



# BEACH ZONATION

## OVERVIEW

During this activity, students investigate beach zonation by gathering and comparing sand samples gathered from different areas of the beach.

## OBJECTIVES

Following completion of this lesson, students will be able to:

- Identify and separate the different zones of the beach by observation of various visual characteristics, including grain size and composition
- Understand that the zones of the beach respond to weather, waves and human actions.
- Draw conclusions about how beaches work

## GRADE LEVELS

4<sup>th</sup> -12<sup>th</sup> grades

## NJCC STANDARDS

### Science Indicators:

**5.1:** End of Grade 4: A1, A2, B1, End of Grade 8: B3,

End of Grade 12: B1; **5.3:** End of Grade 4: A1, B2,

**5.4:** End of Grade 4: B1; **5.5:** End of Grade 4: B1,

End of Grade 8: B2, B3, End of Grade 12: B1; **5.7:** End of Grade 2: A2,

End of Grade 4: A1, A2, End of Grade 6: A2; **5.8:** End of Grade 2: A3,

B1, End of Grade 4: A1, B1, C1, End of Grade 6: B1; **5.10:** End of Grade

2: A1, End of Grade 4: B1 End of Grade 6: A1,

### Mathematics Indicators:

**4.1:** 6B1, 6C3; **4.2:** 2A4, 2D1, 2D2, 2D3, 4A5, 4D2, 4D4, 8D4, 8D5,

12A4, 12D3, 12E1; **4.3:** 2A1, 4A1, 4A4, 4C1, 4C3, 6C1, 6C2, 8C1, 8C2,

12B1, 12D3; **4.4:** 2A1, 2C1, 4A1, 4C1, 6A1, 6A2, 12A5; **4.5A:** 1, 2, 3, 5;

**4.5C:** 3, 4, 6; **4.5E:** 2; **4.5F:** 4

## MATERIALS

- A trip to the beach,
- 4 small sampling bags (clear plastic is best) labeled **dunes, berm (or backshore), foreshore, nearshore** per student or per student team.

## PROCEDURES

Students collect a small sample of sand from each of the different zones of the beach:

- Base of the **dunes**,
- **Berm** or **Backshore**,
- **Foreshore**,
- **Nearshore**.

Conclusions are drawn about the different size of sand grains found in each area.

## BACKGROUND

The beach is one of the earth's most dynamic environments. Beaches are zones of active sand movement, with sand constantly migrating and responding to natural and human forces. It is important to keep in mind that the beach is not just what we see above water but extends from the

toe of the **dune** to an offshore depth of 40 to 50 feet.

A natural beach is a logical environment that builds up when waves and winds are gentle, and strategically but only temporarily, retreats when confronted by big storm waves. This system depends on four factors: wave energy, water level, the amount of beach sand, and shape of the beach. The relationship among these factors is a natural balance and is referred to as a dynamic equilibrium. When one factor changes, the others adjust accordingly to maintain a balance. When we alter this system, as we often do, the dynamic equilibrium continues to function in a predictable way, but in a way that often has repercussions for our use of the system. It is to our benefit, therefore, to understand how the natural shoreline system functions. Humans intervene with the natural beach processes by building structures such as homes, snow fences, jetties, groins, sea walls and by replenishment of sand to the **foreshore**.

## VOCABULARY

**Dune** - Natural hills or mounds, located at the back of the beach, comprised of fine grains of sand moved there by winds. Ideally, **dunes** become stabilized by coastal plants. **Dunes** provide inland areas natural protection against excessive flooding during storm-driven high tides.

**Berm or Backshore**- The portion of the beach that extends from the normal high tide to the coastline. The portion of the beach from the base of the **dunes** to the **berm** crest. This is the flat part of the beach where you can place your beach chairs and umbrellas for a day of fun.

**Berm Crest** - The outer border part of the **berm** just before the drop off to the ocean.

**Foreshore** - The portion of the beach exposed at low tide and submerged at high tide.

**Nearshore** - The zone between the low tide shoreline and breakers. The **nearshore** is always under water.

## EXTENSIONS

Have students make observations of the type of waves hitting the shore that day. Draw conclusions as to the type that causes the most erosion.

## REFERENCES

Nordstrom, Gars, Pouty, Paley Jr., Neal, Paley Sr. 1993 Living with the New Jersey shore. Duke University Press

The American Association for the Advancement of Science 1993 Benchmarks For Science Literacy Project 2061 Oxford University Press

Harold V. Thurman. 1993. Essentials of Oceanography. Fourth Edition. Macmillan Publishing Company.

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The Education Program at the  
New Jersey Marine Sciences Consortium/New Jersey Sea Grant  
22 Magruder Road Fort Hancock, NJ 07732 732-872-1300 njmsc.org

