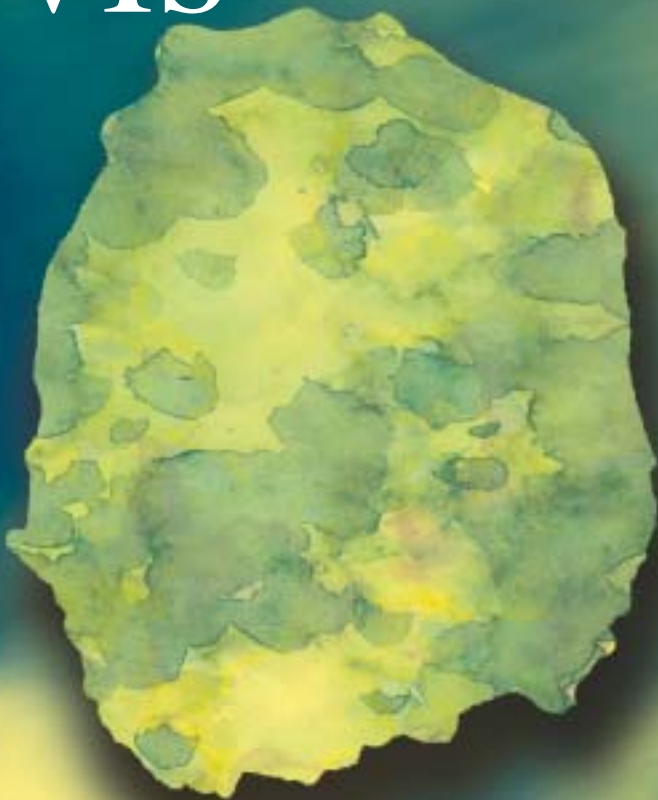


Wise practices for coping with
BEACH EROSION



Nevis



Nevis Historical and Conservation Society
Department of Physical Planning, Natural Resources and Environment, Fisheries Division
University of Puerto Rico, Sea Grant College Program; 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 height.

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 and sand from the beaches and dunes, 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 large tourism properties and establishments continue to be attracted towards the shores of St Kitts and Nevis. 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 in winter** 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.

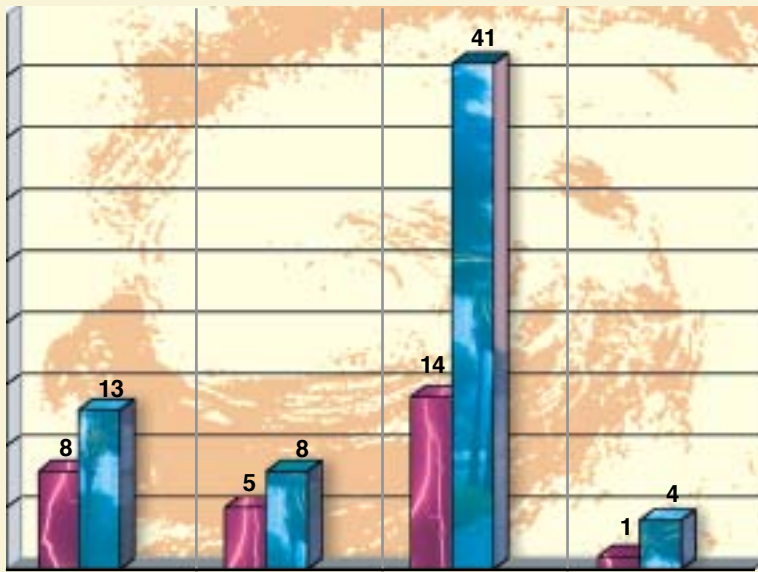


Number of
named storms
per year

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/>

Hurricane frequency between 1990 and 1999 in the Atlantic Basin

5 year periods

1990 – 1994

1995 – 1999

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** from beaches and dunes for construction purposes causes erosion and the loss of beaches and coastal lands, 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 the dunes** destabilises these protective sand barriers; and clearing sites inland results in increased soil and dirt particles being washed offshore and smothering coral reef systems.

