OAHU CIVIL DEFENSE AGENCY
CITY AND COUNTY OF HONOLULU
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12. Coastal Erosion

COASTAL EROSION

The beaches of Hawaii are vital economic, environmental, and cultural resources. A healthy, wide sandy beach provides protection against the effects of storm surge, tsunami flooding, and high surf impacts. The beach environment provides habitat for marine and terrestrial organisms with beach dependent life stages and is home to species of indigenous and endemic Hawaiian plants. Beaches are also the basis for the visitor industry, exceeding by a factor of three all other industries combined when providing direct income to the State. (DLNR, Coastal Erosion Management Plan, 2000)

Beaches change their shape, depth, and slope in response to wind, wave, and current forces, and the availability of sand. The sources and sinks of sand within a particular beach system and the mechanisms by which they affect the beach morphology are often cumulatively referred to as the sediment budget of the beach. Seaward sources of sand to the sediment budget of a beach include longshore currents moving sand along the coast and cross-shore currents moving sand onshore. Landward sources of beach sand include dunes, ancient shorelines, and other onshore sand deposits that release sand to the beach by the forces of the wind and waves. High waves will cause a beach to change its shape, or profile by redistributing sand across the shoreline.

Causes of coastal erosion and beach loss in Hawaii are numerous but, unfortunately, are poorly understood by the public and rarely quantified. Construction of shoreline hardening structures limits coastal land loss but does not alleviate beach loss and may actually accelerate the problem by prohibiting sediment deposition in front of the structures. Other factors contributing to beach loss include reduced sediment supply, large storms, and sea-level rise. Reduction in sand supply, either from landward or seaward (primarily reef) sources, can have a myriad of causes. Obvious causes such as beach sand mining and structures that prevent natural access to back beach deposits remove sediment from the active littoral system. More complex issues of sediment supply can be related to reef health and carbonate production, which in turn, may be linked to changes in water quality. Second, the accumulated effect of large storms is to transport sediment beyond the littoral system. Third, rising sea level leads to a landward migration of the shoreline. Dramatic examples of coastal erosion, such as houses and roads falling into the sea, are rare in Hawaii, but the impact of erosion is still very serious. The signs of erosion are much more subtle and typically start as a "temporary" hardening structure designed to mitigate an immediate problem which, eventually, results in a proliferation of structures along a stretch of coast. The natural ability of the sandy shoreline to respond to changes in wave climate is lost. It appears obvious that the erosion problem in Hawaii would be much less severe if adequate setback rules were established.

Coastal zones are dynamic areas that are constantly undergoing change in response to a multitude of factors including sea level rise, wave and current patterns, hurricanes, and human influences. Despite the fact that Hawaii appears to have a well-developed and comprehensive governmental system in place to respond to coastal erosion and beach loss, beach loss still occurs.

High winds and associated marine flooding from storm events such as Kona Storms and hurricanes, sea level rise, seasonal high surf, stream flooding on coastal plains, all increase the risk exposure along developed coastal lands.

Coastal erosion and beach loss are chronic and widespread problems in the Hawaiian Islands. Typical erosion rates in Hawaii are in the range of 15-30 cm/yr (0.5-1 ft/yr; Hwang, 1981; Sea Engineering, Inc., 1988; Makai Engineering, Inc. and Sea Engineering, Inc., 1991). Oahu shorelines are by far the most studied. Recent studies on Oahu (Fletcher et al., 1997) have shown that nearly 24% or 27.5 km (17.1 mi) of an original 115 km (71.6 mi) of sandy shoreline (1940s) has been either significantly narrowed (17.2 km; 10.7 mi) or lost (10.3 km; 6.4 mi). Nearly one-quarter of the islands' beaches have been significantly degraded over the last half-century and all shorelines have been affected to some degree. The impact of the beach loss at Waikiki has been estimated to be about $700,000 to $1 million per year, in order to maintain the beach in its current state.

Waters slowly steal Waikīkī sand

By Matt Sedensky
ASSOCIATED PRESS

Millions of tourists voyage across the Pacific just to spread their beach towel on a patch of Waikīkī's warm, inviting sand.

