Planning for Coastal Hazards and Community Resilience in West Maui

With Particular Attention to Climate Change and Sea Level Rise

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Located in the central Pacific, Hawaii is uniquely vulnerable to natural hazards.

coastal storms
photo: Shawn Racem

coastal erosion
photo: Shawn Racem

high wave flooding
photo: Asa Ellison
Coastal Erosion is Widespread in West Maui

• 85% of beaches undergoing long-term (chronic) erosion

• Beaches eroding 0.5 ft/yr on average

• 2.4 miles (14%) of beaches have been completely lost to erosion and seawall construction over the past century

• West Maui beaches also have high seasonal variability, increasing risks

Updated State Hazard Mitigation Plan (2018) : Includes assessment of increasing coastal flood hazards with sea level rise
Climate Change is having a variety of impacts on Hawaii and the Pacific Islands

Sea level is rising around Maui and Hawaii

= ~8+ inches per century
The rate of global mean sea level rise is increasing

Global Mean Sea Level Change

- Adjusted Tide Gauge Data
- Satellite Radar Altimetry

- 3.2 mm/yr
- 1.2 mm/yr
- 0.6 mm/yr

The rate of global mean sea level rise is increasing. Hansen et al., 2015; Church and White, 2011; Nerem et al., 2010; Hay et al., 2015; Yi et al., 2015

NOAA 2017 Global Mean SLR Scenarios

**2050 forecast**
0.2 – 0.6 m, Intermediate = 0.3 m (1 ft)

**2100 forecast**
0.5 – 2.5 m, Intermediate = 1.0 m (3 ft)
Sea level rises in two styles

The Hawaii Sea Level Rise Vulnerability and Adaptation Report and Viewer

climateadaptation.hawaii.gov  hawaiisealevelriseviewer.org
Passive (high-tide) flooding

Annual high wave flooding

Coastal erosion

Sea Level Rise Exposure Area (SLR-XA)
Sea Level Rise Exposure Area (SLR-XA)

Potential loss of private lands and structures in the 3.2 ft SLR-XA
Potential impacts to West Maui CP Area with 3.2 feet of sea level rise

Response & Adaptation Strategies for Coastal Hazards

- **Protect (Harden)**
  - Prioritize protecting people and property
  - Typically employs shoreline armoring (e.g., seawalls)

- **Accommodate**
  - Require building construction or retrofit for improved resilience
  - Limit shoreline armoring

- **Retreat (Planned Realignment)**
  - Discourage development in hazard-prone areas
  - Plan for relocation of existing development inland

- **Preserve**
  - Preserve and restore coastal environments for ecosystem value and as a natural buffer to coastal hazards
Planning Related Strategies

- Consider the 3.2 feet Sea Level Rise Exposure Area (3.2 SLR-XA) in planning decisions
  - The 3.2 SLR-XA has been formally recognized by the County of Maui through a Mayoral proclamation and a County Council Resolution
  - The Community Plan may provide a venue for identifying specific strategies and actions
- Support resilience actions that provide multiple benefits
- Consider sea level rise in designing and siting development
- Prioritize new development outside of the 3.2 SLR-XA
- Identify urban lands outside of the 3.2 SLR-XA suitable for smart growth
- Integrate sea level rise into capital improvement planning for all County Departments and public facilities
Plan for disaster impacts and rebuilding

- Disaster can be an opportunity to improve resilience to future impacts, particularly for existing vulnerable development
  - Consider redevelopment scenarios based on a major disaster event occurring in West Maui
  - Limit rebuilding in areas vulnerable to sea level rise

Policy Related Strategies

- Consider adjusting Special Management Area (SMA) boundaries to coincide with the 3.2 SLRXA
- Consider adjusting shoreline development setbacks based on new information about SLR exposure (underway)
- Adopt siting and design standards to enhance resilience in public housing and affordable housing projects
Other Strategies and Needs

• Develop innovative and sustainable financing and incentives to support adaptation to sea level rise
  • tools such as improvement districts and community facilities districts
• Conduct detailed vulnerability assessments for existing critical infrastructure
  • 6 feet in plans for critical, low-tolerance, long-lived infrastructure
• Commission additional sea level rise exposure modeling for six feet or more of sea level rise to use in vulnerability assessments of critical infrastructure

Other Strategies and Needs

• Develop an inventory of private wastewater systems (septic systems, cesspools) that may be affected by sea level rise
• Develop an inventory of natural and cultural resources and practices impacted by sea level rise along with preservation plans
• Inventory and evaluate shoreline access locations
• Explore options for beach and coral reef preservation
Climate change is an opportunity to do what we should have been doing all along.