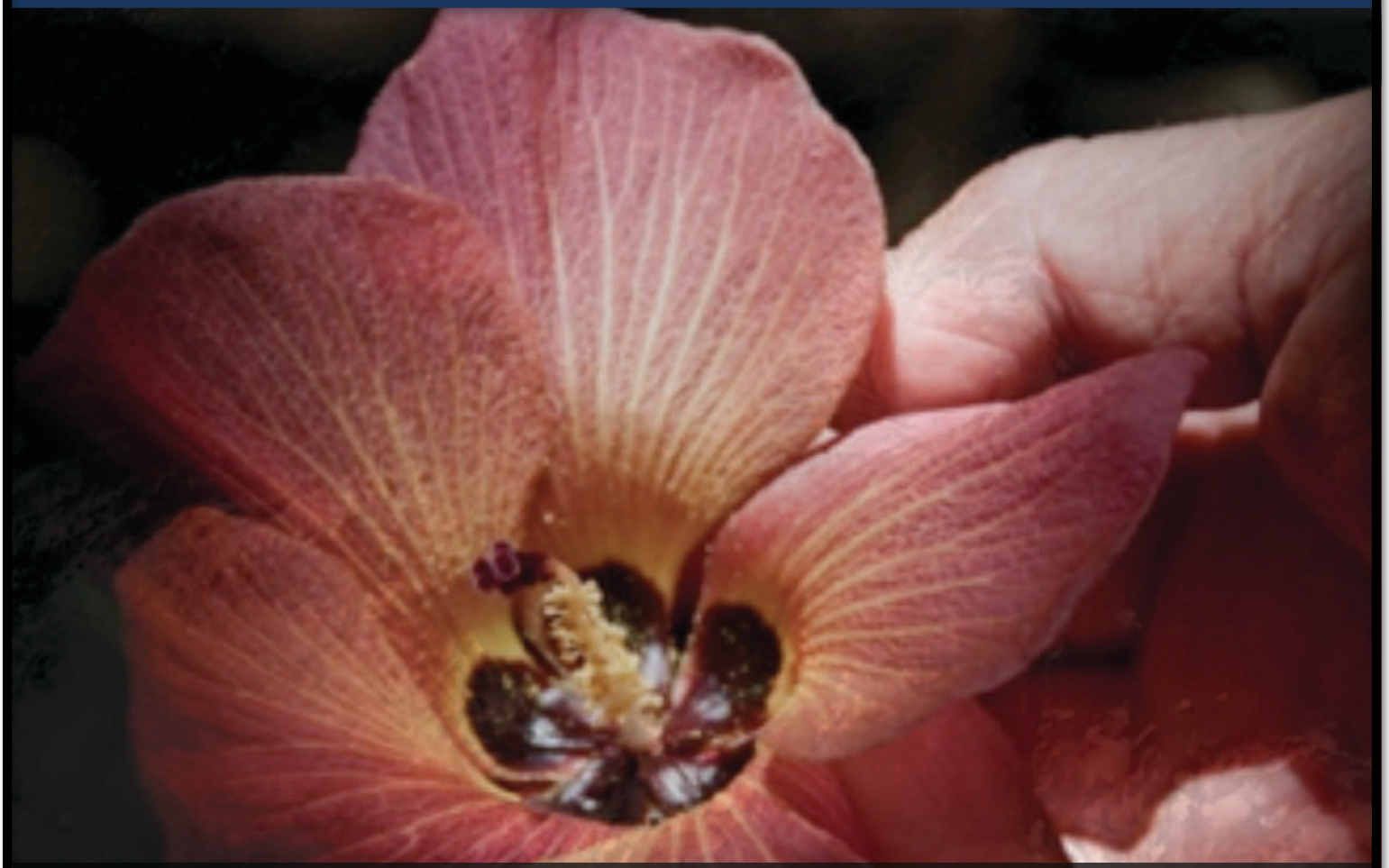
Spring 2011



Hau'ula Coastal Community Resilience

PLAN 661
Collaboration Between Sectors

University of Hawaii at Manoa
Prof. Dolores Foley

Emily Ann Kukulies
Roma Mukarromah
Mika Okuno
Stacy Peters
Maria Rosario Saldua
Chankanitha Vong

Table of Contents

Executive Summary 3

Governance 5

Society and Economy 13

Coastal Resource Management 16

Land Use and Structural Design 18

Risk Knowledge 21

Warning System and Evacuation Plan 25

Emergency Responses 30

Disaster Recovery 34

Planning Framework Summary 38

Appendix 43

References 55

Hau'ula
Coastal Commuity Resilience

This document is a product of a collaboration between Hau'ula Community Association and the University of Hawaii at Manoa Department of Urban and Regional Planning. The overall experience has been a journey together to examine and enhance of the resiliency of the coastal community of Hau'ula Hawaii. Hazards and disasters can impact every aspect of a community, including its social, economic and environmental components. Coastal communities will repeatedly face natural hazards. Coastal community resilience can help communities prepare and rebound from hazard events. This project has a key objective to plan for coastal community resilience with a review of existing materials and discovering ways to integrate coastal community resilience into existing plans and programs.