Trouble is, there's not as much of it as there used to be.

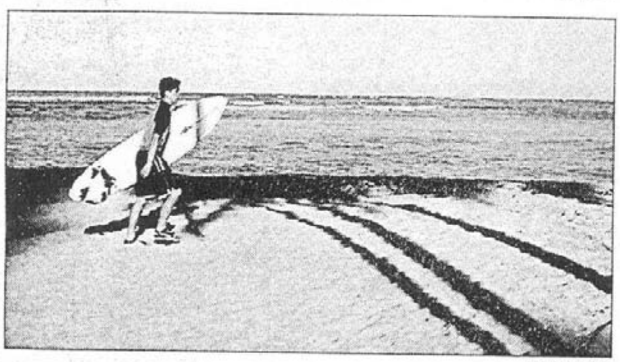
Waikīkī's beaches have been eroding an average of a foot a year since 1985, experts say. And as the shoreline shrinks and reefs fill with the sand moving offshore, many say it's time to protect the key asset of Hawai'i's best-known strip.

"The fundamental problem is that we haven't maintained the resource," said Chip Fletcher, a professor of coastal geology at the University of Hawai'i. "If we're going to insist on having a beach there, we've got to keep putting a fresh coat of paint on it."

Waikīkī Beach was artificially widened three generations ago in anticipation of a surge in popularity, but officials have done little over the years to maintain its plus-size status.

Now, after years of wrangling, state lawmakers included $700,000 in the state budget to widen Kūhiō Beach. But even taking into account an estimated $1 million allocated by the federal government over the past three years, the money will hardly put a dent in the cost of full sand replenishment

See WAIKĪKĪ, A28



Associated Press
Erosion has shortened the beaches and changed wave breaks along Waikīkī.

FROM PAGE A23

along Waikīkī.

Sam Lemmo, Coastal Lands Program manager with the state Department of Land and Natural Resources, says the price is up to $25 million to fix the entire length of Waikīkī.

"It's way overdue," said state Rep. Galen Fox, R-23rd (Waikīkī, Ala Moana, Kaka'ako). "We very much need sand."

Originally a narrow sandy strip, Waikīkī grew from less than ½ mile long in 1925 to about 1.5 miles long today, Fletcher said.

Over the years, truckloads of sand were brought in, though rumors are rampant about its origin, from Australia to Moloka'i. Sand importation — common at beaches throughout the world — largely stopped in the early '70s.

And for all the sand brought in, Fletcher estimates that 100,000 cubic yards receded into the Pacific since 1951 — filling in reefs, creating shallower water and changing the way the surf breaks.

"It's very disappointing to see the small amount of sand left," said Robert Finley, chairman of the Waikīkī Neighborhood Board, which has lobbied for sand replenishment.

It's likely that few Waikīkī sunbathers notice much wrong with the beach or water. But aficionados who have made Waikīkī's beaches a part of their life say the area has seen significant changes.

"Waikīkī is such a unique spot that when you start to fill the reef contours, the wave takes on a different personality," said George Downing, vice president of Save Our Surf, an advocacy group focusing on coastal issues.

Some small projects aside, little has been done in the past three decades to restore Waikīkī's sand volume. After more than 20 years out of the public eye, the issue motivated a number of studies in the early to mid-1990s.

While some money is now set aside for Kūhiō Beach and perhaps other sections of the shoreline, no definitive project is on the horizon, and even smaller undertakings are probably years away.

Lemmo said completing environmental impact statements and acquiring permits could delay use of allotted money three or more years.

Still, what concerns many is how the sand eventually will be replenished. Officials could choose to truck it in — the method used before. Or, as many are urging, sand that has receded into the water could be pumped back to the beach.

"We're opposed to them bringing in sand from other venues," Downing said.

"The place to go ... is not to get new sand," said Fletcher. "It's to reclaim the sand that's been lost from the shore."

The sand was lost in the first place because of ocean movements, not overuse. Waves created by the trade winds tend to erode the beach. Summer's large swells bring some sand back in. The end result is a coastline that needs constant maintenance to keep a steady volume of sand.