Pipes discharging onto the beach and into the sea cause pollution and may harm marine life, Pinney's Beach 2000



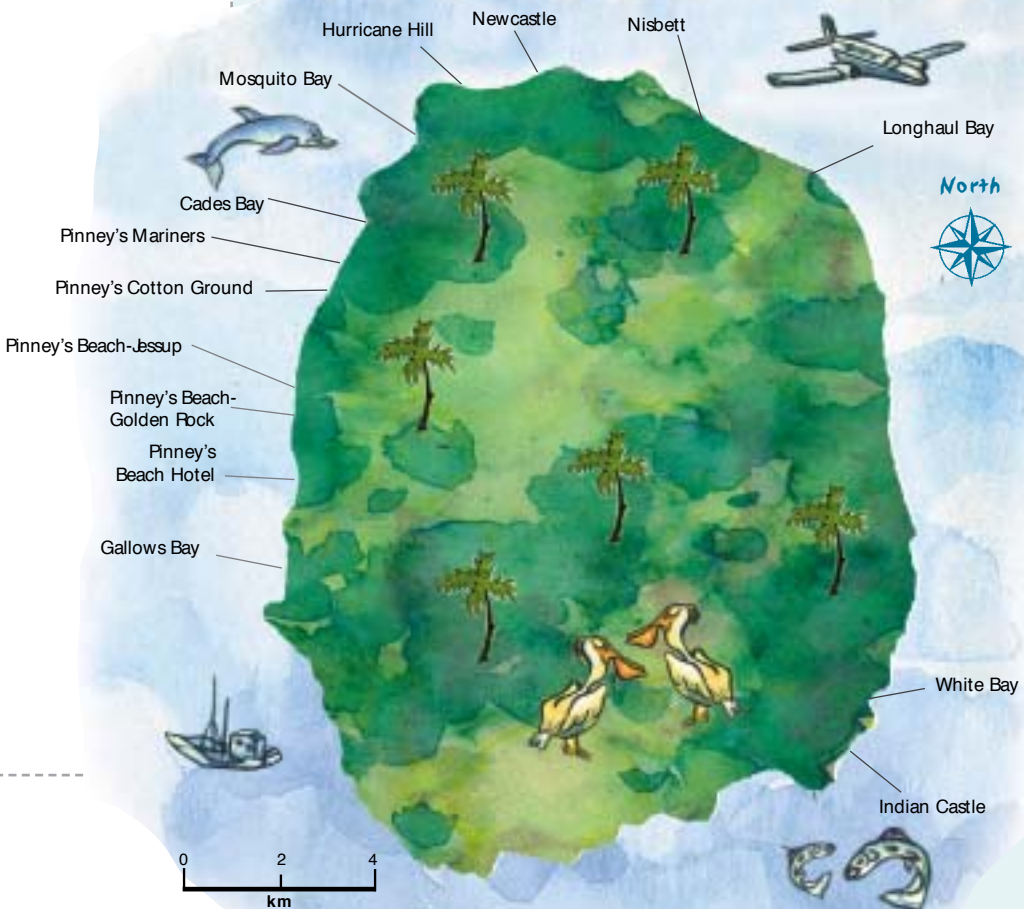
WHAT'S HAPPENING WITH NEVIS' BEACHES?

In order to manage these changes, Nevis' beaches have been monitored since 1988 by the Nevis Historical and Conservation Society, who measure the beach slope and width every three months at numerous sites around the island.

*Beach monitoring
in progress at
Hurricane Hill, 1988*

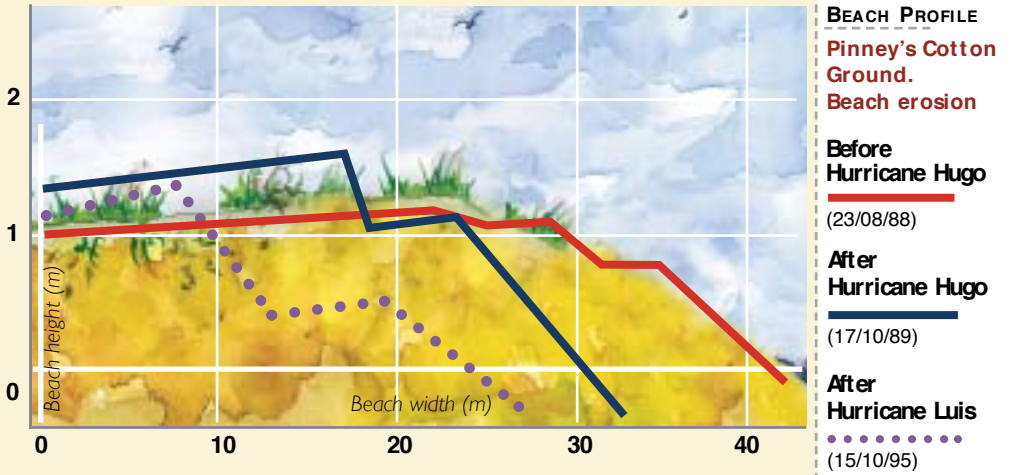


Location of monitored beaches



SAND IN, SAND OUT

When Hurricane Hugo struck in 1989, much of the beach was lost at Pinney's Beach on the west coast. In the months and years after the hurricane the beach recovered, but not to pre-hurricane levels. The beach was further eroded by successive hurricanes: Hurricane Luis in 1995, Hurricane Georges in 1998 and Hurricane Lenny in 1999.



