Wise practices for coping with

# BEACH EROSION




# Anguilla


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## 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.

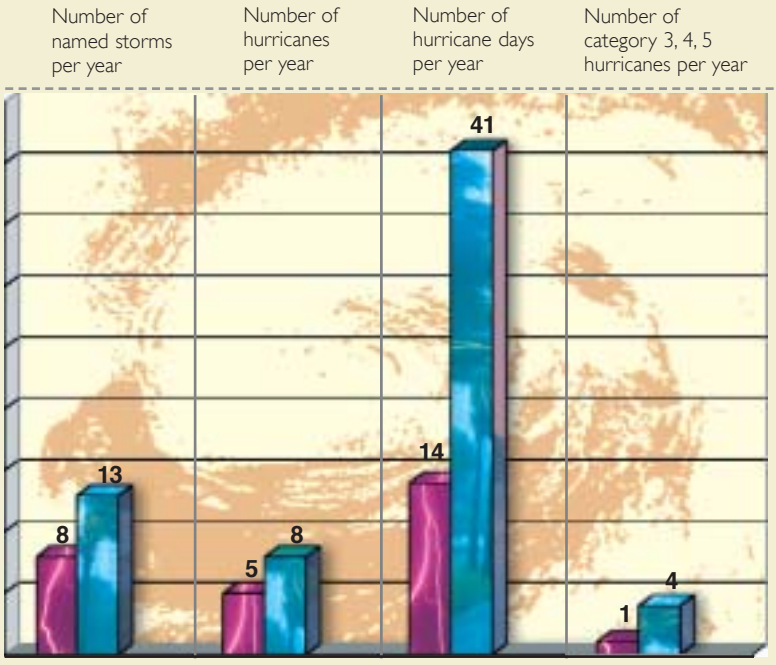
But it is not just natural forces that change the beach, humans have a big role to play in this process as well, through mining stones and sand from the beaches and dunes, polluting and damaging coral reefs, and constructing buildings and walls too close to the sea.

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 Anguilla's shores. Tourism is a driving force in Anguilla'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**

5 year periods

**1990 – 1994**

**1995 – 1999**

*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.

*It was unwise to rebuild a beach bar at Sandy Island in October 1995 immediately after Hurricane Luis, as waves reshaped the cay leaving the structure in the sea*

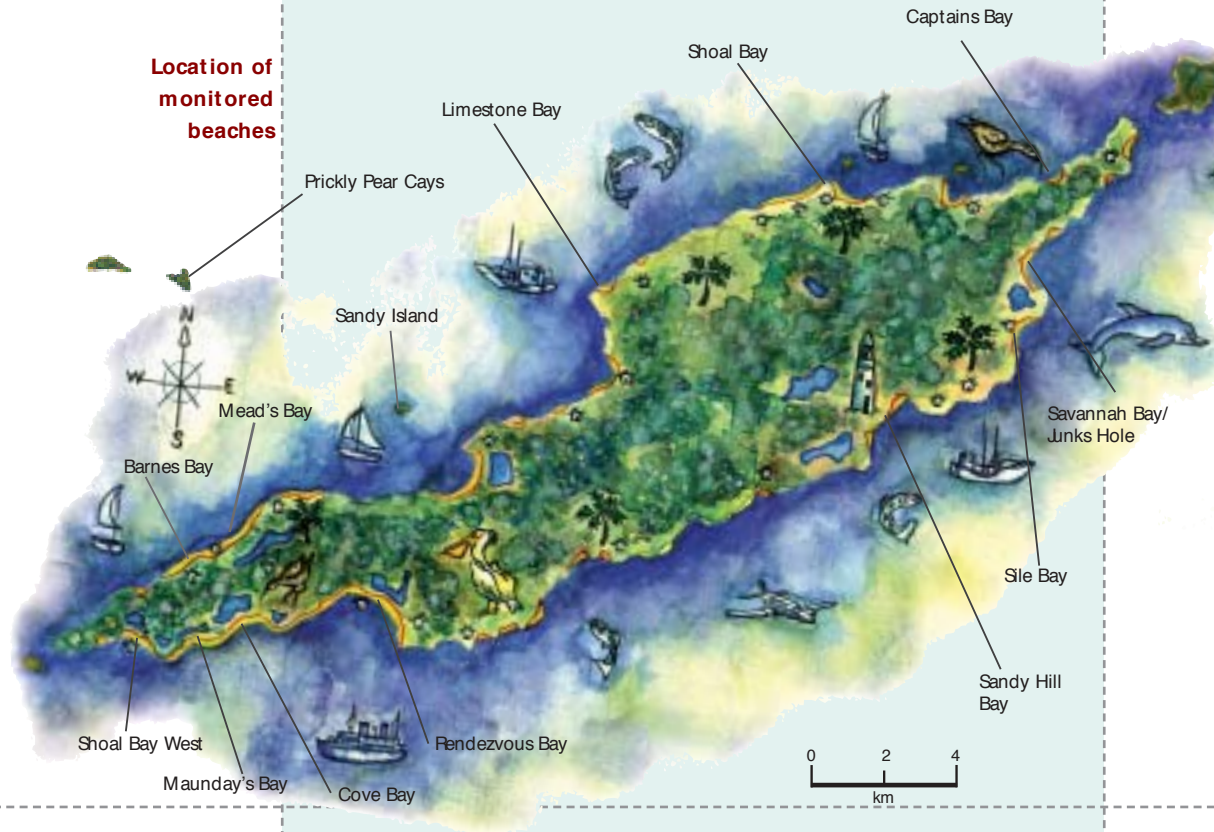
## WHAT'S HAPPENING WITH ANGUILLA'S BEACHES?

