cabrillo Beach ASA (14A) Review: Hints & Advice

Coastal Wetlands

When asked what wetlands look like or what is found in them, LOOK AT THE PICTURES in the slides, and describe what you see. Do NOT read about wetlands, and then list generic information about them.

Note: Notice that water in wetlands is “murky” (see the pictures), so clearly sunlight is not more available in wetlands than in the coastal ocean.

Which organisms are at the bottom of the ocean food chain? What do they need to survive? Why do they need it? Why is this substance more abundant in wetlands than along the coast?

Why are animals abundant in wetlands? What is the most important reason that animals are attracted to the wetlands?

Note: Animals do NOT eat nutrients. Animals do not “filter” nutrients out of the water.

The Waves, the Breakwater, and Beaches

Discuss why the breakwater was built. In other words, after you state what the breakwater does, discuss why this is beneficial to the people who work in the harbor.

Make sure that you explain why the water in one place (the harbor or along the coast) is more polluted or less clean than the other place.

Make sure that you discuss why the objects on the cliffs are beneficial. In other words, explain how they help the homeowner reach their objectives.

Storm Drain Pollution, Cliff Erosion, Beach Sediments, and Tides

Make sure that you discuss the primary causes of erosion at the TOP of the cliffs and bottom of the cliffs.

Make sure you give a detailed description when discussing the evidence that sea level goes up and down each day. For example, make sure you discuss WHERE the evidence is relative to the shoreline in the pictures, and how the land farther from the shoreline is different; simply stating that you saw “seaweed on the beach” or “wet sand” is not satisfactory.


**Tide-pooling**

To determine whether the organisms prefer to be in the water or out-of-the-water, use the *BEST* evidence that you would have seen if you had gone on the ASA. In other words, consider the implications of the observations from the pictures in the slides (the answers to the previous questions).

Being “active” is not necessarily a good sign that an organism “likes” an environment. Motion and other signs of “activity” may be a desperate attempt to survive harsh conditions. There is better evidence that can be used to support the hypothesis that the organisms prefer to be underwater.