



Hazard zone signage

SECTOR: IX. PUBLIC SAFETY & HAZARDS RESILIENCY

Educating our people and practicing public safety and preparedness for hazards is part of what it means to live on Kaua'i. The better prepared each of us are to do our part, the safer and more resilient we will be as a whole.

Planning for Hazards and Resilience

As an island susceptible to a host of natural hazards, Kaua'i is committed to becoming a disaster-resilient community. In June of 2015, Mayor Bernard Carvalho signed an executive order "To Sustain Kaua'i as a Disaster Resilient Community." The General Plan broadens "resilience" to include economic resilience, community health, and the many other factors that influence how well a community can withstand and recover from disasters. This sector focuses on public safety and hazards resiliency. Maps showing hazard areas around the island and critical public facilities are included in Chapter 5.

Hazard mitigation refers to actions and measures taken before an emergency occurs and includes any activity to reduce the impacts from a disaster. It reduces the damages and costs of response and recovery, allowing communities to more quickly bounce back. Assessing risks is a key component in identifying the actions that can be taken to mitigate negative impacts.

Supporting and protecting the facilities and systems needed for recovery is a key part of the equation. Harbors and airports need to be maintained so that they can withstand severe events. Roads, power plants, and critical infrastructure located in high

hazard areas should be relocated to less vulnerable areas. If relocation is not possible, then they should be hardened. Buildings must follow the most recent codes and wind loading requirements. Emergency warning systems and communications systems need to be kept in good working order. Small businesses, as the backbone of Kaua'i's economy, should have continuity plans and assistance so they can bounce back quickly following disasters.

1. POLICE, FIRE, OCEAN SAFETY, AND EMERGENCY SERVICES

Our first responders are critical to maintaining health and safety on our island. As the population grows, we need to do our part to ensure that police, fire, and emergency services are supported and that our resident and visitor populations are educated about ocean safety and fire prevention.

Objective: To ensure adequate coverage of public safety and emergency services as Kaua'i grows.



1.1 Ensuring the Safety of the Resident and Visitor Population

Kaua'i's police, fire, and emergency services departments provide a wide range of security and emergency response duties for residents and visitors.

Kaua'i's three police stations are located in Hanalei, Waimea, and Lihu'e, with a force of 161 police positions. Kaua'i had a ratio of 1.79 officers for every 1,000 persons in 2015 (including residents and visitors), but the size of the police force has not expanded in over 25 years. In order to achieve the national average for police presence, Kaua'i would need to add 109 officers by 2035 to service the projected residential and visitor population.⁵¹

Kaua'i's Fire Department responds to multiple types of hazards, including structural and outdoor fires,

ocean and backcountry rescues, aircraft accidents, and hazardous materials emergencies. The Department also conducts fire inspections and investigations, and handles fire code review and enforcement. There is at least one station in each planning district capable of addressing all basic fire and medical calls. Kaua'i had 135 firefighters in 2015, which translates to two firefighters per 1,000 persons. This ratio is favorable compared to the national average of approximately 1.76 firefighters per 1,000 persons. This level of expansion would require adding two or three new fire stations, most likely in Kīlauea, Kōloa, and Līhu'e. A related infrastructure issue is that certain bridges are undersized to handle larger emergency response vehicles.

The Fire Department's hazardous materials (hazmat) operations were previously focused on environmental accidents in industrial centers and on transportation corridors. With the increased national focus on terrorism since 2001, current hazmat responsibilities must also address chemical, biological, radiological, nuclear, and environmental hazards from foreign or domestic terrorism. The needed skills sets and testing equipment to address these responsibilities have required significant additional training.

1.2 Promoting Ocean Safety

As a community with substantial marine recreational activity, the Fire Department's role in ocean safety is extremely important for residents and visitors. Kaua'i's shorelines are popular and attractive for swimming, surfing, and other water sports. They are also notoriously dangerous, particularly for weaker and inexperienced swimmers. The Fire Department is responsible for the Ocean Safety Bureau, which includes ten lifeguard towers, three jet-ski operations around the island, and 45 Water Safety Officers. Education and community awareness programs also support improved water safety.

A. PERMITTING AND CODE CHANGES

1. Maintain effective levels of public safety services to protect the growing population.
2. Upgrade and enhance facilities to address existing vulnerabilities and support necessary growth in emergency response personnel.

