Wise practices for coping with

BEACH EROSION




Turks and Caicos Islands

UNESCO

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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.

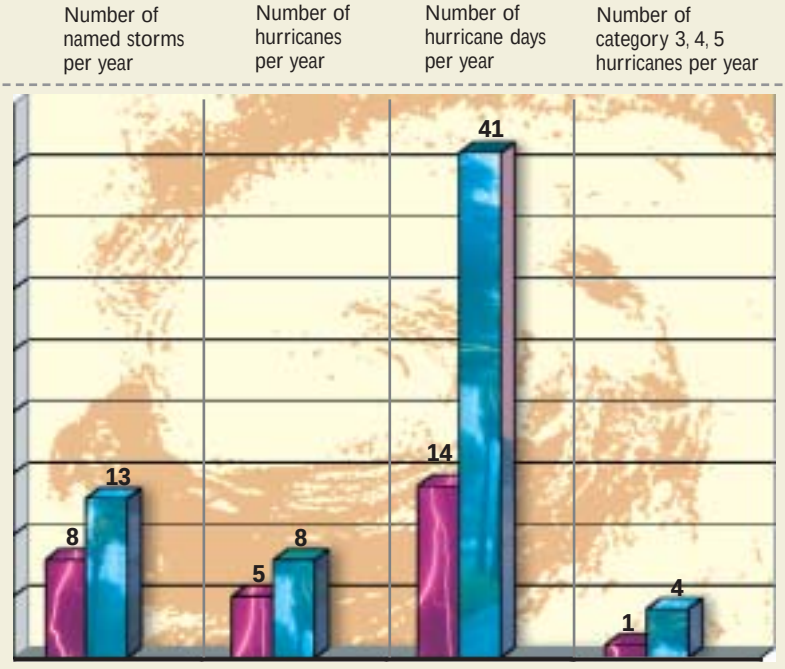
But it is not just natural forces that change the beach. Humans have a big role to play in this process as well, through mining stones, gravel and sand from the beaches, polluting and damaging coral reefs, and constructing buildings and walls too close to the sea.

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 the Turks and Caicos Islands. 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.



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 and other materials 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 coastal areas destabilises beaches; and clearing sites inland results in increased soil and dirt particles being washed offshore and smothering coral reef systems.

Abandoned sand mining pit at South Bay, South Caicos, 1999

What's happening with beaches in the Turks and Caicos Islands ?

Beach monitoring in progress at Pelican Bay, Providenciales, 1997

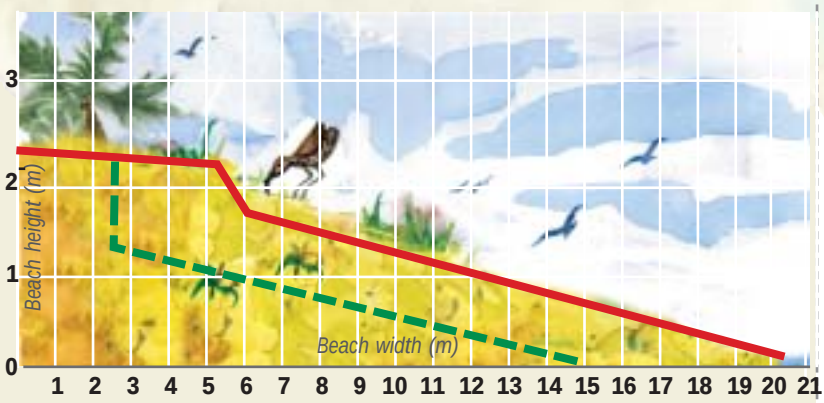
In order to manage these changes, it is essential to measure the beach regularly. The Department of Environment and Coastal Resources takes a lead in this with a limited beach monitoring programme, which includes measuring the beach slope and width at several sites around some of the islands. Owners of beachfront properties are urged to assist in this effort.

Location of monitored beaches in Providenciales

Pelican Bay, Providenciales, 2001

SAND IN, SAND OUT

Beaches often show changes from season to season and from year to year. Here at Emerald Beach in Providenciales there has been dramatic erosion over recent years.



BEACH PROFILE
Emerald Beach, Providenciales.
Beach erosion

Nov. 1995

July 2001

In 1995 there was a narrow beach backed by a dune ridge at one part of Emerald Beach in Providenciales...

By 2001, erosion of the beach and the dune ridge has occurred, resulting in the loss of some of the casuarina trees.

DUNES AS RESERVOIRS OF SAND

Dunes function as reservoirs of sand, supplying beaches during storms and protecting coastal land from flooding. Every effort should be made to conserve sand dunes and their protective vegetation cover, which is fragile and can easily be destroyed by people trampling over it.

(Top) Dunes also provide protection to beachfront property, Grace Bay, Providenciales, 2001

Protective dunes at Grace Bay, Providenciales, 2001, are an important part of the beach system and need special care

At Booby Rock Point in Grand Turk, the dunes have been extensively mined leaving the beach vulnerable during storms and hurricanes, 1995

HERE TODAY, GONE TOMORROW

Beaches show very rapid and dramatic changes as a result of storms and hurricanes. The Turks and Caicos Islands have experienced fewer severe hurricanes than their Caribbean neighbours over recent years. However, it pays to be continually vigilant and prepared.

