

GEOINDICATORS OF COASTAL CHANGE IN THE HUMID TROPICS

MORTON, R. A., U.S. Geological Survey, Center for Coastal Geology, St. Petersburg, FL., U.S.A. 33701

The primary geoindicators applicable for monitoring changes in coastal processes and landforms in the humid tropics are: water level (relative sea level), shoreline position, wetlands distribution (especially mangroves), coral chemistry and growth patterns, landslides, and sediment sequence and composition. Most of these geoindicators are sensitive to regional tectonic processes of subsidence and uplift as well as anthropogenic alterations to fluvial discharge, water quality, and sediment supply. Where humid tropical coasts coincide with active tectonic margins, the seismicity geoindicator is critical to understanding coastal changes associated with co-seismic subsidence or uplift, tsunamis, and liquefaction. Extremely dense vegetation in some tropical regions obscures surficial features, greatly reduces the effectiveness of many remote sensing techniques, makes geo-referencing difficult, and inhibits ground observations. Consequently, the resolution needed to accurately monitor shoreline position and wetlands distribution may be limited. Vegetative successions also are indicators of fluvial and shoreline changes. Coastal landforms and sedimentary deposits that record late Quaternary environmental changes in the humid tropics are perched fluvial and marine terraces, delta plains, crevasse splays, peats and paleosols, beach ridges, inlets and shoals, and mud volcanoes. Where mountains are relatively near the shore, coastal rivers typically transport high discharge and high sediment load, and rivers commonly debouch directly into the ocean rather than into an embayment. In the southern hemisphere, large areas of the coast are unaffected by tropical cyclones. Nevertheless, these tropical coasts are vulnerable to other non-storm processes, such as El Niño events, that increase water levels and cause widespread flooding and beach erosion.