"Waikīkī is a man-made beach," Lemmo said. "If you're going to build something, if you're going to create something, you've got to care for it."

Impoundment

In addition to the natural processes that cause erosion, human alterations are affecting erosion rates. Human interference with sand transport processes underlies much of the chronic erosion impacting portions of the shoreline. The original sandy shoreline along many segments of coast has been replaced by shoreline hardening structures of various designs and construction materials (i.e., seawalls, revetments, groins of concrete, stone, and wood). The presence of a shoreline structure is indicative of an erosion hazard, but in many places the structure probably exacerbates the problem and changes a condition of shoreline erosion into one of beach loss (Fletcher et al., 1997). Coastal lands are typically composed of carbonate sand in Hawaii; therefore, when they experience chronic erosion and the shoreline shifts landward, a supply of sand is released to the adjoining beach and near-shore region. The beach then remains wide even as it moves landward with the eroding shoreline.

Most beach sand in Hawaii is composed of carbonate grains derived from the skeletons of corals, mollusks, algae, and other reef-dwelling, carbonate-producing organisms. Sand supplies are limited relative to mainland coasts where terrigenous sand derived from large rivers and other sources dominate. The formation of beachrock, storage of sand in coastal dunes, and irretrievable sand loss to deeper water beyond the reef crest all contribute to relatively low volumes of sand available to the system. On many Hawaiian beaches, the available sand ends beyond the toe of the beach in a water depth of 1.2-1.8 m (4-6 ft) where the bottom becomes reef or a reef pavement. In contrast, on mainland beaches the sand deposits often extend a considerable distance (hundreds to thousands of meters) offshore.

Sediment impoundment accompanies coastal armoring. Sands that would normally be released into coastal waters during high wave events and with seasonal profile fluctuations are trapped behind walls and revetments and prevented from adding to the beach sediment budget. One wall may have minimal impact, but along many Hawaiian coastlines myriad armoring types combine to reduce sand availability to nearly zero. Natural coastal erosion does not damage beaches that have access to a robust sediment budget. Armoring traps those sands and a sediment deficiency develops, such that the beach does not withstand seasonal wave stresses and begins to narrow with time. Chronic beach erosion and beach loss eventually results. If sand is not available to the beach, such as when a wall is built to protect the land (e.g., sand is trapped behind the wall), then beach erosion will ensue as a result of sand impoundment, which leads to beach narrowing and eventually beach loss.

Table 12-1 Beach Narrowing and Loss on Oahu (adapted from Coyne et al., 1996 and Fletcher et al., 1997)

Beach Condition and Change	Mokuleia	Kaaawa	Kailua-Waimanalo	Maili-Makaha	Island-wide
Originally sandy (km)	12.2 +/- 1.0	7.5 +/- 0.6	15.5 +/- 1.3	6.0 +/- 0.5	115.6 +/- 9.8
Narrowed beach (km)	2.1 +/- 0.2	3.2 +/- 0.3	0.9 +/- 0.1	1.3 +/- 0.1	17.3 +/- 1.5
Lost beach (km)	0.2 +/- 0	0.8 +/- 0.1	1.6 +/- 0.1	0.2 +/- 0	10.4 +/- 0.9
Degraded beach (%)	18.7	53.6	16.3	24.9	23.9
Net shoreline change rate (m/yr)	-0.2 to 0.3	-1.7 to 1.8	-0.9 to 0.6	-0.4 to 0.6	N.C.
Non-armored mean sandy beach width (m)	26.8	13.2	22.4	43.7	N.C.
Armored mean sandy beach width (m)	12.8	8.9	7.1	24.5	N.C.
Mean long-term shoreline change rate for armored sites (m/yr)	-0.2	-0.3	-0.6	-0.5	N.C.
Range of shoreline change rates for armored sites (m/yr)	-0.1 to -0.3	0 to -1.7	0.2 to -1.8	-0.2 to -1.0	N.C.

