

Wise practices for coping with

BEACH EROSION



St Vincent



and the Grenadines



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Caribbean Development Bank

UNESCO Environment and Development in Coastal Regions and in Small Islands

FORCES TO BE RECKONED WITH

Beaches are continuously changing – from day to day, month to month and year to year – as the natural forces of wind and water meet the land. These changes, which have been taking place for millions of years, are linked to variations in wind, waves, currents and sea level.

But it is not just natural forces that change the beach. Humans have a big role to play in this process as well, through mining stones, gravel and sand from the beaches, polluting and damaging coral reefs, and constructing buildings and walls too close to the sea.

Changes in the beaches affect everyone. The coast is a place we are all attracted to for recreation, sports and simple enjoyment. This constantly changing and hazard-prone coastal environment is also where the greatest financial investment is concentrated, as roads, airports, buildings and tourism properties continue to be attracted towards the shores of St Vincent and the Grenadines. Tourism is a driving force in the country's economy so the state of its beaches is of major importance.

Natural forces

- **Hurricanes and tropical storms**, occurring between June and November, cause dramatic beach changes usually resulting in serious beach erosion.
- **High waves during 'winter' months** resulting from storms in the North Atlantic Ocean, and known as swell waves, or locally as 'groundseas'.
- **Sea-level rise**, which is a long-term factor, taking place very slowly over decades causes shorelines to retreat inland.

Since 1995, the Atlantic Basin (including the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico) has entered a more active hurricane cycle, which may continue for more than 20 years.

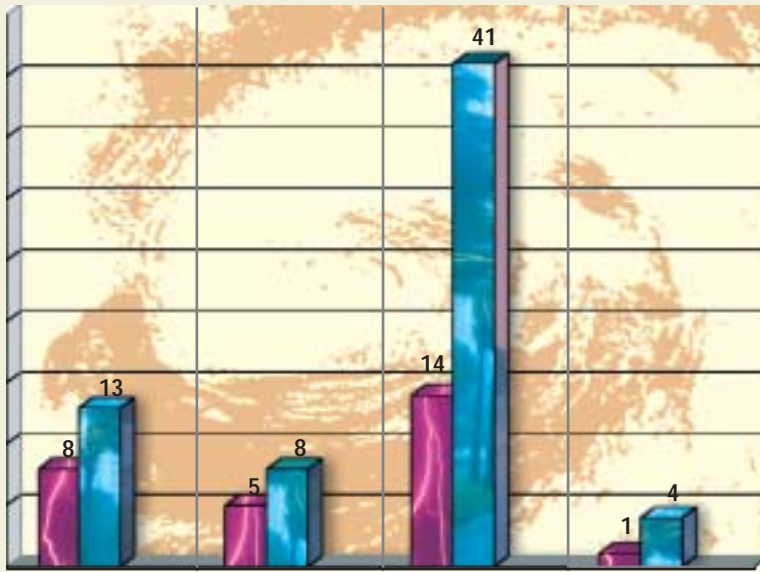


Number of
named storms
per year

Number of
hurricanes
per year

Number of
hurricane days
per year

Number of
category 3, 4, 5
hurricanes per year



Source: Gray et al <http://typhoon.atmos.colostate.edu/forecasts/1999/nov99/>

In the Atlantic Basin the number of really severe hurricanes (categories 3, 4 and 5) increased from one per year (1990 –1994) to four per year (1995 – 1999).

Human forces

- **Removing sand and other materials** from beaches and dunes for construction purposes causes erosion and the loss of beaches and dunes, destroying the natural heritage of the coast and reducing the vibrancy of the tourism industry.
- **Building too close to the beach** interferes with the natural sand movement and may impede beach recovery after a serious storm or hurricane.
- **Badly planned sea defences** may cause the loss of the beach, and of neighbouring beaches.
- **Pollution from human activities** on the land may damage coral reefs and seagrass beds; these biological systems protect, and provide sand to the beaches.
- **Removing vegetation from coastal areas** destabilises beaches; and clearing sites inland results in increased soil and dirt particles being washed offshore and smothering coral reef systems.

Hurricane
frequency
between 1990
and 1999
in the Atlantic
Basin

5 year periods

1990 – 1994
1995 – 1999

*Garbage and plastic
debris, seen here on
Bequia's south coast,
is unsightly and
pollutes the marine
environment*

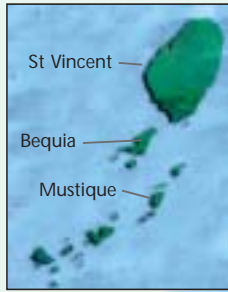


WHAT'S HAPPENING WITH ST VINCENT AND THE GRENADINES' BEACHES?



Beach monitoring in progress at Hamilton, Bequia, 2000

In order to manage these changes, several beaches in Bequia and the Tobago Cays have been monitored since 2000 by students from the Bequia Community High School, who measure beach slope and width on a regular basis. Beaches in Mustique are also monitored by the Mustique Company.