51 Adequacy of Future Infrastructure Analysis, 2016

B. PROJECTS AND PROGRAMS

1. Upgrade bridges in key areas to ensure emergency vehicles can service all residents and visitors.
2. Construct new fire stations to accommodate anticipated growth in the firefighting force.
3. Strive to attain a police force, firefighting force, and water safety officer force whose coverage meets or exceeds national standards.
4. Support continuous training for all emergency response officers.
5. Encrypt County radio communications systems.

C. PARTNERSHIP NEEDS

1. Support the State and County's coordinated response system to wildfires.
2. Implement and update the *Kaua'i Community Wildfire Protection Plan*.
3. Strengthen hazard monitoring systems, such as stream flow and river gauges.
4. Participate in quarterly disaster response training and exercises.



Beach Rules Sign, East Kaua'i. Photo by Travis Okimoto

2. HAZARDS RESILIENCY

There is probably no greater challenge to a community's resilience than a natural disaster, like Hurricane 'Iniki which struck Kaua'i in 1992. Hurricane 'Iniki affected all community members, regardless of their age or economic status. Strengthening resilience to these types of events will require the community and County government to function as one 'ohana. Hazards resiliency is built on coordination amongst the community, all levels of government, and the private sector to mitigate against, prepare for, respond to, and recover from natural disasters, acts of terrorism, and other threats and hazards.

Objective: To ensure that Kaua'i is resilient to natural disasters and other emergencies.



2.1 Responding to Natural Disasters and Emergencies

Kaua'i's most common natural hazards include flooding, wildfires, storm surges, tsunamis, and hurricanes. The Hazard Map identifies vulnerable areas including extreme tsunami and tsunami evacuation zones, wildfire risk areas, and flood zones. Dams, critical facilities, and emergency shelters are also shown.

The Kaua'i Emergency Management Agency (KEMA), Police Department, Fire Department, State DLNR, and Army National Guard have extensive responsibilities in the event of natural disasters. It is important that first responders have effective communications systems, high levels of training, and emergency supplies that are well protected.

KEMA coordinates the County response to all hazardous weather events and operates a network of evacuation shelters in partnership with the Department of Education and the American Red Cross. KEMA works with Federal agencies such as

the National Weather Service and the Pacific Tsunami Warning Center to ensure Kaua'i residents and visitors receive life-saving information on potential hazards in a timely manner.

In the event of a major disaster, KEMA directs Federal disaster relief efforts, as well as recovery dollars, to ensure disaster relief funds reach communities in need and restore essential services as quickly as possible. Currently, KEMA is staffed with only six employees. To keep pace with the projected growth of the resident and visitor population, KEMA will need to increase the number of permanent positions in the organization, and the equipment and software packages it uses to fulfill its coordination functions will require improvement, expansion, and modernization.

2.2 Creating Resilient Communities and Prepared Citizens

Kaua'i understands the importance of planning and preparation at the individual and neighborhood levels. Depending on the scale and duration of the event, it could be days or weeks before recovery efforts begin in isolated neighborhoods. Consequently, some communities have developed their own plans and procedures for emergency response. The *Hanalei to Hā'ena Community Disaster Resilience Plan* (2014) provides a model that other communities can follow. The County provides information, programs, and resources to support community based preparedness efforts, such as Community Emergency Response Team (CERT) training to individuals and groups. The ultimate goal is to have CERT teams in every neighborhood.

The *Kaua'i Climate Change and Coastal Hazards Assessment* (2014) focused on the coastal hazards present on Kaua'i (erosion, flooding, wave inundation, and wind) and how these hazards are affected by climate change and sea level rise.

Kaua'i's Multi-Hazard Mitigation and Resilience Plan (MMRP) (2015) includes a definition of resilience that encompasses the need to strengthen and support community, economy, and environment alike:

"The communities of Kaua'i County actively build resilience through local planning and environmental initiatives. This resilience of the communities enhances their ability to withstand the impacts of disasters and longer term effects of climate change. Focus on agriculture and local livelihoods enhances sustainability, and will enable

survival should catastrophic events occur that prevent imported products from reaching Kaua'i. Environmental restoration efforts in the ahupua'a of Kaua'i have improved the ecological resilience of the environment."

Recommendations from both documents are incorporated into subsection actions.

2.3 Public Safety and the Tsunami Zone

Many transient vacation rentals are located within tsunami evacuation areas. Unlike resorts, which have tsunami evacuation plans and procedures in place to protect guests, visitors staying in units without onsite managers may be less prepared and more vulnerable should a disaster occur. Vacation rentals may not be equipped with emergency supplies or adequate information about warning sirens, evacuation shelters, and other important safety information. Informing visitors about tsunamis and other natural hazards should begin before they arrive on island at the time of booking. Educational materials should be readily available and prominently displayed. Clear signage indicating the tsunami evacuation area and evacuation routes will help those unfamiliar with the island to reach safety.