In Hawaii, coastal erosion issues are addressed by three layers of jurisdiction with varying degrees of overlap and coordination: The Army Corps of Engineers; the State Coastal Zone Management Program and State Department of Land and Natural Resources, and County Government. Federal jurisdiction applies to the navigable waters of the United States, extending from the mean high water mark to the 200-mile limit of the Exclusive Economic Zone. State jurisdiction is the conservation district, which extends from the certified shoreline (often the vegetation line) to the limit of state territorial waters. County jurisdiction extends landward from the certified shoreline to the limit of the special management area boundary, which varies in width from a couple hundred yards to a few miles.

Sea Level

Hawaii has a system of tide gauges, maintained and operated by the federal National Ocean Service, located on the islands of Kauai, Oahu, Maui, and Hawaii that record fluctuations in sea-level. Analysis of these records provides scientists with rates of long-term sea-level rise around the state. A fascinating outcome of this has been the realization that each island has its own rate of rising sea level. This is not because of ocean behavior, it is due to island behavior. The Big Island, because of the heavy load of geologically young volcanic rocks, is flexing the underlying lithosphere causing the island to subside. This creates a relatively rapid rate of sea-level rise, on the order of 1.5 in/decade. Because it lies near the Big Island and is also geologically youthful, Maui is affected by the flexure process and is experiencing rapid sea-level rise, nearly 1 in/decade. Oahu and Kauai lie outside the area of subsidence and have lesser rates of rise, approximately 0.6 in/decade.

Sea-level rise is not presently a cause for alarm. Questions regarding future rates of rise resulting from an enhanced greenhouse effect have been discussed by scientists, planners, and policymakers throughout the 1980's and 1990's. At present, sea level is projected to rise 2 ft over the 21st century. This is more than twice the rate of rise of the 1900's. The impact of rising sea level in the Hawaiian Islands will be severe unless planners and resource managers incorporate sea-level rise scenarios into their coastal management efforts. As sea-level rise accelerates in the future, low-lying, low relief, readily erodeable, and low slope coasts will be the most vulnerable to sea-level hazards. (A more complete discussion of future sea levels and impacts is available in Fletcher, 1992.)

Present rates of sea-level rise play a role in coastal retreat. The engineers' "Bruun Rule" (relating sea-level rise to beach retreat (Bruun, 1962)) predicts a retreat of 4-5 ft/decade on Oahu (Hwang and Fletcher, 1992). This finding is supported by aerial photographic measurements of beach retreat and suggests that presently narrow beaches fronting seawalls on these islands are likely to be lost over the next quarter century.

Hwang (2003) has recommended an Erosion Zone Formula that consists of three major factors: the trend risk, the storm erosion event, and a design safety buffer.

Erosion Zone = Trend Risk + Storm Erosion Event + Design Safety Buffer

The Trend Risk is determined by multiplying the planning lifetime of buildings times the erosion rate. The erosion rate is adjusted for errors (FEMA CCM, 2000) and sea level rise.

Trend Risk = (Life Expectancy of Structures) x (Erosion Rate x Adjustment for Errors x Adjustment for Accelerated Sea Level Rise)

Thus, the parameters needed to determine the erosion zone are:

- Planning Period – Determined by Life Expectancy of Structures
- Average Annual Erosion Rate
- Adjustment of Erosion Rate for Errors
- Adjustment of Erosion Rate for Accelerated Sea Level Rise
- Storm Erosion Event
- Design Safety Buffer

Table 12-2 Extent of Erosion Zone Given Erosion Rate and Life Expectancy

Erosion Rate ft./yr.	Adjusted Rate for Errors (20%)	Adjusted Rate for Errors and Accelerated Sea Level Rise (20%) x (10%)	Storm Event	Safety / Design Buffer	Erosion Zone 70-yr. Life of Structure	Erosion Zone 50-yr. Life of Structure
0	0.12	.013	20	20	49	35
.1	0.12	.013	20	20	19	35
.2	0.24	0.26	20	20	58	41
.3	0.36	0.39	20	20	67	48
.4	0.48	0.52	20	20	76	54
.5	0.60	0.66	20	20	86	61
1.0	1.20	1.32	20	20	132	94
1.5	1.80	1.98	20	20	179	128

For areas that are accreting, the erosion rate should be treated as zero, since HRS Section 183-45 prohibits building structures on accreted land. For areas with an erosion rate of 0, the setback is based on an erosion rate of 0.1 ft./yr. Factors related to the accelerated sea level rise adjustment or the storm event of 20 feet may be analyzed by a consultant to determine if a different number is warranted for a specific site. This analysis assumes no adjustments for erosion rate variability.

