Erosion

What is Natural Erosion?

The coast, as the collision point between the waves and the land, is a very active part of the surface of the earth. The contact zone is very narrow. It begins at the point at which waves first "feel" the land and extends to the top limit of storm waves at high tide. The energy collected by the waves over thousands of miles acts on this tiny strip of land, which is why it wears away so quickly. This wearing away is called erosion.

Most of the energy of the beach system comes from waves. With few exceptions, changes in the beach result from waves crashing against the land. When the sea is set in motion, the moving water exerts stress against the coast and this may cause erosion.

Waves act as very efficient agents of erosion in a number of ways:

- Water crashes against rocks and cliffs, breaking them up.
- Pebbles and boulders caught in a wave dash against each other and break into smaller and smaller particles.

Spits should not be built on, and vegetation should be protected.
Nestucca Spit, Oregon.
• Waves hurl boulders, pebbles, and sand against the base of a cliff or platform, undercutting the cliff.

Much of the material carried by wind and water is eventually dropped by the waves and forms beaches and spits. It should be remembered that coastal erosion is a continuous process and that it takes place over millions of years. A beach that appears to be stable may in fact be gradually eroding. Thus, the coastal zone is constantly changing.

Erosion has been going on since land first formed on the earth. Wind and water will erode rock. Soil and clay, so much softer than rock, erode even more quickly. Fire burns the trees, shrubs, and grasses that hold soil together. The soil blows away, leaving clay or rock. Waves erode the shore. These are the natural processes of erosion, but human beings have brought others.

Rain erosion. After a bulldozer made a path up a hill, heavy rains fell. The wet ground became soft and the tree fell down, taking large chunks of soil with it. Thus both the hill and the path were destroyed. Waimea Falls Park, Hawaii.

Wind erosion. The owners of this Oregon home built their house on a sand dune. The wind did the rest.
When Humans Intervene

Grazing animals crop the grass so closely that the topsoil blows away. The clay beneath is then carried off with rain and flood. When people cut down forests, the same thing happens. Elsewhere, they mine sand or gravel for construction and leave the earth gaping. They blast mountains open, looking for gold or iron, and wash the rock in rivers to separate out the metals. The soil and rocks are either carried away by the river, or they block it up. People use great hoses with enormous water pressure to wash away the rock. This is called hydraulic mining. Rivers are dammed, leaving the bed below the dam dry and open to erosion. Furthermore, dams can burst, and when they do, the rush

Mining activities can lead to erosion and the destruction of habitats. Goliath Gold Mine on the South Island of New Zealand.

Both rocks and wood have been used here to try to stop beach erosion, but they cannot withstand the power of the sea.
of water breaks up the soil and carries it down to the sea. To
grow wheat or other European crops, farmers clear vast areas of
forest. The now cultivated land, left exposed for part of the year,
becomes sand. As a result, many places on the edge of deserts are
turning into desert too.

Even in our own homes things go wrong. If we live near the
beach and we water the garden too much, this will break up the
clumps of soil. They can become sand and blow away or be
carried away by water. If sand is dug up to put in foundations for
buildings, it can blow away.

The steeper the slope, the greater the erosion. Therefore,
mountains erode more easily than flat land. Volcanic islands are
particularly in danger because volcanos are often steep.

The power of
nature is enor-
mous. When
people change the
coastline, they
sometimes fail to
allow for the
impact of nature
on what they have
built. For example,
developers built
these houses in
Pacific City,
Oregon, on a cliff
that was prone to
erosion. When
waves began to eat
away at the cliff,
the builders
dumped large
quantities of rocks
in an attempt to
stabilize the bank.

Now the same
houses are
threatened for a
different reason: the
rock provided a
foothold for drifting
sand, which is
beginning to
envelop the houses.
Many parts of continents rose millions of years ago out of the sea. Because the land was once seafed, there is now a layer of salt under the soil. If areas like this are then irrigated, the soil becomes wet and the water soaks down to the layer of salt. The salt dissolves in the water and soaks upwards so that now a layer of salt lies on the surface. Land that was once good for growing crops becomes useless desert.

When land is turned to desert, rainwater carries the sand down to the rivers, which in turn carry it to the sea. When the sand reaches the coast, it is dumped and the coast silts up. The land starts growing out into the sea. The Yellow River in China gets its name because it is really yellow. It is yellow from the volume of soil it carries from the dry lands through which it flows. The map shows how the coastline around the estuary of the Yellow River has changed over the centuries because of siltation.

In a river carrying a lot of silt into estuaries and bays, there is less light for the plants; in addition, the feeding and breathing systems of animals may become clogged with silt, so they may not survive so well.

The power of the sea is enormous. When people change the coastline, they sometimes fail to allow for the effect of the waves on what they have built. For example, during the Second World War, an army built a bridge halfway across the mouth of a river. The bridge altered the way the waves carried the sand into the estuary and onto the beach.

In the intervening years, the beach has silted up, so that where you could once step from a nice white beach into deep water and swim, you now have to walk hundreds of meters over mudflats before you find water deep enough for swimming. Also, the sea is eating away the cliffs so that the water is now within a couple of meters of the road, and on the other side of the road are houses. The government is dumping huge amounts of rock on the cliffs to stop them from being eaten away and to save the road and the houses.

In the Marlborough Sounds in New Zealand, logging has cleared the land of trees. This has exposed the soil, which has been washed down from the steep hills into the water of the sound, killing a variety of animals.
Some natural and human causes of erosion

Rain
Fire
Roof runoff
Vertical farming techniques
Felling
Subsistence farming
Wind

Land-clearing techniques

Overgrazing

Hydraulic mining

Sluice
The steeper the slope, the greater the erosion
Siltation alters a coastline. Changes at the outlet of the Yellow River between 1855 and 1976.