2.4 Homeland Security, Threats, and Health-Related Hazards

In addition to managing Kaua'i's susceptibility to natural hazards, KEMA and emergency response professionals (i.e., Police and Fire Departments) must also be prepared to mitigate and respond to potential threats that stem from society itself. Such security threats and health-related hazards include but are not limited to: acts of terrorism, acts of war, biological warfare/terrorism, nuclear attacks/threats, hazardous materials, and disease outbreaks and epidemics.

As with natural hazards, communities and school campuses must be educated on the best practices and techniques for preparing for and responding to these unique types of threats and hazards. This includes the universal understanding for all residents of what to do when prompted by the outdoor siren warning systems.

The Kaua'i Police Department is the lead agency responsible for Active Shooter Training for the County. Additionally, KEMA will occasionally coordinate Department of Homeland Security trainings on this issue. The Hawai'i Emergency Management Agency is the lead in public education and outreach for Nuclear/

Ballistic Missile Preparedness and Awareness; KEMA is the County lead, with support of on-island trained personnel from KPD, KFD, and the Department of Health, Kaua'i District Office. The State Department of Health, Kaua'i District Health Office is the on-island lead for all Public Health and Epidemiological emergencies; KEMA will assist with coordination amongst partners and relaying information to the public.

Actions that encourage hazards resiliency and community preparedness are provided below.

A. PERMITTING AND CODES CHANGES

1. Minimize coastal development in areas of high risk of erosion, flooding, tsunami inundation, and sea level rise.
2. Provide for adequate emergency shelters and communication systems in all planning districts.
3. Periodically review building codes and permitting standards for alignment with disaster risk reduction (DRR) efforts.
4. Designate areas to serve as public shelters when designing and constructing new public buildings.
5. Include conditions in transient vacation rental and homestay permits that require disclosure to visitors and occupants of hazard risks and instructions for evacuation in cases of natural hazards, such as tsunamis, hurricanes, or flooding. Require disclosure of hazards prior to reserving or booking.

B. PLANS AND STUDIES

1. Encourage community-based disaster resilience plans and incorporate components into future Community Plan updates. Plans should include an assessment of risks and vulnerabilities in the local economy to hazards.
2. Develop an inventory of Critical Infrastructure and Key Resources, according to the standards of the National Incident Management System (NIMS), which can be used for mitigation and disaster recovery efforts.
3. Work with the State Office of Conservation and

Coastal Lands (OCCL) to update the *Coastal Erosion Mitigation Plan* for Kaua'i.

4. Identify and index communities that have existing disaster resilience plans. Provide support to current and ongoing community hazard risk reduction, mitigation, and planning efforts.
5. Periodically review and update the *Multi-Hazard Mitigation and Resilience Plan*.

