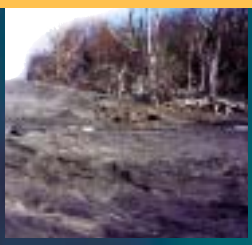
Wise practices for coping with

BEACH EROSION




St Kitts

Department of the Environment, St Kitts
Fisheries Division, St Kitts
Physical Planning and Development Division, St Kitts
University of Puerto Rico, Sea Grant College Program; Caribbean Development Bank
UNESCO Environment and Development in Coastal Regions and in Small Islands

UNESCO

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.

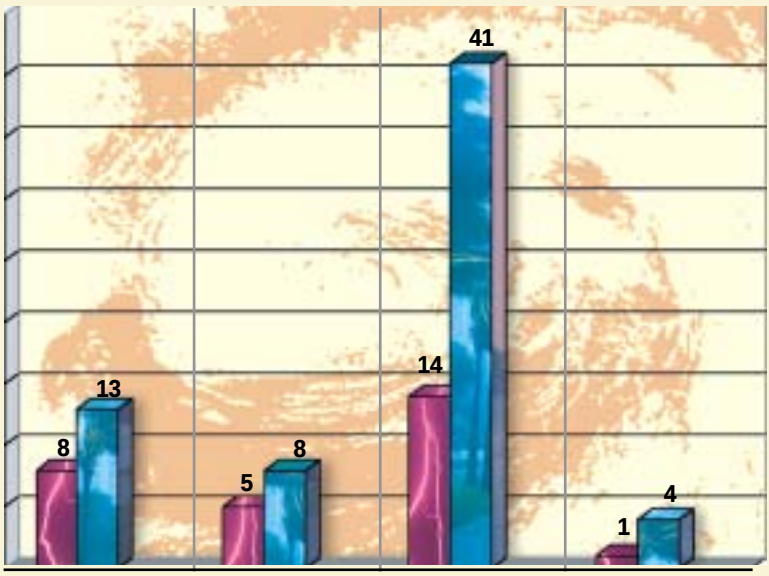
But it is not just natural forces that change the beach, humans have a big role to play in this process as well, through mining stones and sand from the beaches and dunes, polluting and damaging coral reefs, and constructing buildings and walls too close to the sea.

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.



Hurricane frequency between 1990 and 1999 in the Atlantic Basin

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 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.

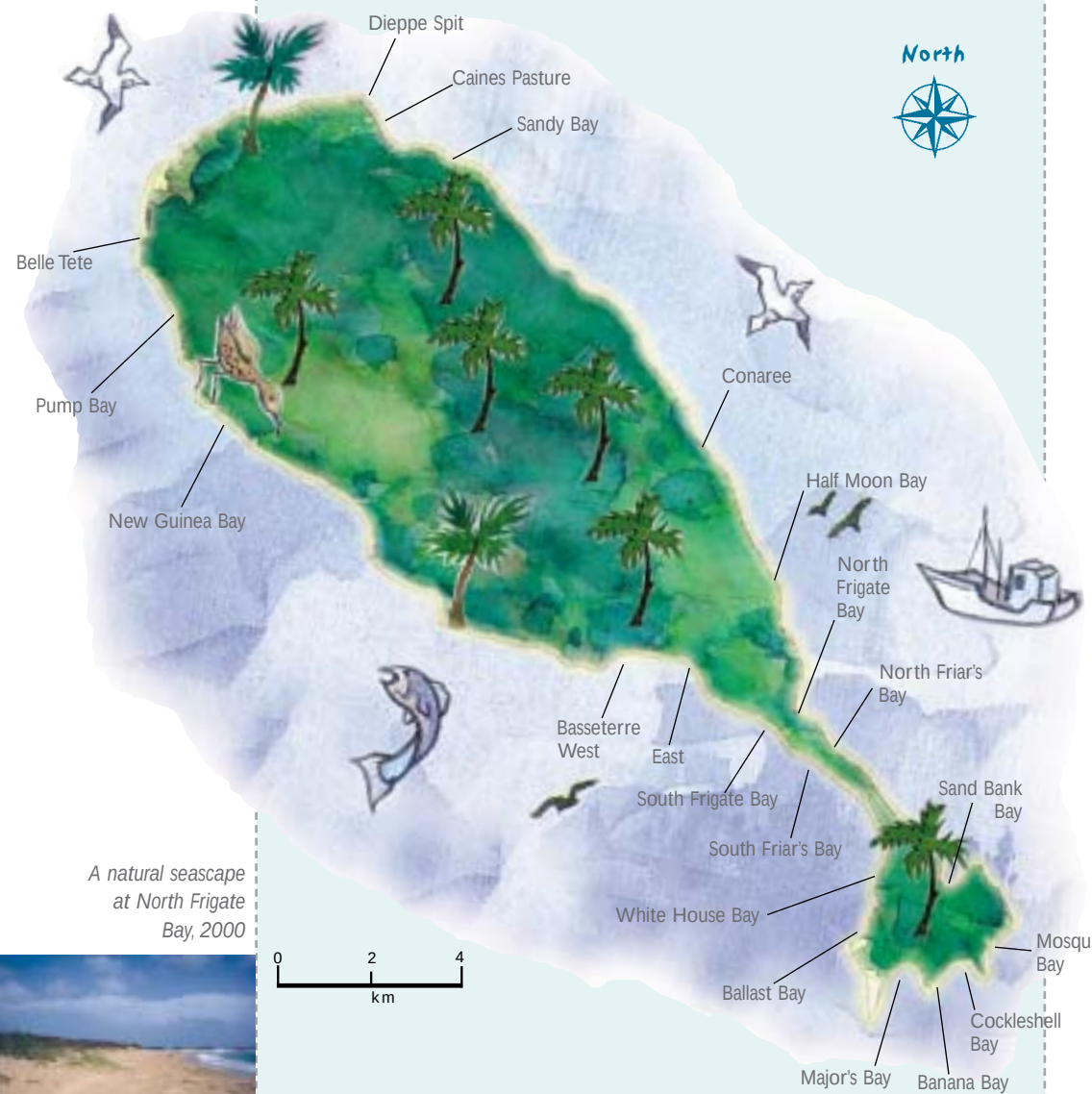
Garbage and pollution at the mouth of this ghut in Basseterre Bay are not only unsightly, but also damage the coral reefs and seagrass beds, 1999