The University of Hawaii team hosted a FEMA Coastal Community Resilience workshop to produce a raised awareness of (1) hazards facing coastal communities, (2) potential social, economic, and environmental impacts of these hazards, (3) approaches to prevent or mitigate hazard impacts, and (4) tools to increase resilience so that a community can rebound when a hazard event occurs. This workshop was a two way street, spurring organizational action to increase coastal community resilience through existing planning and mitigation efforts and providing the University of Hawaii team feedback on Hau'ula's assets and challenges.

The University of Hawaii team determined that Hau'ula had a realistic perspective on their community's assets and challenges. The concerns were numerous and with an outcome of a large variety of action items. The team believed the community needed a framework through which to view the enormity of material. The material garnered from the workshop was divided into categories based on NOAA's concepts of Coastal Community Resilience.

The categories are:
Governance
Society & Economy
Coastal Resource Management
Land Use & Structural Design
Risk Knowledge
Warning System & Evacuation Plan
Emergency Response
Disaster Recovery

The team has provided Hau'ula Community Association a framework they can use for planning their actions. Many of the Action items are already started but it is necessary they are documented as a collective so that the HCA and the community can see the progress. For example the relationship with the American Red Cross that led to training community members as official shelter workers was pivotal in securing a shelter location and contracting emergency food providers. The continued efforts with this project effect five of the eight reliance categories. HCA needs to map out how they will continue this relationship by determining additional actions needed, budgetary needs, leadership and implementation period.

With this framework the community can also identify the constraints of budget, leadership/advocacy and time that may effect each action. This information can be used to prioritize the actions. Since the actions items from the workshop yielded an unwieldy list of over 60 items, the team suggests that the community reduce the priorities to 3 – 5 depending on the items. Using the framework some items may reveal they can be delegated to other entities to provide the leadership.

An item we assisted the HCA with is accomplishing finding materials to share with the community to raise the awareness of disaster preparedness issues. The team is providing the HCA with a resource binder filled with brochures and handouts available royalty-free for use by communities. Items from FEMA, American Red Cross, and many others provide the community expert materials on topics from "Preparing Your Family Emergency Kit" to "Talking to Children About Disasters." These are resources that the community can use for free with very little additional planning. They only need to determine the delivery method.

In conclusion, Hau'ula Community Association is now better enabled to build Coastal Community Resilience. The workshop, framework and resources have provided the community the tools needed to move forward. Now it is in the hands of the community to map out what items to included in their framework and prioritize them. The team believes that the community has a large number of assets that if properly supported will lead to successful implementation.

Governance

The desired outcome of this element of resilience is that leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.
(Source: How Resilient Is Your Coastal Community?)

I. What is Governance?

Governance is a process through which government institutions, organizations, communities, or any group of people with a mandate or with a common purpose make decisions that direct their collective efforts. Local governance is governing at the local level, viewed broadly to include not only the machinery of government, but also the community at large and its interaction with local authorities. Good governance is about achieving desired results and achieving them in the right way, in compliance with laws and policies and shaped by cultural norms and values of an institution, organization, or community.

II. Why is Governance Important to Hau'ula?

Governance can facilitate conditions for Hau'ula's community to absorb or resist the effects of a hazard, bounce back from disturbances, and adapt to change. Governance provides the connection whereby community resilience is guided and nurtured over time through the various interventions of government, civil society, and the private sector in community development, coastal management, and disaster management.

III. Current Analysis of Hau'ula Community Governance

Community Engagement

One of the strengths of the community is that it is able to engage a certain level of engagement among some members of the community. They were able to organize themselves in responding to their needs. The lead organization is the Hau'ula Community Association (HCA) that has five (5) groups within it that try to respond to the different needs of the community. The HCA has established a website (http://hauulacommunityassociation.com/index.html) open to the public that hosts announcements, minutes of meetings for different committees allowing individuals to see what is taking place in the community. The different groups are the Hau'ula Ahupua'a Hui (HAH), Hau'ula Emergency Leadership Preparedness (HELP), Hau'ula Neighborhood Security Watch (HNSW), Hau'ula Park Coalition (HPC), and Hui O Hau'ula (HOH), and Hau'ula Monk Seal Recovery & Protection Team. The accomplishments and plans of each group are listed on the following table.