C. PROJECTS AND PROGRAMS

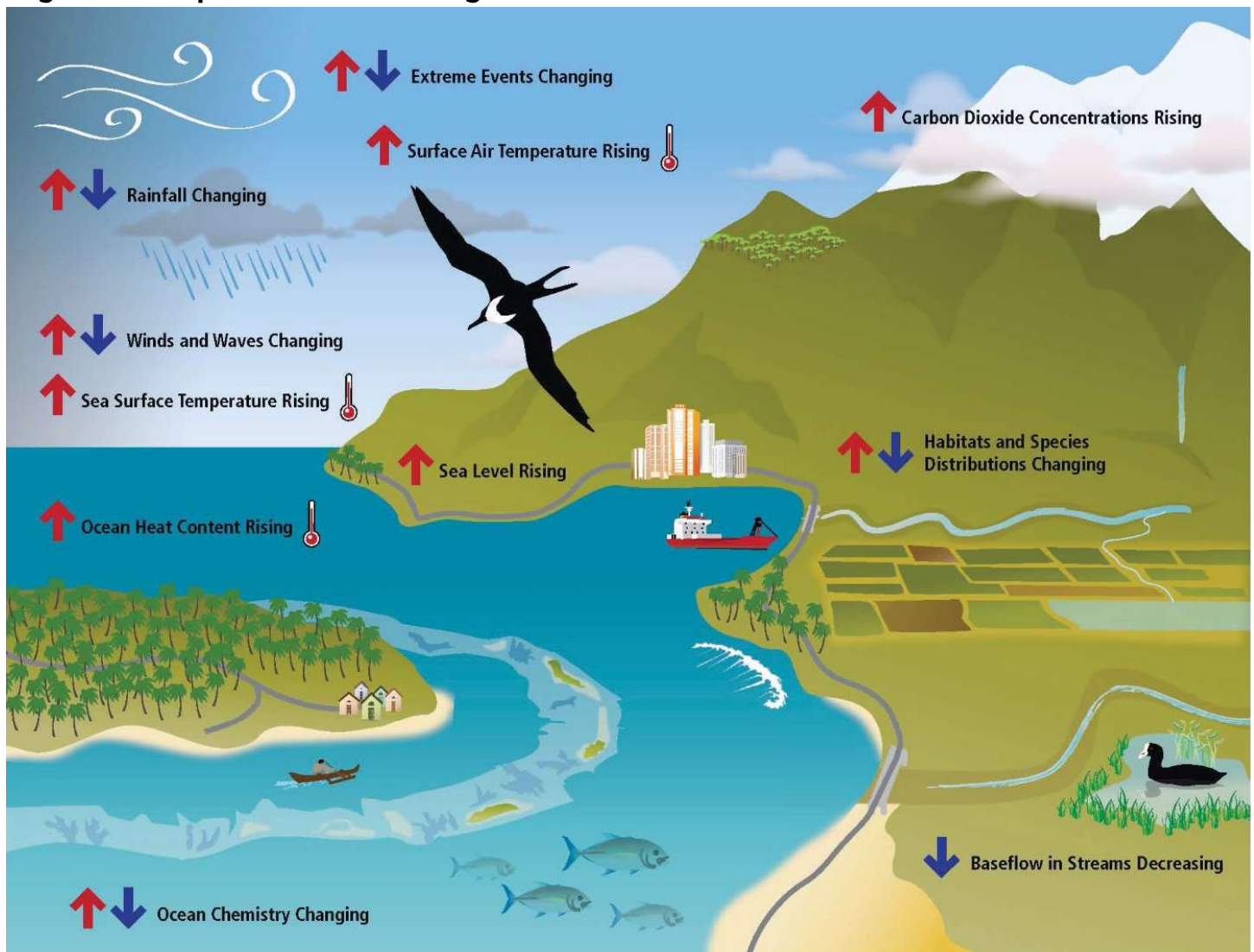
1. Ensure that the County's GIS database, including all maps, data, and hazard information, is consistently available to all agencies. Facilitate data sharing through participation in the Hawai'i Geographic Information Coordination Council.
2. Update, maintain, and enhance the use of the County's GIS and database to improve decision-making and ensure consistency in planning, permitting, and construction regulations to reduce disaster risk.

D. PARTNERSHIP NEEDS

1. Designate evacuation routes, critical facility access routes, and public shelters in cooperation with local communities. Encourage storage of food and water in communities in order to encourage local recovery.
2. Encourage the integration of agricultural planning and coordination into disaster risk management to improve local food security, sustainability, and community resilience to hazards.
3. Plan for maintenance of critical facilities and infrastructure in the event of a hazard. Identify mitigation opportunities in utility service plans and implementation resources.
4. Improve public awareness materials distributed by the County through periodic updating with the best available data and maps.
5. Enhance channels to the community by distributing materials at outreach and community events, via online and printed media, discussion on radio and news media, and by incorporating into the process of community resilience planning.

6. Improve data gathering and accounting for risk and vulnerability assessments for wind, droughts, and wildfires.
7. In assessing telecommunications vulnerabilities and planning pre-disaster preparedness measures, consult with the Utility Disaster Preparedness and Response Group for advice and recommendations.
8. Utilize local communications networks, community organizations, and local information sharing modes, both traditional and new (such as social media), to disseminate warning, response, and preparedness information. Include local communications strategies in resilience plans.
9. Ensure that existing designated shelter and critical services are built or retrofitted to withstand projected hazard scenarios. Incentivize and encourage residents and hotels to integrate hardened shelters into their structures.
10. Reduce “flash fuels” such as dry vegetation in high use areas and encourage vegetation clearing and clean-up programs.
11. Assess the need for specialized accommodations at shelter facilities to improve accessibility for special needs groups and pet owners.
12. Ensure the capacities of shelters, infrastructure, and critical facilities can accommodate the population exposed to catastrophic events

Figure 3-20 Impacts of Climate Change on Kaua‘i



Source: Pacific Islands Regional Climate Assessment

according to recent census numbers, projected growth models, and projected hazard scenarios.