For Oahu, there is a 60-foot setback for new subdivisions. This would be comparable to the setback for structures with a 50-year life and an average erosion rate of 0.5 ft./yr. (5 ft./decade). However, the fixed 60-foot setback would be too small if the measured erosion rate increases or for a longer building lifespan. For example, if the erosion rate is 0.5 ft./yr., the setback for a 70-year structural lifespan should be about 86 feet.

The FEMA CCM recommends that for the building lifetime, a minimum of 50 years be utilized. 70-year extended time frame recommended by Hwang is based on a study conducted for the Federal Insurance Administration, Department of Housing and Urban Development to establish reliable estimates for the life of coastal residential structures (Anderson, 1978).

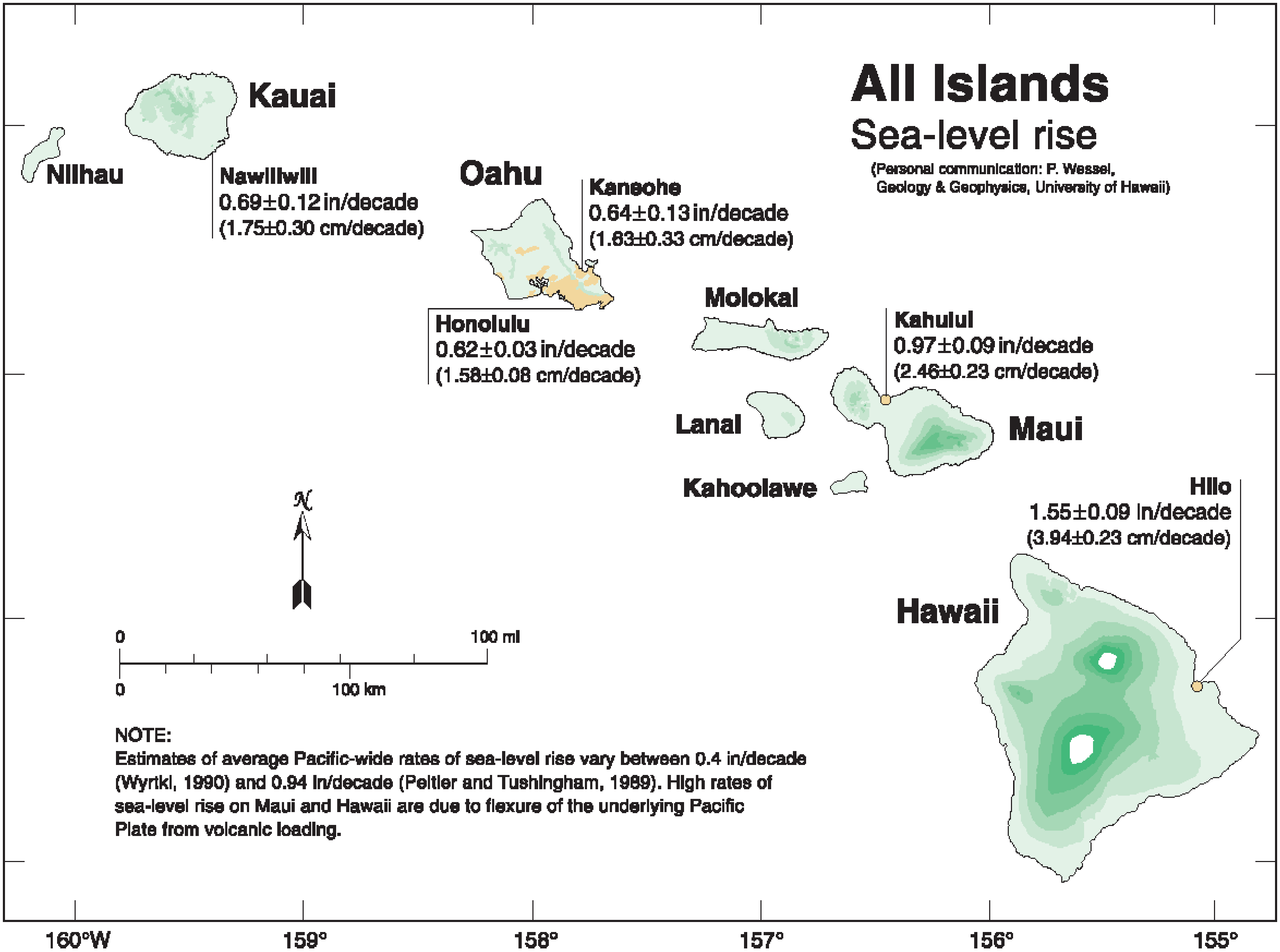

All Islands
Sea-level rise
(Personal communication: P. Wessel, Geology & Geophysics, University of Hawaii)
Kauai
Niihau
Nawiliwili
0.69±0.12 in/decade
(1.75±0.30 cm/decade)
Oahu
Kaneohe
0.64±0.13 in/decade
(1.63±0.33 cm/decade)
Honolulu
0.62±0.03 in/decade
(1.58±0.08 cm/decade)
Molokai
Kahului
0.97±0.09 in/decade
(2.46±0.23 cm/decade)
Lanai
Maui
Kahoolawe
Hilo
1.55±0.09 in/decade
(3.94±0.23 cm/decade)
Hawaii
N
0
100 mi
0
100 km
NOTE:
Estimates of average Pacific-wide rates of sea-level rise vary between 0.4 in/decade (Wyrtki, 1990) and 0.94 in/decade (Peltier and Tushingham, 1989). High rates of sea-level rise on Maui and Hawaii are due to flexure of the underlying Pacific Plate from volcanic loading.
22° N
21°
20°
19°
160°W
159°
158°
157°
156°
155°

TABLE 12-3 Hazard Intensity Rank Definitions				
Hazard	**Low (1)**	**Moderately Low (2)**	**Moderately High (3)**	**High (4)**
Erosion	long-term accretion (>10 yr) with no history of erosion, or dynamic cycles with consistent annual accretion	long-term stable or minor erosion / accretion cycles with erosion fully recovered by accretion; low rocky coasts; perched beaches	long-term erosion rate <1 ft/yr or highly dynamic erosion / accretion cycles with significant lateral shifts in the shoreline	chronic long-term erosion >1 ft/yr, or beach is lost, or seawall at water-line for portions of the tidal cycle