Strengths	Weaknesses	Actions
Hau'ula Emergency Leadership Preparedness (HELP)		
Accessed training through Red Cross for 22 community members, certified and qualified shelter operation personnel Obtained a 20 foot trailer which is up on a property on Hau'ula Homestead Road Arranged for Coastal Community Resilience training with University of Hawaii Manoa Department of Urban and Regional Planning Collaborating with faith-based organizations, such as Mt. Zion Church and Pastor Welch, who have resources and leadership Mobilized community members to give resources and help (i.e. Alexander and Baldwin will give us a 40 ft 40 ft trailer. Gary North will pay for painting over signs on the containers) Identified Alakai wards 1, 3, and 4 and target community members that fall within those categories Identified sites at high ground like the Mauka Chapel, Ivan Keoho's property and the Hau'ula Kai shopping center for possible evacuation Ko'olauloa Community Health and Wellness Center is working on a plan for tents in parking lot, generators, medical supplies	Lack of awareness and participation of many community members No fixed building yet for an evacuation center 72-hour emergency kit for everyone Hau'ula has two emergency sirens out of function Communication system needs improvement	Heighten people's awareness of disaster Identify and get permits for use of access roads leading to evacuation points during emergency Locate evacuation at the New park to be located at Hanaimoa St. (when park is completed) Need for additional trailer/ container Building of concrete pad for the current container Assessment of community needs particularly on what to prepare for the supply trailer Prioritize siren repair and replacement Put up signage and warnings in strategic places that tell everyone to go up higher grounds in tsunami events Develop a tsunami response plan

Hui O Hau'ula (HOH)		
New Project under Nonprofit Ko'olauloa Community Health and Wellness Center The group has crafted its vision, mission and draft strategic plan A separate entity from HCA Pursue grants to bring in resources		
Hau'ula Park Coalition (HPC)		
HCA sent letters to various public officials with problem solving suggestions Neighborhood Board pass a resolution supporting: Development of a new park site at the corner of Hau'ula Homestead Road and Hanaimoa Street, including playground/ play courts, playfields for soccer/football games, parking area/s and a comfort station For replacement of the backstop for the ball field at Hau'ula Community Park (submitted by Board member Dotty Kelly-Paddock)	Consistent, chronic prostitution (men and women) and drug selling and usage at Hau'ula Beach Park Many homeless (13 - 20 people) in the park are also drug users and have mental health problems Park's individual wastewater system is being over taxed	Research, contact and involve appropriate agencies to include: Queen Lili'uokalani Children's Center with the goal of finding out what they can do to help Place a security access gate to the park Close park for family camping Family camping is still permitted for up to 10 people per campsite. Families with more than 10 persons will need to secure the permits for additional campsites as available. Keep park open for group camping only Fri., Sat., Sun.
Hau'ula Ahupua'a Hui (HAH)		
Attended a workshop with Hawaii Stewardship Network and a part of the Monitoring and Evaluation Design Team Involvement in organization may provide support as Hau'ula		

community plans programs and network with other non-profit organizations throughout the state		
Hau'ula Neighborhood Security Watch (HNSW)		
Conducted community training A drug sweep was done since the issue was raised by the community		
Hau'ula Monk Seal Recovery & Protection Team		
This volunteer group organizes 'haul outs' to protect monk seals when they surface on a beach and provides educational presentations and trainings		Organize a workshop in Hau'ula with the Monk Seal organization in March

Basic Social Services

Water Related Infrastructure and Services
Fortunately the Hau'ula community has access to safe drinking water as provided by the Board of Water Supply and there are also homes in the community that already have their own water catchment systems installed. However there are also issues identified by the communities such as water shortage when there is also power interruption, and many people are not yet aware of any water conservation programs. Other issues regarding water supply and infrastructure are reflected in the table below.