Beaches in the Turks and Caicos Islands are also influenced by the tidal channels that run between the islands. At Leeward-going-through a huge sand bank has built up naturally at the mouth of the tidal channel, holding up the sand movement along the coast. This has resulted in erosion at several Leeward beaches, causing damage to buildings and necessitating the construction of protective measures.

Revetments have been built to protect valuable coastal property, seen here at Emerald Beach, Providenciales, 1997

(Top) A huge underwater sandbank has built up at the mouth of the channel between Little Water Cay (left) and Providenciales (right), 1997

Erosion at one of the Leeward beaches (Providenciales) has resulted in the collapse of this swimming pool, 2001

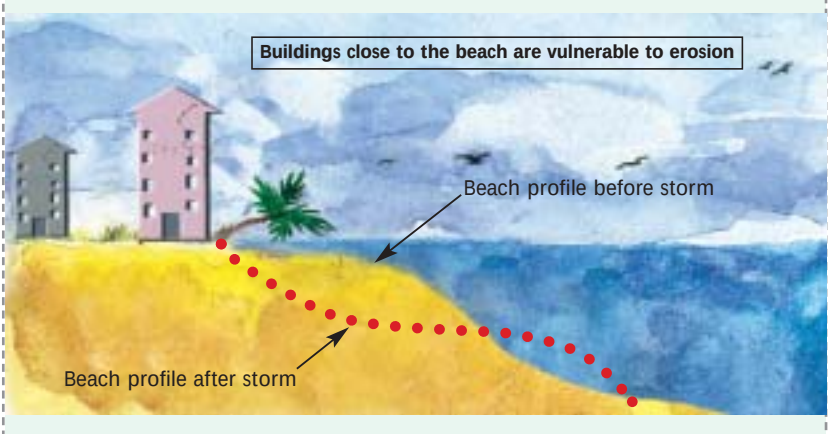
WISE PRACTICES FOR A HEALTHY BEACH

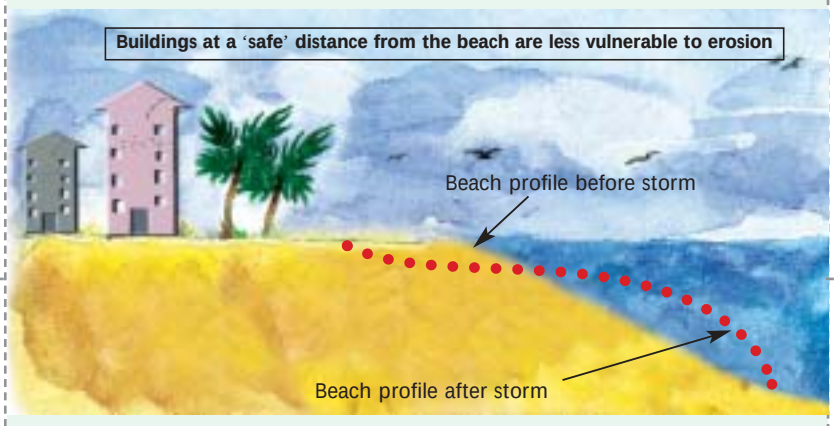
Sea lavender helps to hold the sand in place, Pillories Beach, Grand Turk, 1995

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 Planning before undertaking any action at a beach.

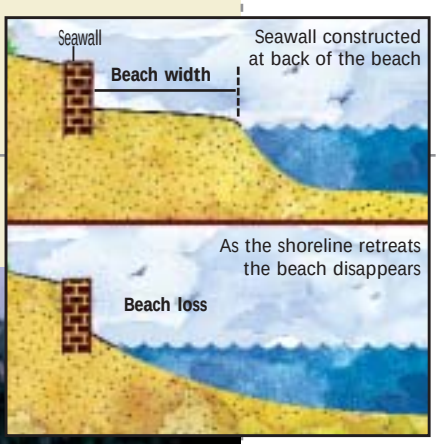
Some forces of change, such as hurricanes and winter swells are natural, and there is little we can do to stop them, yet there are ways we can help to slow down the rate of erosion:

- 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 beach areas beyond the reach of storm waves, and sand dunes, with native vegetation, e.g. grasses, vines and salt resistant, deep-rooting trees, such as sea-grape.





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



Seawalls, such as this one at Grand Turk, protect the road and buildings, but do not encourage sand build-up, 1999

- 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 Planning.

Groynes result in sand build-up on one side, but erosion on the other side, Grand Turk, 1997

This walkway at Grace Bay, Providenciales, protects the delicate dune vegetation from trampling by human feet, 1999

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 Planning for information on 'safe' distances).
- **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.
- **Stop the mining of sand from beaches and dunes,** ensure that inland mining sites are restored after use, and investigate alternative building practices.
- **Provide for dedicated public access lanes to all beaches** in the Turks and Caicos Islands, and where appropriate provide facilities for beach users (e.g. parking, safety measures, sanitary facilities).
- **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.
- **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, groups and agencies work together.
- **Promote the concept of coastal stewardship** and civic pride.
- **Respect the rights** of all beach users.

For more information on shoreline change in TURKS AND CAICOS ISLANDS consult:

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For more information on shoreline change in the CARIBBEAN consult:

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by Gillian Cambers
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This booklet is one of a series covering several Caribbean islands

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

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