Coastal vulnerability index

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Havet tar Thomas Hus
Stormen gjorde stranden 25 meter större
"Jag klarar inte en till"
Lake Cathie coastal erosion plans continue

By Lisa Tadell  May 10, 2015, 4 a.m.
Hundreds of homes will disappear into the North Sea over the next century, as more properties fall victim to the rampant coastal erosion attacking the coastline. Pictured: The coastal road, south of Bridlington.
Beach erosion

Shayal Devi and Repeka Nasiko
Thursday, May 21, 2015

Like most of coastal Fiji, beach erosion is one of the biggest issues faced by villages in the Yasawa Group. With such adverse effects of climate change slowly surfacing, Vinaka Fiji, the charitable organisation of South Sea Cruises, Blue Lagoon Cruises and Awesome Adventures Fiji, has started a range of surveys across villages in the area.

Operations manager Elenoa Nimacere said this had been possible through joint efforts by Vinaka Fiji staff members and villagers.

Giant swells on Sunday left debris on the Queen’s Road near Vatukarasa Village in Nadroga. Picture: Kitione Tuapati Jr
A documentary on India’s disappearing beaches highlights how erosion is triggered by certain construction projects that hinder natural patterns of sand movement.

Images of menacing waves pounding on the walls of a concrete house, worried faces of villagers, and an aerial shot of the eroding coastline are some of the first thought-provoking images that arrest the attention of viewers of the documentary, ‘India’s Disappearing Beaches – A Wake Up Call’, produced by Shekar Dattatri for citizen’s group Pondy CAN.

But what follows next in the 15-minute public service film is even more startling.

“Beaches on India’s coast are disappearing at an alarming rate. Houses that were built from the high tide line are being thrown into the sea. This catastrophic consequence of coastal erosion is a human tragedy and a lesson for the future.”

The case of eroding coastline of Visakhapatnam too requires serious attention.—File Photo: K.R. Deepak
Multi Scale CVI

• Multi Scale CVI, A Cooper and S. McLaughlin, (University of Ulster, N. Ireland)

• Work in different scales
  – National level
  – Regional level
  – Local level

• Different parameters at different scale
Multi Scale CVI

- Solid geology
- Drift geology
- Shoreline type
- Elevation
- River mouths
- Orientation
- Inland buffer

- Significant wave height
- Tidal range
- Difference in storm & modal wave height
- Storm frequency

INDEX

Socio-economic
- Population
- Cultural heritage
- Roads
- Railways
- Landuse
- Conservation status

Coastal Characteristics

Coastal forcing
Multi Scale CVI

Vulnerability = \( f \) coastal characteristics + coastal forcing + socio-economic
Multi Scale CVI

- Geology
- Topography
- Distance to the beach

• Ongoing erosion
• Sea defence

- Housing
- Industry
- Roads
- Railways
- Cultural heritage
- Recreation
- Conservation status
### Value for Coastal Characteristics, CC

<table>
<thead>
<tr>
<th>Parameter/Värde</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geology</strong></td>
<td>Solid material or very little sensitivity for erosion. (solid rock, moraine, hard clay)</td>
<td>Medium sensitivity for erosion. (gravel, coarse sand, silty moraine, clay silt, silty clay and peat)</td>
<td>Easily erodible material. (medium and fine sand, silt and alluvium)</td>
</tr>
<tr>
<td><strong>Topography/elevation (m)</strong></td>
<td>&gt;3 MSL.</td>
<td>1-3 MSL</td>
<td>0-1 MSL</td>
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<tr>
<td><strong>Distance to the beach</strong></td>
<td>&gt;200 m</td>
<td>50 – 200 m</td>
<td>0 – 50 m</td>
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<tr>
<td><strong>Ongoing erosion</strong></td>
<td>Presented as a line on the map</td>
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<td></td>
</tr>
<tr>
<td><strong>Sea defence</strong></td>
<td>Presented as a line on the map</td>
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</table>
Parameter: CC1 - geology

### ATTRIBUT

<table>
<thead>
<tr>
<th>ATTRIBUT</th>
<th>LEGEND</th>
<th>1-2-3-Klass</th>
</tr>
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<tbody>
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<td>Sten--block</td>
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<tr>
<td>Flygsand</td>
<td>Sand</td>
<td>3</td>
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<tr>
<td>Fyllning</td>
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<tr>
<td>Glacial finlera</td>
<td>Lera--silt</td>
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</tr>
<tr>
<td>Glacial finsand</td>
<td>Sand</td>
<td>3</td>
</tr>
</tbody>
</table>

**Legend:**
- Blockjord
- Flygsand
- Fyllning
- Glacial finlera
- Glacial finsand
- Sten--block
- Sand
- Fyllning
- Lera--silt
- Sand
- Som för underliggande jord
- 1-2-3-Klass
ArcGIS Model Builder

Map Algebra expression:

\[\frac{((\%CC1\%+\%CC2\%+\%CC6\%-3)*100)}{6}\]

Map Algebra expression:

\[\frac{((\%CC\_sub\_index\%+\ldots+\%SE\_sub\_index\%))*2}{14}\]
Sub-indices CC och SE
CVI-map
Interactive Web Map