North



Location of monitored beaches in Bequia



Tony Gibbons Bay (Princess Margaret), Bequia 2000



SAND IN, SAND OUT

Tropical storms and hurricanes erode sand from the beaches in St. Vincent and the Grenadines, and while there is some beach recovery after the event, this is often not to pre-hurricane levels.

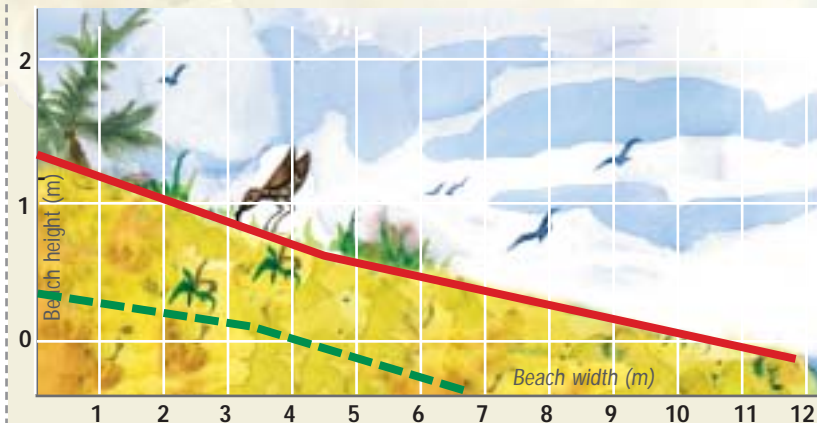
BEACH PROFILE

Port Elizabeth, Bequia.

Beach erosion

Before Tropical Storm Lilli (May 2002)

After Tropical Storm Lilli (Sept. 2002)



1995

Many beaches were dramatically changed by Hurricane Lenny in 1999. Here at Honor Bay in Mustique, there used to be a small sand beach, which was washed away during the hurricane, leaving rocks



2000

DUNES AS RESERVOIRS OF SAND

Dunes function as reservoirs of sand, supplying beaches during storms and protecting coastal land from flooding.



*(Top and bottom)
The removal of these substantial dunes at Brighton in St Vincent in 1995, destabilised the beach, so the coastline retreated inland a considerable distance. In addition, salt spray now penetrates much further inland.*



These low, vegetated dunes at Macaroni Beach in Mustique help to stabilise the beach as well as protect the land behind the coast, 1995



HERE TODAY, GONE TOMORROW

Besides damaging infrastructure and eroding beaches, tropical storms and hurricanes impact coral reefs and seagrass beds, although often this damage is unseen, except by divers and fishers. Along the west coast of Mustique the waves from Hurricane Lenny in 1999 extended their full force on the offshore coral reefs, breaking off pieces of coral. The waves then piled up these broken coral fragments into 'natural' breakwaters at several places along the coast. These breakwaters attest to the underwater damage, where the coral reefs, which grow very slowly, may take decades to recover.



Piles of coral fragments (top) seen here at Old Plantation and Plantain Bay in Mustique (left) attest to the underwater damage caused by Hurricane Lenny in 1999



Hurricane Lenny caused serious damage to the coastal road at Hamilton, Bequia in 1999

WISE PRACTICES FOR A HEALTHY BEACH



These deep-rooting manchineel trees at Lagoon Bay, Mustique, help to stabilise the beach...



...and warning visitors of their poisonous nature is a wise practice



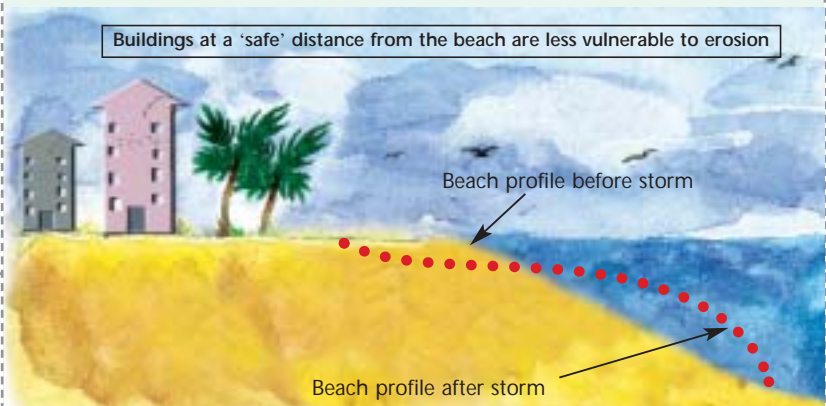
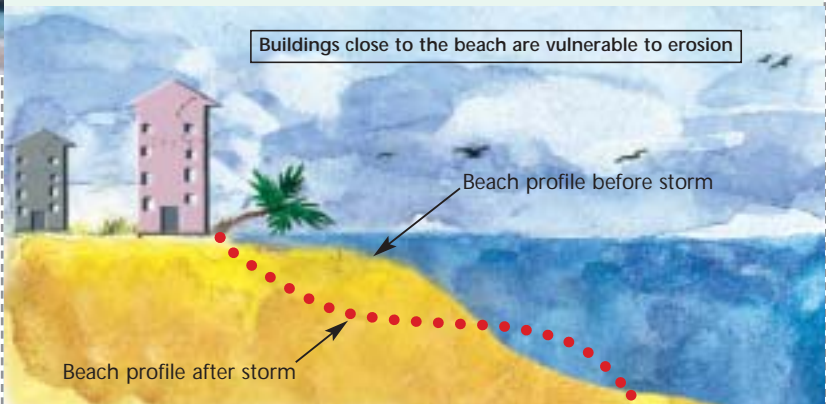
Keeping the natural coastal vegetation such as here at Lower Bay, Bequia, helps to conserve the beach, 2000