*Shoal Bay in 1992*

In order to manage these changes, Anguilla's beaches have been monitored since 1992 by the Department of Fisheries and Marine Resources, who measure the beach slope and width every 3 months at numerous sites around the island, as well as at the offshore cays.

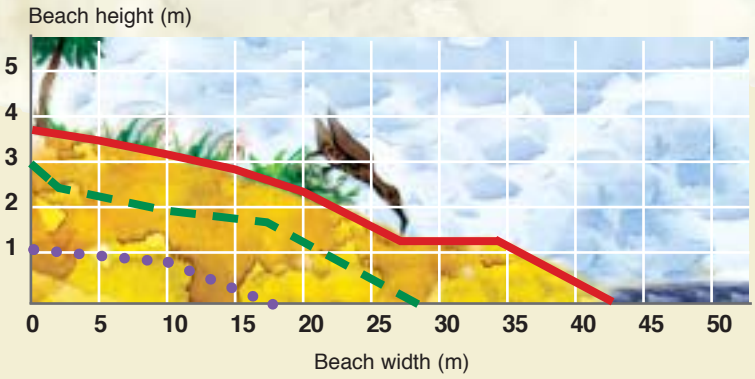
*Beach monitoring in progress at Shoal Bay West, 1992*

**Location of monitored beaches**



## SAND IN, SAND OUT

When Hurricane Luis struck in 1995, much of the beach was lost at Mead's Bay on the north coast. In the months and years after the hurricane the beach recovered, but not to the pre-hurricane level.




**BEACH PROFILE**

**Mead's Bay Central. Beach erosion**

**Before Hurricane Luis**
(Sept.1992)

**After Hurricane Luis**
(Sept.1995)

**3 years later**
(Oct. 1998)



*Beachfront properties were transformed overnight after Hurricane Luis struck in 1995. Mead's Bay Central: reference point before and after Hurricane Luis*