STRENGTHS	WEAKNESSES	ACTIONS
Have access to safe drinking water as do other communities from the Board of Water Supply (BWS) Some homes have installed a water catchment system however more homes need to install water catchment systems	No water during power interruptions because water flow is dependent on pumps that need power Low lying areas of the community often experience flooding during rainy season because of clogged drainage	Increase people's awareness on water conservation especially in summer months. Implement programs for water conservation, harvesting (i.e. rain barrel catchment, low flow faucets, and toilets.) Clearing of Mouths and Culverts

	Not being cleared by the State or city and county. People are not aware of any water conservation programs implemented in our community BWS has detected leaking effluents especially from toilets Mosquito problems, stagnant water, and foul odors at the streams Do not have adequate storm drainage No sewer system only septic system(s) Septic run-off around beach areas and is major concern problem during rainy season	Cleaning of Streams and Drains Master plan for Hau'ula to deal with water management

Energy and Communication Infrastructure

STRENGTHS	WEAKNESSES	ACTIONS
HECO promotes the opportunity for their customers to sign up for solar system installation to cut down electricity There are institutions promoting energy awareness and efficiency Some businesses, the university, and the PCC have backup systems when the power is out	A significant amount of power, telephone and cable service outages occur frequently No emergency backup services Not everyone uses electricity because they can't afford it Older homes in Hau'ula do not have solar water heaters	Work representatives to ensure Hau'ula is given equal priority in regards to planning and developing backup protocol priorities that other communities have Put cables and electricity wires underground to mitigate outages Establish and put into practice emergency systems and protocols

Transportation

STRENGTHS	WEAKNESSES	ACTIONS
The Bus serves the community regularly Handy van	There is no gas station within the community Roads are not safe for bikes Traffic congestion especially at the PCC during closing There is only one way in/out of the community Narrow road, only one lane each way	Designation of bike lane/ walk way Identification of access roads to use during emergency

Education

There is one elementary school within the community, the Hau'ula Elementary with a total population of 275 children. The school has faced many challenges including but not limited to meeting academic benchmarks. Many children from the community are sent to schools outside by their parent who got geographic exemptions. Some of the concerns of the education in Hau'ula are listed on the following table.

STRENGTHS	WEAKNESSES	ACTIONS
Good plan in place Practice Enrollment Diversity of plan To increase student attendance schools have various programs that give rewards and incentives New Public Charter School will be in Hau'ula	School curriculum does not include disaster Parents are not involved in drills School is within evacuation zone	Included disaster management in school curriculum Educate Community/Parents

IV. Planning Framework

Under governance, there are plan of actions of each committee or group that would fall into other sectors like in society and economy; coastal resource management; risk knowledge; emergency response; warning and evacuation; and disaster recovery so that they are transferred there. Those retained here are actions specific to strengthening community engagement and increasing collaboration with other organizations and agencies. Also included are the formulation of various plans identified that could help build communities' resiliency against disasters.

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objectives: Strengthen community engagement and increase collaboration with other organizations and agencies.								
Heighten people's awareness of disaster								
Assessment of community needs particularly on what to prepare for the supply trailer.								
Develop a tsunami response plan.								
Tap appropriate agencies such as Queen Liliokalani Children's Center to find out what services are available								
Organize a workshop in Hau'ula with the Monk Seal organization in March								
Increase people's awareness on water conservation especially in summer months.								
Master plan for Hau'ula to deal with water management								
Work with our representatives to ensure Hau'ula is given equal priority regarding Planning for and developing backup protocol								

priorities that other communities have								
Put in place emergency systems and protocols								
Include disaster management in school curriculum								
Educate Community/Parents								

V. Additional Information and Resources

There are still many agencies, groups, and civic organizations in Hau'ula whose possible contribution to building the community's resiliency has not made use of. The Hau'ula Community Association may want to know them more and discover ways in which to encourage them to participate and engage in this effort. Among these groups/agencies are:

Hau'ula agencies, groups, and civic organizations:

Hau'ula Fire Station Number 15
Police Department
Red Cross
Hau'ula Civic Center
Hospitals
Public Parks Management to include: Hau'ula Beach Park, Kokoleo Beach Park, Hau'ula Community Park
Shopping Center: Hau'ula Kai Shopping Center
Churches in Hau'ula
Hau'ula Congregational Church
Hau'ula Seventh-Day Adventist Church
North Windward Baptist Chapel
Church of Christ in the latter day Saints
Other Organizations in the Community

When searching for organizations in Hau'ula, the following list came up. It might be worthwhile to find out what are the roles of these neighborhoods in Hau'ula? How do they work and relate to the Neighborhood # 28 Ko'olauloa, Neighborhood Board, and HCA?