13. Support the development of a Common Operational Picture, which incorporates real-time asset status tracking for Emergency Management.

3. GLOBAL WARMING AND CLIMATE CHANGE ADAPTATION

Climate change and its associated symptoms will have wide-ranging impacts on Kaua'i's environment, economy, and way of life. Understanding and incorporating the best available information on climate change is critical to planning effectively and taking proactive measures to adapt to climate-related changes.

Objective: To prepare for and adapt to the impacts of climate change on the natural and built environments.



3.1 Anticipating Climate Change Impacts

There is substantial documentation of global warming trends over previous decades, but predicting the exact rate and timing of future warming and associated sea level rise is difficult. Based on the best available science, we should plan for three (3) feet of sea level rise by the latter half of the century. It is important to note that this estimate may be conservative, as some studies project upwards of six (6) feet of sea level rise by 2100. The greatest uncertainty surrounding the projections is the rate and magnitude of ice sheet loss primarily from Greenland and West Antarctica. Further, the rate and magnitude of sea level rise is dependent on worldwide efforts to reduce greenhouse gas emissions. Given the range of uncertainty, a scenario-based planning approach that utilizes a range of SLR projections and uses a risk tolerance metric when choosing a SLR planning target for a project. For example, new infrastructure with a long anticipated life would represent very low risk tolerance while shorter-term, low-cost infrastructure that

is adaptable and/or moveable could tolerate a greater risk.

Coastal areas are expected to experience the greatest amount of change, which in turn will impact the roughly 20 percent of Kaua'i residents who live near the shoreline. There are many pieces of critical infrastructure along the coast and in low-lying areas, including roads and bridges, harbors, wastewater and storm water systems, potable water systems, and energy facilities. Climate change could impact several other aspects of Kaua'i's environment, economy, and daily life, such as agricultural production, tourism and recreation, and wetlands or other important natural habitats.

Climate change is also prompting the movement of people away from vulnerable coastal areas, and in some cases, whole islands. The State of Hawai'i has already received some of the world's first climate immigrants from low-lying Pacific nations such as the Marshall Islands and Micronesia.⁵²

Climate change can also impact food security, as evidenced by the widespread and severe droughts in California over the past several years. With approximately 90 percent of our food being produced outside of Hawai'i, this is an important issue for Kaua'i. Kaua'i residents will be facing these challenges for decades and even centuries into the future.

Water supply may also be impacted by climate change, especially if Hawai'i's rainfall patterns are disrupted or if salt water intrudes into any low-lying water wells. Kaua'i's arid environments, such as the West Kaua'i plateau, may become drier and may impact agriculture as well. Ocean acidification will also impact marine environments – such as coral reefs – thus having a great impact on Kaua'i's fisheries. Figure 3-20 depicts the various impacts that climate change could have on Kaua'i's natural and built environment.

3.2 Planning for Adaptation

The *Kaua'i Climate Change and Coastal Hazards Assessment* (2014) was prepared as a technical study for the General Plan. It discusses the likely coastal hazard impacts of climate change and suggests measures for adaptation, resiliency, and mitigation. The *Kaua'i Multi-Hazard Mitigation and Resilience Plan* (2015) also examines natural hazards with an emphasis on an integrated and collaborative approach to risk reduction and building community resiliency.

⁵² As Pacific Islands Flood, A Climate-Driven Exodus Grows, Scientific American, 2013

Initial mapping of sea level rise (SLR) inundation in selected areas of Kaua'i was done utilizing data from the NOAA Digital Coast Sea Level Rise Viewer. The areas modeled include 1 foot, 3 foot, and 6 foot SLR scenarios for shorelines in Waimea, Hanapēpē, Po'ipū, Nāwiliwili, Wailua, Kapa'a, Anahola, Hanalei, and Hā'ena. Appendix D includes SLR maps of these areas. They illustrate the types of impacts that might occur, and act as a screening tool to identify vulnerable areas that may require further study, or where dense development should be avoided. The maps only depict still water flooding and do not show erosion or wave inundation impacts. They serve as an interim planning and assessment tool until new hazard maps are released by University of Hawai'i researchers. This data, combined with FEMA flood maps, was used to evaluate and refine the General Plan Land Use Maps in Chapter 5.