## DUNES AS RESERVOIRS OF SAND

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

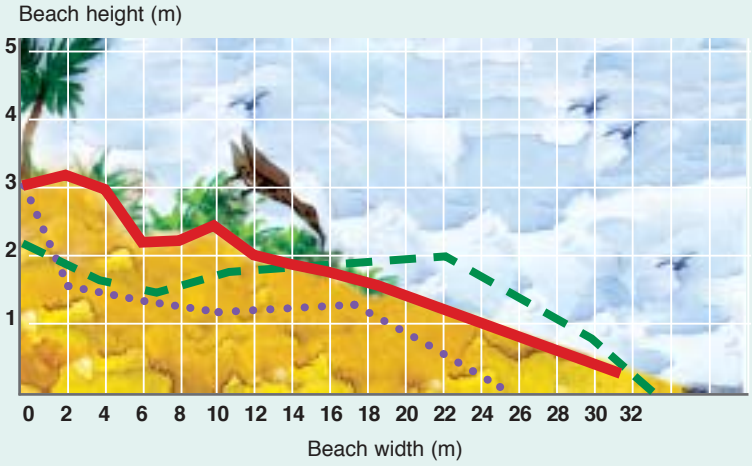
**BEACH PROFILE**

**Cove Bay Central. Beach erosion**

**Before Hurricane Luis**
(March 1993)

**After Hurricane Luis**
(Sept.1995)

**After Hurricane Lenny**
(Jan. 2000)



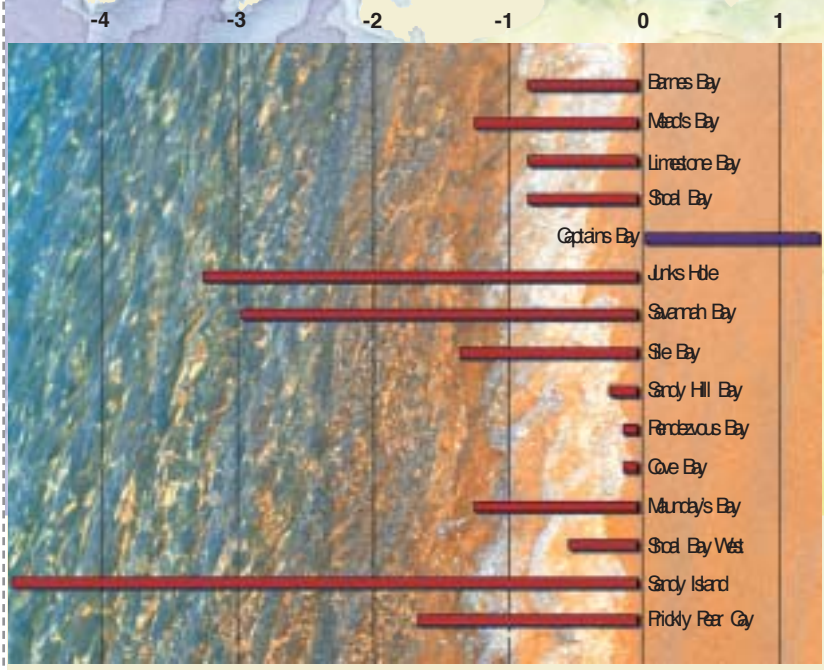

*Sandy Ground. During Hurricane Lenny (Nov. 1999) the sea and the pond were temporarily joined*

**A**t Cove Bay there used to be an extensive line of sand dunes separating the salt pond from the sea and measuring more than 3 metres high. In 1995 Hurricane Luis eroded the seaward face of these dunes and in 1999 the waves generated by Hurricane Lenny broke through the dunes in places, joining the salt pond to the sea.

*Cove Bay, 2 months after Hurricane Lenny struck (Nov. 1999). There used to be a wide belt of sand dunes separating the salt pond (right side of photo) from the sea. Now only eroded remnants exist*

## HERE TODAY, GONE TOMORROW

The table shows generalised rates of change at the measured beaches in Anguilla. During the 1990s, all of the beaches, with one exception, showed erosion, a result, at least in part, of the impact of several severe hurricanes since 1995. However, most beaches in Anguilla show erosion along one part of the beach and accretion (or build-up) at adjacent sections, thus these figures must be treated as average trends.




**Beach change rates in Anguilla (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.*

*(below) Measuring sand loss after Hurricane Luis, 1995*

*(left) Maunday's Bay after Hurricane Lenny in 1999. Hotel villas were undermined and stairways leading over the once extensive dunes were left as isolated monuments*