Hale'aha Ahupua'a Neighborhood
Hau'ula Homesteads Neighborhood
Kaipapa'u Ahupua'a Neighborhood
Kaluanui Ahupua'a Neighborhood
Kapaka Ahupua'a Neighborhood
Kapano Ahupua'a Neighborhood
Makao Ahupua'a Neighborhood
Papa'akoko Ahupua'a Neighborhood
Puhe'emiki Ahupua'a Neighborhood
Punalu'u Ahupua'a Neighborhood
Wai'ono Ahupua'a Neighborhood

Society and Economy

I. What is Society and Economy?

A community's resilience on society and economy is usually determined after the disaster(s). How a community's economy and people's quality of life are affected and/or changed are often strong indicators of the community's resilience. The strength of the economy and the diversity of livelihoods greatly influence the community's ability to prepare for disasters, quicken the recovery process, and adapt to changes that make them less vulnerable in the future. It is the improvement or decline in a person's livelihood that directly affects resilience regardless of changes in coastal ecology, health, laws, governance frameworks, or hazard response programs.

The desired outcome of this element of resilience is that communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.
(Source: How Resilient Is Your Coastal Community?)

II. Why is Society and Economy Important to Hau'ula ?

Society and economy are important for Hau'ula's to achieve resilience because of the direct relationship between economic activity (markets and commerce) and social life (culture, family, recreation) in Hau'ula. Changes in the local and regional economy have positive and negative impacts on individuals and communities through life expectancies, employment, wealth, and quality-of-life issues. Similarly, the culture of the community, family structure, and gender roles influence economic activities. Social, cultural, and economic conditions provide the enabling environment for self-reliance in a community.

III. Current Analysis of Hau'ula Community Society and Economy

This analysis uses indicators on how resilience is your community.

Strengths	Weakness	Action
Society		
Kupuna Gathering Hawaiian Civic Club Large Hawaiian Culture May Day Local health center Hospital 5 miles from bridge	Art exposure – locals Historical signage missing No written history Lack of art and culture in schools Thief Consistent, chronic prostitution (men and women), drug use and	Research/contact appropriate agencies such as Queen Liliuokalani Children's Center to find out what services are available Close park for family camping but keep open for group camping on Fri., Sat., Sun.

Fire station Police station (10 minutes) Medevac available Local professional Athletics (organized) Parks Good education plan in place Practice Enrollment increases Diversity of plan Have workshops like ARC, UH/FEMA, HELP Website Message board	selling in Hau'ula Beach Park Many homeless (13-20 people) in the park, some are drug users and have mental health problems Evacuation plan for disabled Not enough food produced local Fire station floods No easy place to walk or bike School curriculum does not include disaster plan Parents remove children from school on days of drills Schools is in evacuation zone Community/parents do not have enough education Level of participation and commitment Poverty Survival mode Family load Communication Denial of potential hazard(s) Lack of place	Put a gate to the park Produce more local food Improve pedestrian paths for walking and/or and biking School implement in curriculum a disaster plan Community/ parents receive more education Place for meeting Raise awareness of disaster
Economy		
Diverse languages and cultures Space available Job center Plan for Community Garden Entrepreneurial and home businesses	Need more business Not too many jobs Not utilizing film industry No market place No contingency plan	Market place Encourage business collaboration

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Action 1:								
Action 2:								
Action 3:								
Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

Coastal Resource Management

I. What is Coastal Resource Management?

Coastal resource management (CRM) is a process to develop and implement a coastal management scheme or plan. CRM refers to a formal or informal set of rules, practices, technologies, economies, and interactions between humans and the natural resources (animals, plants, rocks, water, etc.) located both landward and seaward of the coast, that define how resources are utilized and protected.

The desired outcome of this element of resilience is that active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.
(Source: How Resilient Is Your Coastal Community?)

II. Why is Coastal Resource Management Important to Hau'ula ?

Coastal resources provide many valuable and sustainable services to Hau'ula's community. Coastal resource management protects the source of power for the community's resilience in terms of food, economic resources, environmental qualities that are central to a culture and lifestyle, and protection from the forces of nature. If managed and protected, coastal resources can continue providing these services. If not managed, many normal events such as storms or fishing can create significant negative, expensive, or tragic consequences on the community.

III. Current Analysis of Hau'ula Coastal Resource Management

This analysis uses indicators on how resilience is your community.

Strengths	Weakness	Action
Predefine roles and responsibilities for immediate action at all levels		
Have beaches Have one policies protecting Monk seal team created Have clean ups Have recycling station	Erosion Fishing policies not enforced Lack of education in school Need fisheries Sea level rise No disaster contingency plan	After school program via NH grant

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Action 1:								
Action 2:								
Action 3:								
Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

V. Additional Information and Resources

Endorse plan and policy for coastal resource management
Assessment of physical and natural resource
Community involvement in planning
Budget for CRM

Land Use and Structural Design

I. What are Land Use and Structural Design?

The desired outcome of this element of resilience is effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.
(Source: How Resilient Is Your Coastal Community?)