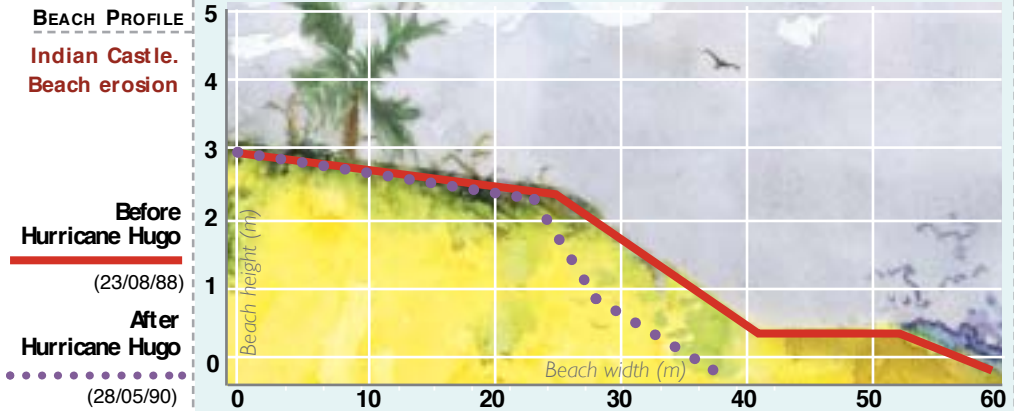
Pinney's Beach, August 1995, before Hurricane Luis



Pinney's Beach, October 1995, after Hurricane Luis

DUNES AS RESERVOIRS OF SAND

Dunes function as reservoirs of sand, available for supply to the beach during storms. In addition, they protect coastal land from flooding.



At Indian Castle, there used to be extensive sand dunes, several metres high. These were mined extensively for construction sand in the 1970s and 1980s, and the remnant dunes were eroded by the recent hurricanes.

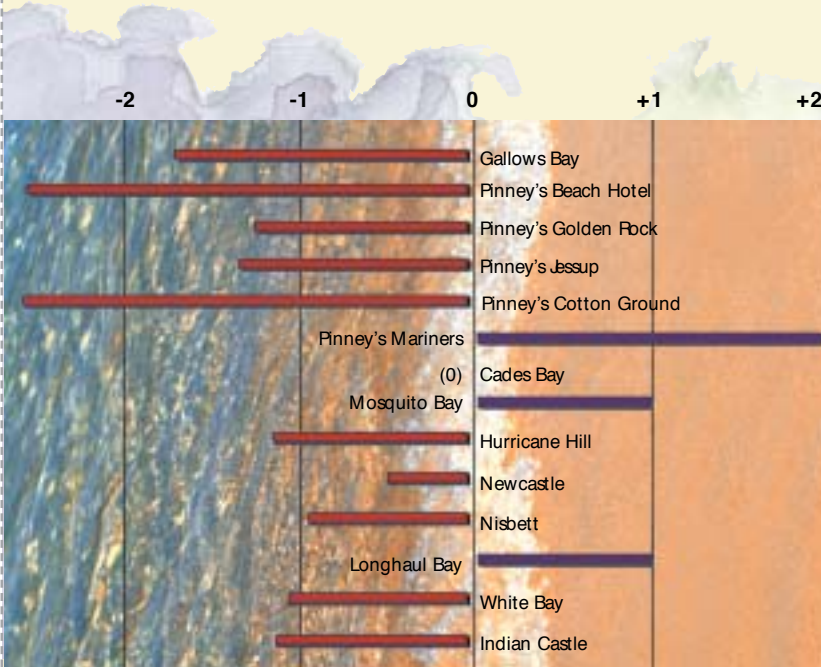
Extensive mining in the '70s and '80s destabilised the dunes at Indian Castle and left them vulnerable to hurricanes, 1988



Low sand dunes, stabilised with vegetation, as seen at White Bay, play an important role in maintaining the beach, 1996

HERE TODAY, GONE TOMORROW

The table shows generalised rates of change at the measured beaches in Nevis. During the decade of the 1990s most of the beaches showed erosion; a result, at least in part, of the impact of several severe hurricanes since 1989. The erosion was especially severe on the west coast beaches.



Beach change rates in Nevis (metres per year)



A negative rate of change (red bar) indicates erosion and retreat of the shoreline, a positive rate of change (black bar) indicates accretion or advancement of the shoreline towards the sea.