# WISE PRACTICES FOR A HEALTHY BEACH

*Seagrape trees*

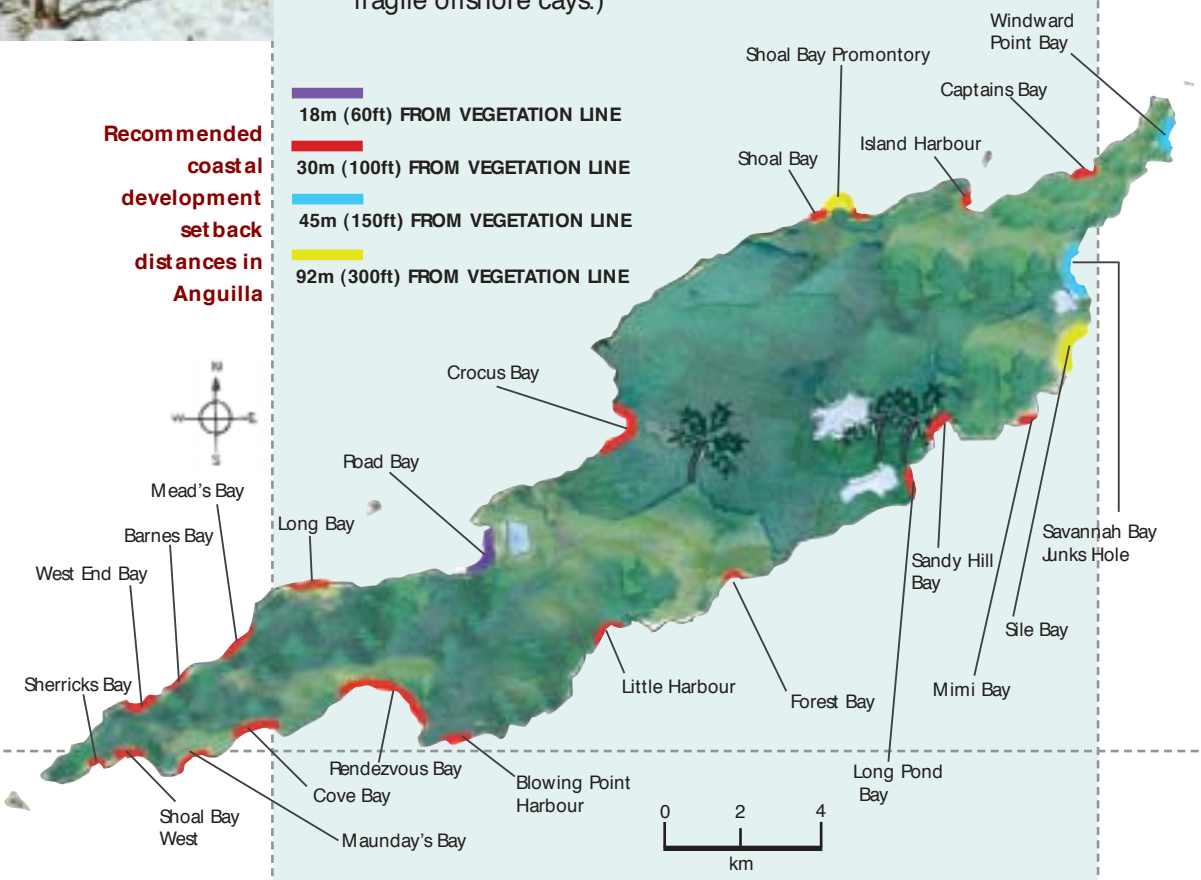
*Building sand fences at Savannah Bay, 1997*

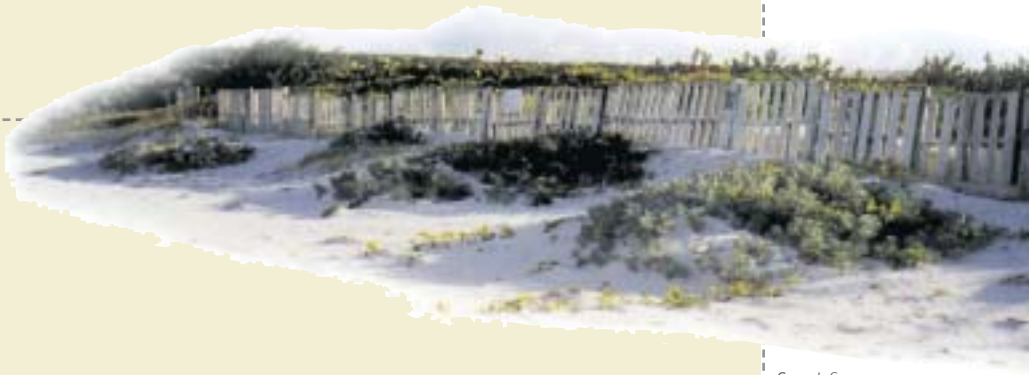
The state of the beach affects everyone's lives. There are no simple or universal solutions to shoreline erosion, since there are often several factors, both human and natural, contributing to the problem at a particular beach. Each beach behaves differently, so it is advisable to find out as much information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

**Recommended coastal development setback distances in Anguilla**





*Sand fences and sea lavender, Shoal Bay, 1998*

- 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.

*Planting dunes with native grasses, Maunday's Bay, 1996*

*Moving sand from an accreting part of Shoal Bay West to an eroded part, 2000*

*A retaining wall under construction at Mead's Bay after Hurricane Luis, 1995*

*Planners and a developer discuss a recently constructed seawall at Mead's Bay, Anguilla, 1998*

# 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 for information on 'safe' distances).
- **Ensure the physical planning process is fair,** equitable and transparent.
- **Involve all stakeholders** (e.g. government agencies, coastal communities, non-governmental agencies, coastal residents, beach users and others) in the review and permitting process for major developments.
- **Review and carefully consider ALL options** when considering 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.
- **Involve Anguilla's youth** in the management and conservation of beach resources.
- **Provide for public access** to all beaches, and where appropriate provide facilities for beach users (e.g. parking, safety measures, sanitary facilities).
- **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 ANGUILLA 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 Anguilla's Government agencies

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

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