Sea Level (0.04 in=1mm)	steep coastal slope where rise >0.04 in/yr or gentle slope where rise <0.04 in/yr	gentle or moderate slope, where rise >0.04 in/yr or steep slope where rise >0.08 in/yr	gentle or moderate slope, where rise >0.08/yr or steep slope where rise >0.12 in/yr	gentle or moderate slope, where rise >0.12 in/yr

Federal
Army Corps of Engineers

An Army Corps permit must be obtained for any dredge, fill, and/or discharge activities regardless of land ownership.[1] Corps permits will not be issued until all other applicable state and county permit requirements have been met. In addition to the navigable waters authority, federal jurisdiction is triggered for projects needing a federal permit if significant federal funding is involved, or if any major federal action significantly affecting the environment is required.[2]

Pertinent Legislation

- **Section 10, Rivers and Harbors Act of 1899** (33 USC 403) – *prohibits the obstruction or alteration of navigable waters of the United States without a COE permit*
- **Section 404 Clean Water Act** (33 USC 1344) – *prohibits discharge of dredged or fill material into waters of the US without a COE permit*
- **Section 103, Marine Protection, Research and Sanctuaries Act of 1972**, as amended (33 USC 1413) – *authorizes the COE to issue permits for the transportation of dredged material for the purpose of dumping it into ocean waters*

[1] Section 10, Rivers and Harbors Act of 1899 (33 USC 403); Section 404 Clean Water Act (33USC 1344); Section 103, Marine Protection, Research and Sanctuaries Act of 1972 as amended (33 USC 1413).
[2] The National Environmental Policy Act of 1969 (NEPA) requires the preparation of a federal Environmental Impact Statement (EIS) or Environmental Assessment (EA).