Measuring the damage at Pinney's Beach after Hurricane Luis, 1995. The fallen tree and piles of washed-up seagrass point to the damage caused by the hurricane waves



Damaged beach bar at Golden Rock, Pinney's Beach, after Hurricane Luis, 1995

WISE PRACTICES FOR A HEALTHY BEACH



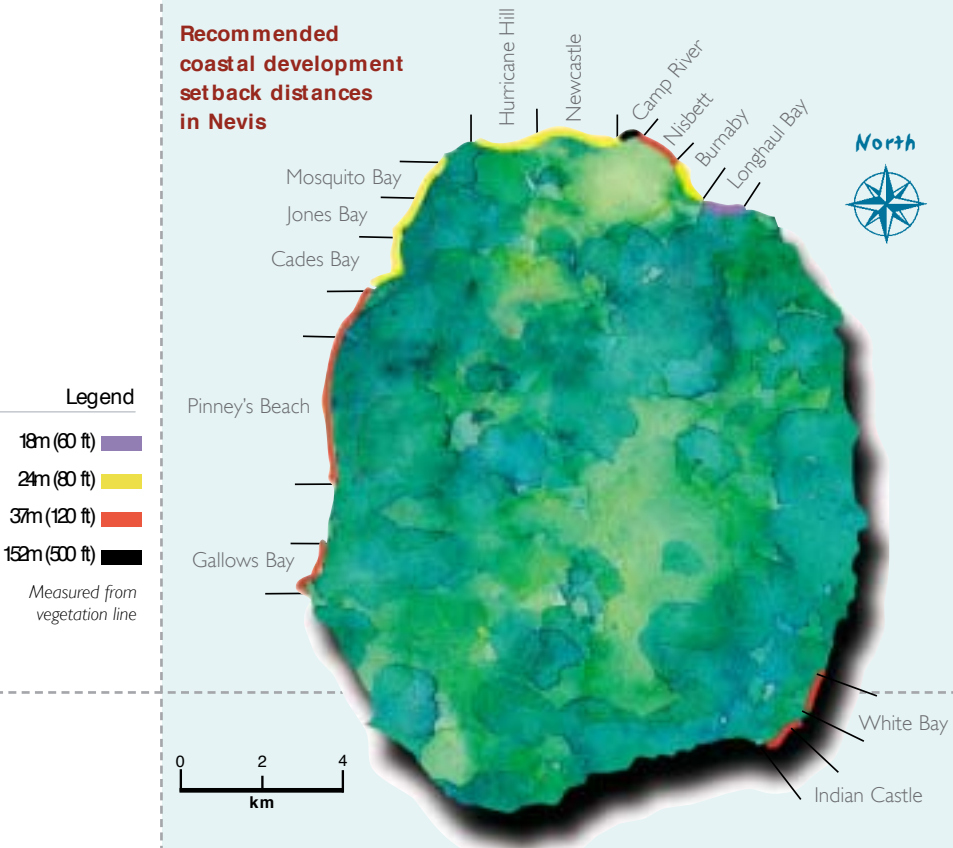
This restaurant at Pinney's Beach was 30 metres from the sea when it was opened in August 1995. One month later it was destroyed by Hurricane Luis. The greater the distance from the sea, the safer the building

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 Department of Physical Planning, Natural Resources and Environment 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 dunes with native vegetation e.g. grasses and vines, and planting beach areas beyond the reach of storm waves with salt-resistant, deep-rooting trees, such as seagrape.

Recommended coastal development setback distances in Nevis





After Hurricane Lenny, sand was pumped from the seabed onto the beach in front of this hotel at Pinney's Beach, 2000

- Resorting to 'hard' engineering structures such as seawalls, 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 Department of Physical Planning, Natural Resources and Environment.



Planning officials inspecting a newly constructed rock revetment at Pinney's Cotton Ground, 1999

Groynes built along the north coast have stabilised the beach in some places (Newcastle 1997)...



...but not in others (Nisbett 1992)













In 1981, there was a small beach at Charlestown



By 2000, the beach had disappeared and land has been reclaimed and protected with a boulder revetment

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 Department of Physical Planning, Natural Resources and Environment for information on 'safe' distances).
-  **Develop a proactive approach to coastal planning** through the preparation of a coastal zone management plan.
-  **Involve all stakeholders** (e.g. government agencies, coastal communities, non-governmental organisations, coastal residents, beach users and others) in the preparation and implementation of the coastal zone management plan.
-  **Develop principles for coastal stewardship**, so that everyone plays their role to the fullest.
-  **Maintain regular dialogue among all stakeholders**, enhanced by awareness and education about beach and coastal issues.
-  **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.
-  **Respect the rights of all beach users.**
-  **Provide and clearly mark** public accesses to all beaches.
-  **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 seagrass beds.

For more information on shoreline change in **NEVIS** 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 Nevis' Governmental agencies

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