Land use management refers to the active use of formal and informal mechanisms for the planning and location of the various land uses, such as agriculture, industry, housing, and tourism in a community. In addition to determining appropriate uses of land, a community can also influence how development, buildings, and infrastructure are designed and built. Structural design refers to how physical structures within a community are engineered and constructed. In order to contribute to a community's overall resilience, both land use management and structural design practices must consider the community's vulnerability to all coastal hazards while minimizing impacts to natural resources.

Basic indicators for effective land use management and structural design include:

1. Land use plans are prepared and implemented
2. Structural design minimizes risk
3. Monitoring and enforcement of policies and codes
4. Pre-established redevelopment policies are in place

Land use management and structural design are excellent examples of planning activities communities can use to minimize potential impacts of tsunami and other coastal hazards.

II. Why are Land Use and Structural Design Important to Hau'ula?

Both land use management and structural design are critical elements to Hau'ula can use to minimize potential impacts of tsunami and other coastal hazards. If they are put into action effectively, they can allow Hau'ula's community to absorb the shock of a tsunami and other coastal hazards. It is important to make sure vulnerable land uses are not within susceptible areas and encourage their development in less hazard-prone locations and reduce the risk to individuals and livelihoods. On the other hand it is important to consider particular types of development in vulnerable areas when the structural design can be an effective way to absorb the shock of coastal hazards.

The Hau'ula community has their own share of challenges to land use and structural design. In particular, there are many structures built along the coastal area thereby exposing them to natural hazards especially that of a tsunami. Some of houses are in low-lying areas making them prone to flooding during the rainy season. Summaries of the land use and structural issues raised by the community are listed in the table under the section on current analysis.

III. Current Analysis of Hau'ula Land Use and Structural Design

This analysis uses indicators on how resilience is your community.

STRENGTHS	WEAKNESSES	ACTIONS
Presence of parks and beaches Presence of trails in the mountains	Need master plan for park & garden General land use plan Effect of climate change	Collaborate with park and recreation management at city and county levels Formulate a master plan especially for coastal areas Conduct community mapping to identify vulnerable areas; evacuation zones/points; where to put signage; and public structures for rehabilitation and possible relocation

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Collaborate with park & recreation management city and county levels.								
Formulate a master plan especially for coastal areas.								
Conduct community mapping to identify vulnerable areas; evacuation zones/points; where to put signage; and public structures for rehabilitation and possible relocation.								

Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

** from Governance sector.*

V. Additional Information and Resources

Ideally disaster/risk knowledge should inform land use management and structural design to build community resilience. Safe building designs and strategies for land use management can be more efficient and effective if they are based on good understanding of the risk and effects of disasters. Usually it is the government that creates design and standards, and building codes to ensure that structures are safe and are resilient to risk. Government also formulates regulations and policies to enhance land use management and specifically where structures can be built or not to reduce the risk of disaster.

Tsunami hazard map of Hau'ula can be accessed through this site www.pdc.org/hazards/tsunami/oahu/10_Hauula_to_Malaekahana.pdf.

A flood hazard map of Hau'ula can also be found in http://gis.hawaiinfip.org/fhat/

Risk Knowledge

I. What is Risk Knowledge?

The desired outcome of this element of resilience is that leadership and community members are aware of hazards and risk information is utilized when making decisions.
(Source: How Resilient Is Your Coastal Community?)

Risk knowledge is the awareness a community has about its potential hazards and its vulnerability to experiencing negative impacts of those hazards. Risk knowledge requires an understanding of all of the chronic and episodic hazards that threaten the community, including the potential geographic extent of impact and the potential frequency of impact. It also involves knowing how each of these hazards threatens various components of the community, such as the local economy, the built environment, terrestrial and marine natural resources, all segments of the population, critical facilities, utilities, infrastructure, etc. It is essential that access to information pertaining to risk knowledge be open and freely shared among the entire community.

Risk = Hazard (frequency and severity) x Vulnerability (Exposure / Capacity).

Source: UN ISDR 2004

II. Why is Risk Knowledge Important to Hau'ula?

Risk Knowledge is essential for building Hau'ula's resilient community. It is needed to map out its path toward resilience. The more comprehensive knowledge the community has about the multiple risks to the Hau'ula allows it to make adaptations to eliminate or lesson the impacts of hazards. In addition, risk knowledge allows the community to more easily absorb the shocks associated with the hazards upon impact and bounce back more quickly after a hazard event.