What's happening with St Kitts' beaches?

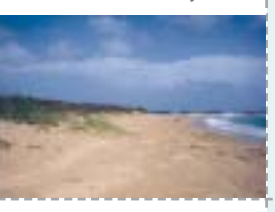
Beach monitoring in progress at North Frigate Bay, 2000

In order to manage these changes, St Kitts' beaches have been monitored since 1991 by the Department of the Environment (who were, at times, assisted by the Fisheries Division and the Physical Planning and Development Division). They measure the beach slope and width every three months at numerous sites around the island.

Location of monitored beaches

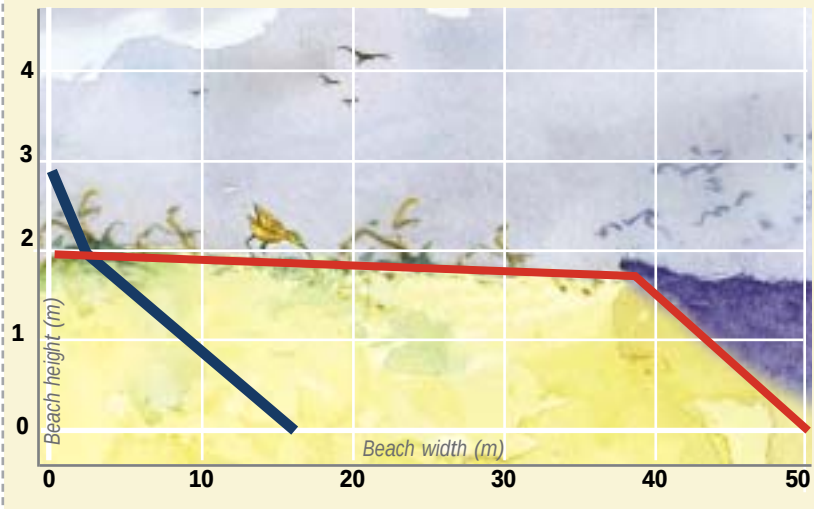


A natural seascape at North Frigate Bay, 2000



SAND IN, SAND OUT

When Hurricane Luis struck in 1995, much of the sand was lost at South Friar's Bay. While there was some beach recovery after this hurricane, the erosion was equally dramatic after Hurricane Georges (1998) and Hurricane Lenny (1999).



BEACH PROFILE
South Friar's Bay.
Beach erosion

Before Hurricane Luis
(16/08/95)

After Hurricane Luis
(14/09/95)

South Friar's Bay, August 1998

South Friar's Bay, February 2000 (after Hurricanes Georges and Lenny)

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.