State
Hawaii Coastal Zone Management Program

The National Coastal Zone Management Act (CZMA) was enacted in 1972 to assist coastal states in developing management policies for the coastal resources located within the state coastal zone. Coastal erosion is specifically mentioned in the CZMA as an area of concern to be addressed by state policy. The CZMA requires that state programs include a planning process for assessing the effects of shoreline erosion, study ways to lessen the impact, and restore areas adversely affected by erosion. (Oceanit, Inc. and Sullivan, J.N., 1990)

The Hawaii Coastal Zone Management Program (CZMP) was enacted in 1977 (Chapter 205A, HRS). Hawaii's coastal zone includes all lands, and all waters from the shoreline to the seaward limit of the state's jurisdiction. The State Office of Planning (OP), in the State Department of Business and Economic Development and Tourism (DEBEDT), is the lead agency for administering the CZMP in Hawaii. The OP administers the CZMP through a network of state agencies and the county planning departments. The erosion planning and management activities fall primarily under the jurisdiction of the counties through the administration of the Special Management Area (SMA) and shoreline setback provisions of Chapter 205A, HRS, and the Department of Land and Natural Resources (DLNR), Conservation District Regulations. The boundary of the SMA is from the ocean generally to the nearest highway or minimum of 300 ft.

Land Use/Zoning

The Conservation District includes all submerged lands seaward of the shoreline, to the limit of state territorial waters. The Board of Natural and Land Resources (BNLR), staffed by the DLNR, is responsible for establishing the procedures and certifying where the shoreline is located, and for promulgating and administering the Conservation District use Regulations. All activities proposed within the Conservation District must submit to an application and review permit in order to obtain a Use Permit (CDUP) from BLNR.

Certified Shoreline

The State Board of Land and Natural Resources was authorized by Chapter 205A, HRS, to adopt rules for determining the shoreline and appeals of shoreline determinations, and to enforce the established rules. The coastal setback in Hawaii is measured from the Certified Shoreline, defined in the CZM as:

The upper reaches of the wash of the waves, other than storm and seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves. (HRS 205A)

This definition creates problems as there are many variables associated within the measurable limits of building space on the shore. Unfortunately the “edge of vegetation growth” or the landward limit of development, all too often appears to be migrating seaward as commercial interests and homeowners frequently landscape their beachfront in order to gain valuable coastal building space. The cumulative effect of this practice “constitutes a slow but inexorable encroachment of development upon the hazardous and fragile beaches of Hawaii. (Fletcher 2000) Also, measuring by the variable characteristics of wave run-up does not allow for a more accurate means of measurement, such as a fixed natural monument or datum with measurable characteristics. (Fletcher 2000)

Problems also arise when the basis of measurement is determined by unobservable phenomenon identified by the property owner’s surveyor. Although the State Surveyor “certifies” the position of the shoreline on a case-by-case basis, the caseload consists of 200 applications per year, rendering it impossible to visit each application that could be located on any of the seven Hawaiian Islands.

Mitigation Actions to Reduce Damages Caused by Coastal Erosion

It would be appropriate that any lots with a history of erosion would be fully disclosed along with any county policy against hardening of the shoreline with seawalls and revetments. If a landowner knows there is a disclosure requirement for erosion, or any policy against hardening of the shoreline, the tendency would be to make a greater effort to plan for this hazard when lots are created in the subdivision process.