III. Current Analysis of Hau'ula Community Risk Knowledge

The community is making effort to enhance knowledge about hazards by having several workshops and training programs. Moreover, the community members, who attended the workshop on Feb. 26, 2011, realized these hazards that are listed below. However, no routinely updated coastal hazard risk assessments exist at a scale appropriate to Hau'ula. A more thorough analysis is necessary to achieve coastal hazard risk assessments for Hau'ula.

Possible Hazards in Hau'ula

1. Floods
2. Hurricanes
3. Tsunamis

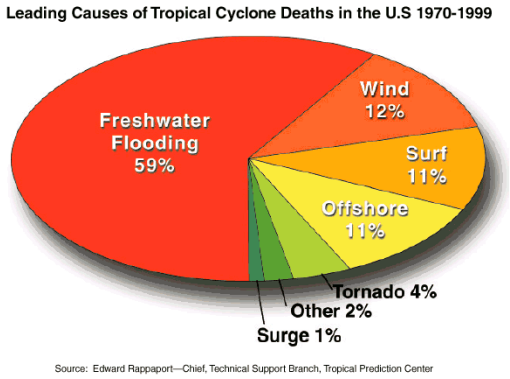
Hazard 1: Floods

A flood is a general and temporary condition of partial or complete inundation of normally dry land areas resulting from overflow of inland or tidal waters, unusual and rapid accumulation or runoff of surface waters from any source, or mudflows or the sudden collapse of shoreline land. (FEMA, 2004b)

For Flood Map(s) visit website: http://flood.firetree.net/?ll=43.3251,-101.6015&z=13&m=7

Hazard 2: Hurricanes

A hurricane is a storm system characterized by a large low-pressure center and numerous thunderstorms that produce strong winds (64 mph or greater) and heavy rain. Hurricanes feed on heat released when moist air rises, resulting in condensation of water vapor contained in the moist air. (FEMA, 2010, p.155)



For National Hurricane Center information visit: http://www.nhc.noaa.gov/HAW2/english/intro.shtml

For Hurricane Map visit: https://hurricanemapping.com//index.cfm

Hazard 3: Tsunamis

A tsunami (Japanese for "harbor waves") is a series of ocean waves produced by a sudden rise or fall in the earth's crust, most commonly caused by an earthquake or underwater landslide. In the open ocean tsunami waves cannot be seen or felt by ships or airplanes because the unbreaking waves are actually hundreds of miles wide with a height of only a few feet. But as the waves approach the coast their height increases dramatically and can be very destructive when they reach the shore. *(PRIMO Website)*

For tsunami hazard map visit: http://tsunami.csc.noaa.gov/map.html?mapname=O_AHU-HAUULA+TO+MALAEKAHANA&submit1=Search+Island+Area

Strengths	Weakness	Action
Hau'ula Emergency Leadership Preparedness Committee (HELP) FEMA Coastal Community Resilient Workshop Monthly meeting at Hau'ula Community Association Training of American Red Cross Training of Civil defense Training of Neighborhood Security School curriculum does include disaster management	No routinely updated coastal hazard risk assessments at a scale appropriate to Hau'ula Many parts of Hau'ula are in low lying areas Clogged drainage at the stream (Watershed management issue) Coastal erosion Sea level rise	Develop Tsunami plan and disaster related coast plan Raise public awareness for disasters Prepare supplies for the emergency container Develop master plan for park and garden Develop general land use plan (especially coastal erosion plan, and watershed management) Ask for clean streams from agencies Collaborate with park and recreation, and city and country.

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Action 1:								
Action 2:								
Action 3:								

Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

V. Additional Information and Resources

NOAA Tsunami website: http://www.tsunami.noaa.gov/tsunami_story.html

PRIMO website: http://tsunami.csc.noaa.gov/preparedness.html

Tsunami Information Center: http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1327%3Atsunami-awareness-posters&catid=1075%3Aawareness-a-education&Itemid=2034&lang=en

The Great Wave: http://hawaii.gov/dbedt/czm/initiative/hazard/TheGreatWave.pdf

Hawaii Coastal Zoon Management Program: http://hawaii.gov/dbedt/czm/initiative/hazard.php

Warning System and Evacuation Plan

I. What are Warning System and Evacuation Plan?

Warning system and evacuation plan consists of three essential parts:

1. Early warning system
2. Evacuation plans
3. Well-informed public

A resilient community has early warning systems in place that provide available information on potential hazards in a timely manner. They also have evacuation plans that can be implemented effectively. In addition, they have a population that responds appropriately to the information that is given.