BEACH PROFILE

Sand Bank Bay. Beach erosion

Before Hurricane Luis

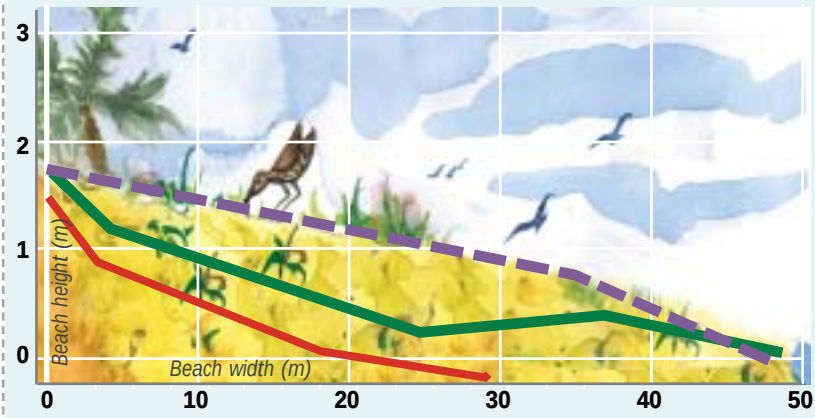
(29/04/94)

After Hurricane Luis

(27/09/95)

After Hurricanes Georges and Lenny

(15/02/00)

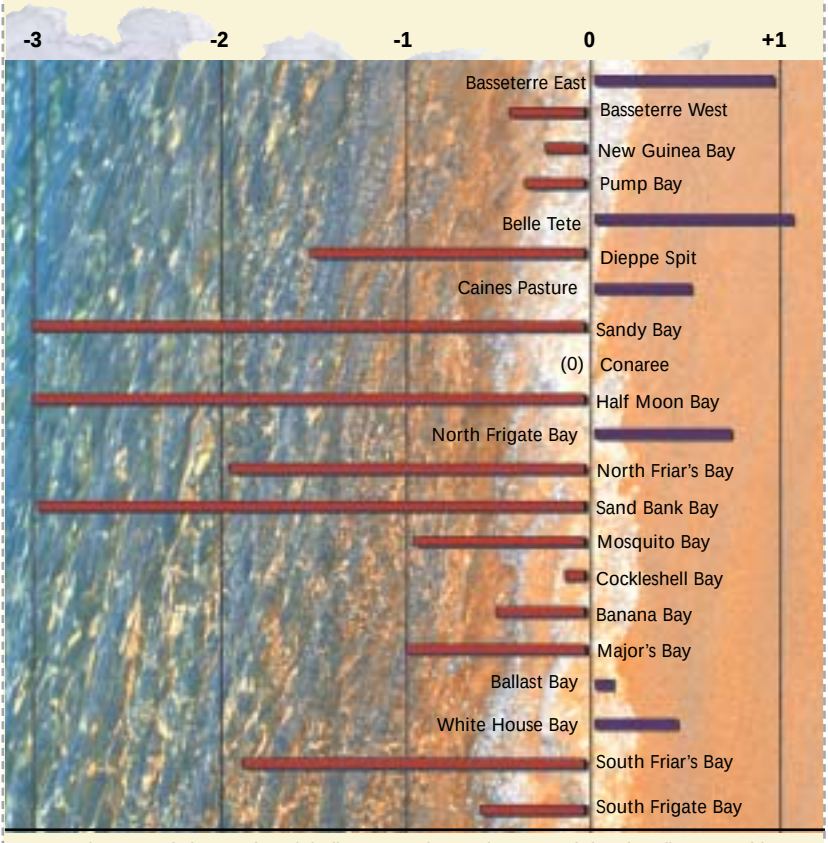


Replacing a naturally vegetated sand dune with a vertical seawall, as seen here at North Frigate Bay, is an 'unwise' practice, 2000

Seagrape (left) and other dune stabilising plants help to keep dunes intact

HERE TODAY, GONE TOMORROW

The table shows generalised rates of change at the measured beaches in St Kitts. During the 1990s, most of the beaches, including those in the Southeast peninsula, showed erosion; a result, at least in part, of several severe hurricanes since 1995. However, many beaches in St Kitts show erosion along one part of the beach and accretion (build-up) at adjacent sections; thus these figures must be treated as average trends.