Recommendations for Disclosure of Hazard Risks

- The legislature should consider changes to the Mandatory Seller Disclosures in Real Estate Transactions Act to require disclosure regarding exposure to erosion, bluff erosion, and lava as well as disclosure of any county policy against hardening of the shoreline for new structures as a material fact.
- The legislature or Department of Commerce and Consumer Affairs should consider changes to the Uniform land Sales Act to require a public offering statement for small subdivisions (less than 20 acres) along the coast in order to notify potential purchasers of the risks of natural hazards.
- County planning departments should continuously evaluate the status of State laws regarding the disclosure of hazard risks. Any gaps can be compensated for by requiring disclosure to prospective purchasers as a condition for a land use approval. The disclosure would be for any erosion or hazard risks (e.g., intentionally building in an erosion zone) and for any county policy regarding hazard mitigation (e.g., policy against shoreline hardening).
- The landowner should properly design lots and structures for natural hazards. Along with disclosing the risks of coastal hazards, the benefits of the enhanced design can be marketed.
- The prospective purchaser of real estate (empty lots or lots with a residence) should fully investigate the physical condition of the site to assess the risks of erosion and other natural hazards. Due diligence should not be compromised by belief that consumer protection laws will address all risks or issues. Generally, consumer protection laws do not place a duty on the seller to investigate problems, only a duty to disclose what is material and known.
- Due diligence by the prospective purchaser may include: (1) review of existing reports on erosion and coastal hazards (Appendix A), (2) hiring a consultant (Appendix B), (3) review of the report "Natural Hazards in the Hawaiian Coastal Zone," (Fletcher, et al., 2002), (4) a site visit to check for evidence of erosion or other hazards, (5) specific questions that are posed to the seller of the property and (6) specific requests for information on the physical condition of the property.
- Produce a real estate brochure to inform potential purchasers of the risks of coastal hazards and how to identify those risks.

Disclosure of Hazard Risks During Property Transfer - Summary of recommendations regarding disclosure to prospective purchasers during the lot transfer stage of development.

Define Statewide Erosion Hazard Zones and Map Base Flood Elevations

Managers and decision-makers need to have detailed information on the pattern and history of erosion along our coastline. Data on both chronic and episodic erosion hazards is crucial when determining effective building setbacks. This information can be integrated with the FEMA Flood Insurance Rate Maps that set Base Flood Elevations for housing construction in coastal flood zones. This data can be established in a variety of media including digital layers on various GIS systems, CD ROMS for desktop viewing, downloaded or viewed interactively from on-line sites, and as hard-copy map products. A series of these reference photomaps would greatly enhance the ability of managers to assess the potential impacts of actions in a physical setting and with knowledge of shoreline change patterns.

Numerical Wave Run-up and Storm Surge Models Should Be Developed

Land management and disaster mitigation agencies should support development of numerical wave run-up and storm-surge models (and their field verification) to predict and improve the understanding of wave impacts, flooding patterns, coastal processes, and to augment the shoreline certification process. Numerical modeling can be a valuable source of information for formulating guidelines for the safe siting of coastal development, defining BFEs for building codes, and for improving the evaluation of the certified shoreline and the appropriateness of the existing setback regime in Hawaii. Surge and run-up models can be used to improve understanding of adequate Base Flood Elevations for currently unmapped regions of the coast in Hawaii where the FEMA does not offer guidance on site elevations for buildings. Models should address run-up characteristics (magnitude, recurrence interval, and elevation) of tsunami, storm surge, swell, and locally generated wind waves.

State Plans to Hasten Process to Replace Sand

Dune and Beach Maintenance

Sand dunes and wide beaches protect inland properties by providing a barrier and breakwater for coastal storms. Maintenance programs can preserve these features and, in some cases, increase their size or effectiveness.

Maintenance of dunes and beaches include protection from disruption by traffic or construction through regulations against foot and vehicle traffic and building codes. Stairs and boardwalks over dunes protect the sand and the plants that help keep the sand in place. Other maintenance projects including planting vegetation and installing fences that catch and hold sand.

Beach nourishment differs from beach maintenance in that sand is excavated from one site and placed to prevent a retreating beach. The effectiveness of nourishment programs depend on the type of sand imported, the slope of the natural beach, cross shore currents, and the frequency of storms. Therefore, careful professional design is essential.

The State Department of Land & Natural Resources is planning to speed up review of sand replenishment requests for beaches that have lost sand. New, quicker permits would not exceed 10,000 cubic yards or sand per project, and the State would ideally take about three months to process the request.

The new process allows the applicant to seek State and Federal approvals under a single permit and for the review to take place simultaneously. The applicant still would have to obtain county approvals separately.

The reviewers include the U.S. Army Corps of Engineers, State Department of Health water quality officials and State Land Board members.