Responding to climate change will require a comprehensive approach with actions that cut across many sectors. Since the rate and extent of climate change is uncertain, an "adaptive management" approach is best suited to deal with the inherent uncertainties. Also needed is a framework to address the impacts of climate change. Adaptive management is dependent on the constant and thorough monitoring of climate change variables, building and revising different scenarios, and developing flexible response mechanisms and actions. One recent County action was to revise the shoreline setback ordinance by an additional 20 feet to account for sea level rise and associated impacts. The shoreline



Flooding in Kapa'a, East Kaua'i District. Photo Courtesy Hawai'i Emergency Management Agency

setback ordinance should be revisited over time as new sea level rise information and projections become available.

Effectively dealing with climate change will require cooperation and participation by all Kaua'i residents, businesses, institutions, and government. Because the General Plan influences the earliest stages of the development process, it provides an important opportunity to prevent and mitigate the impacts of potential future disasters associated with climate change.

A. PERMITTING AND CODE CHANGES

1. Use the best available climate and hazard science to inform and guide decisions. Determine a range of locally relevant (context specific) sea level rise projections for all stages of planning, project design, and permitting reviews. At the time of this General Plan Update publication, the science suggests a planning target of three feet of sea level rise.
2. Regularly review and refine relevant policies, rules, and regulations based on the most currently available climate and hazard science and projections.
3. Identify lands/areas that may serve as buffers from coastal hazards and restrict development within them.
4. Periodically update the shoreline setback and coastal protection article of the Comprehensive Zoning Ordinance to allow for adjustments in the setback calculations based upon best-available SLR data.
5. Update the Floodplain Management Program to incorporate sea level rise planning information, utilizing options detailed in the *Kaua'i Climate Change and Coastal Hazards Assessment* or other relevant resources.
6. Within the Special Management Area (SMA) and Zoning Permit program:
 - a. Require applicants to analyze coastal hazard impacts and include mitigation in permit applications.
 - b. Impose development conditions upon permits that minimize the impacts of

exacerbated flooding, storm surge, and erosion due to sea level rise.

c. Strengthen rebuilding restrictions for non-conforming structures such that these structures are relocated a safe distance from the shoreline in hazardous areas.

d. Evaluate conditions that prohibit shoreline armoring.

7. Update the subdivision standards to:

a. Restrict residential subdivisions in areas prone to current and future coastal hazards, including sea level rise.

b. Outside of these natural hazards areas, provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources.

8. Periodically update the building codes to ensure that the standards for strengthening and elevating construction to withstand hazard forces in hazardous areas utilize the best available science and planning information.

9. When considering project alternatives during the environmental review process, evaluate relocation outside of hazardous areas, elevation of structures, and “soft” hazards such as beach nourishment. When considering environmental mitigation, incorporate climate resilience measures.

B. PLANS AND STUDIES

1. Conduct detailed hazard, risk, and vulnerability assessments for critical infrastructure and low-lying coastal communities when updated sea level rise, erosion rates, and wave inundation information is available.

2. Identify priority planning areas where resources and planning efforts need to be focused and identify how and where to use adaptation strategies such as accommodation, retreat, and protection.

3. Encourage strategic retreat and relocation to safer areas based on the results of the assessments above.

4. Use results of hazard, risk, and vulnerability assessments to inform adaptation strategies to be incorporated into Community Plans or other planning processes.

5. Acknowledge, support, and/or take part in university, government, and private efforts to develop planning information and guidance to address how accelerated sea level rise will affect erosion rates and wave inundation.

6. Support implementation of the Hawai'i Climate Adaptation Initiative (Act 83) and development of the *Sea Level Rise and Vulnerability Adaptation Report for Hawai'i* and the *Statewide Climate Adaptation Plan*.

C. PROJECTS AND PROGRAMS

1. In accordance with Hawai'i State Planning Act Priority Guidelines, consider multiple scenarios of SLR and associated flooding, wave inundation, and erosion impacts when developing and approving capital improvement projects.

D. PARTNERSHIP NEEDS

1. Work with the State Department of Land and Natural Resources (DLNR) to ensure conservation lands have appropriate vegetative ground cover to prevent soil erosion, including native and non-native plant species appropriate for Pu'u Ka Pele and Nā Pali-Kona Forest Reserve locations.

2. Ensure consistent public access to communications, warning systems, roads, and infrastructure in remote areas in the event of a hazard.

3. Consider incentive programs, such as a tax incentive program or a transfer of developments rights program, to relocate potential or existing development out of hazardous or sensitive areas. Consider creating a relocation fund through increased development fees, in lieu fees, or other funding mechanisms.