Beach change rates in St Kitts (metres per year)

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

In the 1980s there used to be a sandy point, more than 100 metres long, at Dieppe Bay

By 1995, the sandy point had disappeared, and the water reached the building

WISE PRACTICES FOR A HEALTHY BEACH

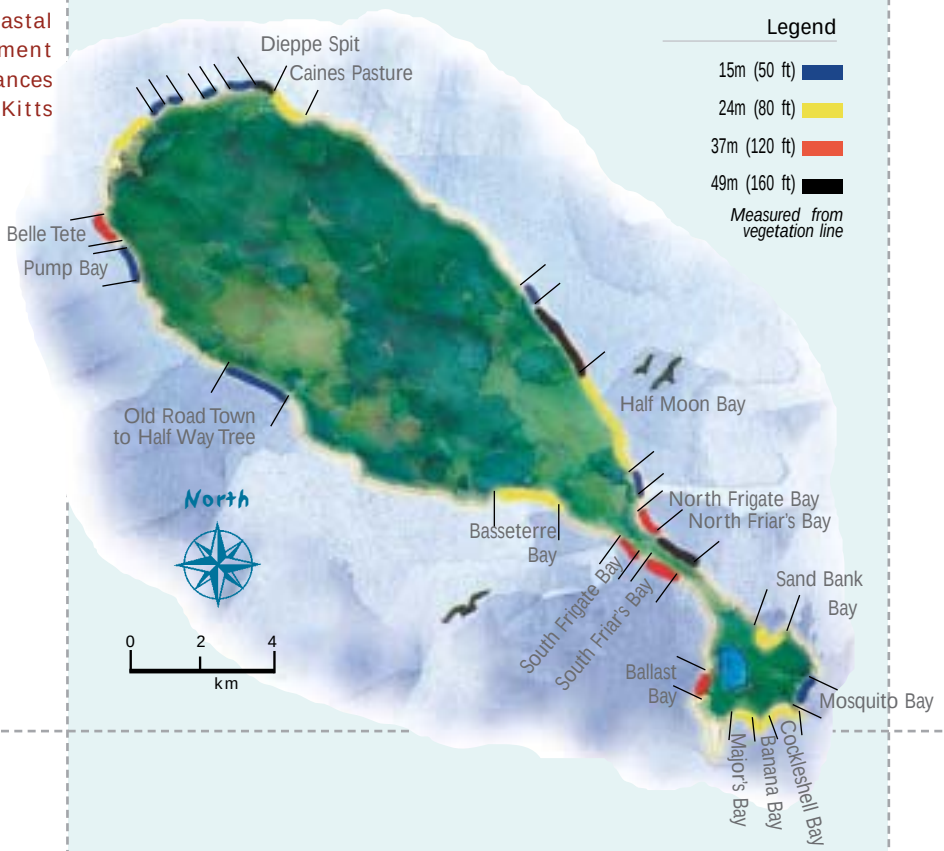
The state of the beach affects everyone's lives. There are no simple or universal solutions to shoreline erosion, since there are often several factors, both human and natural, contributing to the problem at a particular beach. Each beach behaves differently, so it is advisable to find out as much information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

Planting, as here at Dieppe Bay, also helps to conserve the sand, 1995 (deep rooting rees such as seagrape are especially recommended)

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 St Kitts



Buildings constructed close to the water (right), as here at Dieppe Bay, are vulnerable and often interfere with beach movements, 1999

Building well back from the beach and seaward dune, as here at North Frigate Bay, is a wise practice, 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 Physical Planning and Development Division.

Above: Sand mining activities, as seen here at Belle Tete, detract from the integrity and amenity value of the beach, 2000. Such activities need careful management

Vertical walls, such as here at South Frigate Bay, interfere with natural beach processes, 1995

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 and Development Division for information on 'safe' distances).
- **Involve all stakeholders** (e.g. government agencies, coastal communities, non-governmental agencies, coastal residents, beach users and others) in planning and development decisions.
- **Define a framework of guidelines and responsibilities** for beach management, in which governmental and non-governmental agencies can co-operate.
- **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.
- **Develop proactive approaches** to the management of sand mining involving the public and private sectors.
- **Continue to monitor the rate of coastline change** and share the findings with all other stakeholders.
- **Maintain regular dialogue among all stakeholders**, enhanced by awareness and education about beach and coastal issues.
- **Enforce existing laws** relating to beach management.
- **Respect the rights of all beach users**.
- **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 ST KITTS 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 St Kitts' Governmental agencies

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

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