Wise practices for coping with beach erosion

St Kitts
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 ‘grounds eas’.
- **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.
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.

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).

**Hurricane frequency between 1990 and 1999 in the Atlantic Basin**

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

<table>
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<tbody>
<tr>
<td>Number of named storms per year</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Number of hurricanes per year</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Number of hurricane days per year</td>
<td>14</td>
<td>41</td>
</tr>
<tr>
<td>Number of category 3, 4, 5 hurricanes per year</td>
<td>1</td>
<td>4</td>
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</table>
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**
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).
Dunes function as reservoirs of sand, available for supply to the beach during storms. In addition they protect coastal land from flooding.

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

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

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.
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.

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.

Legend

<table>
<thead>
<tr>
<th>Distance</th>
<th>Color</th>
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<tbody>
<tr>
<td>15m (50 ft)</td>
<td>Navy</td>
</tr>
<tr>
<td>24m (80 ft)</td>
<td>Yellow</td>
</tr>
<tr>
<td>37m (120 ft)</td>
<td>Red</td>
</tr>
<tr>
<td>49m (160 ft)</td>
<td>Black</td>
</tr>
</tbody>
</table>

Measured from vegetation line
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.
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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Physical Planning and Development Division
PO Box 597, Bassetterre, St Kitts
St Kitts & Nevis
T: +1 869 465 2277; F: +1 869 466 7398
E: phyplskb@caribsurf.com

For more information on shoreline change in the Caribbean consult:
Coping with Beach Erosion by Gillian Cambers
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