Ensuring new development is a 'safe' distance from the dynamic beach zone, helps conserve the beach and the buildings

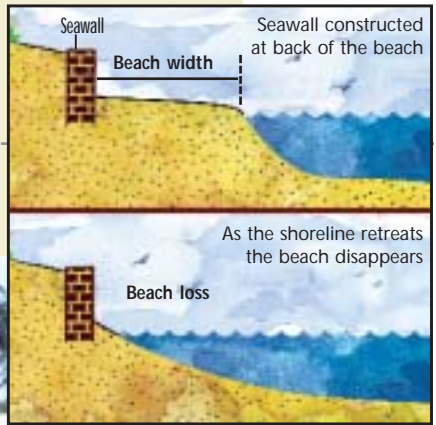
The state of the beach affects everyone's lives. There are no simple or universal solutions to shoreline erosion, since there are often several factors, both human and natural, contributing to the problem at a particular beach. Each beach behaves differently, so it is advisable to find out as much information as possible about a particular beach before taking any corrective action. It is necessary to consult the Physical Planning Department before undertaking any action at a beach.

Some forces of change, such as hurricanes and winter swells are natural, and there is little we can do to stop them, yet there are ways we can help to slow down the rate of erosion:

- Planning new development so that it is a 'safe' distance behind the beach will reduce the need for expensive sea defence measures in the future.
- Revegetating beach areas beyond the reach of storm waves, and other coastal areas, with native vegetation, e.g. grasses, vines and salt resistant, deep-rooting trees, such as sea-grape.



Retaining wall at Port Elizabeth, Bequia, 2000



Replacing beach sand at Port Elizabeth, Bequia, after Hurricane Lenny, 2000



- Resorting to 'hard' engineering structures such as seawalls, retaining walls, revetments and bulkheads, only when there is a need to protect beachfront property from wave action. Such structures, even with careful design, result in the loss or narrowing of the beach over time.
- Considering all other beach enhancement measures such as offshore breakwaters, groynes and beach nourishment (placing sand from the offshore zone or from an inland source on the beach) at a particular site. All such measures require careful design and environmental impact assessments, so always first consult the Physical Planning Department.

Groynes do not always succeed in promoting sand accretion as seen here at Indian Bay, St Vincent, 1995



Students building stone barriers and planting cacti to prevent soil erosion, Park Bay, Bequia, 1997

WISE PRACTICES ✓ CHECKLIST

- ✓ **Plan for existing and future coastline change** by positioning all new development (large and small) a 'safe' distance landward of the vegetation line (consult the Physical Planning Department for information on 'safe' distances).
- ✓ **Ensure the physical planning process** is fair, equitable and transparent.
- ✓ **Review and carefully consider ALL options** when planning ways to slow down the rate of coastline change, these should include planning, ecological and engineering measures.
- ✓ **Continue to monitor the rate of coastline change** and share the findings with all other stakeholders.
- ✓ **Coordinate an integrated approach to beach management**, by ensuring that individuals, members of the general public, governmental and non-governmental organisations work together.
- ✓ **Promote the concept of coastal stewardship** and civic pride.
- ✓ **Respect the rights** of all beach users.
- ✓ **Provide for public access to all beaches**, and where appropriate provide facilities for beach users (e.g. parking, safety measures, sanitary facilities).
- ✓ **Stop the mining of sand from beaches and dunes**, ensure that inland mining sites are restored after use, and investigate alternative building practices.
- ✓ **Conserve and restore vegetative cover**, both adjacent to the beach in order to stabilise the sand, and further inland to reduce sediment reaching the reefs and sea grass beds.

For more information on shoreline change in **ST VINCENT AND THE GRENADINES** consult:

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For more information on shoreline change in the **CARIBBEAN** consult:

Coping with Beach Erosion
by Gillian Cambers
UNESCO Publishing, 1998
ISBN 93-3-103561-4

This booklet is a result of co-operation between UNESCO, the Caribbean Development Bank and organizations in St Vincent and the Grenadines.

To view this booklet on-line, please see:
www.unesco.org/csi/act/cosalc/brochvin.htm