The desired outcome of this element of resilience is a community that is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and acting on an alert.
(Source: How Resilient Is Your Coastal Community?)

An effective early warning system consistently detects potential hazards and communicates the threat to the community in a manner that ensures ample time to respond to the warning. Warning messages inform individuals on what is happening, what this means to an individual, and how the individual should react. Warning messages are delivered in clear, simple languages to allow people of the community to understand the warning so that they can react appropriately. Resilient coastal communities have local early warning systems that are operational at all times and are linked to international or national hazard detection and warning systems. These linkages and other components of the warning system require backup mechanisms that ensure fail-safe operation during hazard events. This redundancy ensures that if one component of the system is not functioning, then the warning message is still delivered.

II. Why are Warning and Evacuation Important to Hau'ula ?

Warning systems and evacuation procedures provide Hau'ula's community an opportunity to reduce the effect of a hazard significantly. Having a plan enables the community to know and be familiar with what actions to take to lessen impacts of the hazard event. An effective response to an impending hazard event can greatly reduce hazard impacts by removing people from dangerous areas.

III. Current Analysis of Hau'ula Warning System and Evacuation Plan

Those following strengths and weaknesses imply that the community needs to develop evacuation plans, to improve hazard related infrastructures, and heighten public awareness of potential hazard. They have already resources such as trained local institutions, trained people, and partnerships with external organizations and institutions. At this level, to utilize those resources and realize their action plans, they need more commitment from all stakeholders and improve coordination among stakeholders within the community.

STRENGTHS	WEAKNESSES	ACTIONS
Improving community capacity on establishing hazard preparedness plans		
Some members of HCA have attended trainings and many community meetings on hazard preparedness so as to improve their understanding on establishing a plan of hazard preparedness. The community has established internal institution such as HELP to develop an evacuation plan The community has established partnerships with external organizations such as University of Hawaii, Red Cross, FEMA, NOAA, BYU, and the likes to give technical assistance in building hazard preparedness.	The community has not established any plan for hazard preparedness especially for tsunami warning system and evacuation plan.	Developing a community based tsunami plan and family based tsunami plan
Improving and maintaining hazard related Infrastructures		
Funds to repair the sirens are available There is one place for tsunami evacuation building located in Homestead Rd.	Two emergency sirens out of function. When they will be repaired is unknown. The evacuation is owned by the state. There are fences and gates that restrict the community to get in the building. No signage or map about hazard zone, evacuation routes, shelters, and safe areas clearly marked	Need one more evacuation shelter Repairing two emergency sirens Need special evacuation place equipped by medical supplies for people with disabilities Put up signage and warnings in strategic places that tell everyone to go up higher grounds in tsunami events

	throughout the community. There is no evacuation place for people with disabilities, equipped with medical supplies, and easily accessible by all community members.	Locate evacuation at the Hanaimoa new park once it's completed
Creating a well-informed public		
Community members are involved in training and meeting on hazard preparedness and building community resilience The HCA has a website http://www.hauulacommunityassociation.com and its residents can access any related information	Low participation in any related meeting and training The website does not contains information about warning system and evacuation procedures yet School does not teach about hazard risk, emergency preparedness, hazard warnings, and evacuation plans School curriculum does include disaster preparedness. Students have not been well informed about the hazard preparedness No specific brochure or flyer for warning system and evacuation that can be accessed easily by all Hau'ula resident	Make flyers and brochures about warning system and evacuation plan Include information about disaster preparedness in school curriculum Upload related information about hazard preparedness on Hauula website

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1: Improving community capacity on establishing hazard preparedness plans								
Action 1: Developing a community based tsunami plan and family based tsunami plan								
Action 2:								
Action 3:								
Objective 2: Improving and maintaining hazard related Infrastructures								
Action 1: Building one more accessible evacuation shelter								
Action 2: Siren repair replacement								
Action 3: Providing a special evacuation place equipped by medical supplies for people with disabilities								
Action 4: Put up signage and warnings in strategic places that tell everyone to go up higher grounds in tsunami events								
Objective 3: Creating a well-informed public								
Action 1: Make fliers or brochures about hazard preparedness								
Action 2: Including information about disaster preparedness in school curriculum.								
Action 3: Upload related information about hazard preparedness in Hauula website								

V. Additional Information and Resources

Direct link to NOAA Weather Radio http://www.weather.gov/nwr/ and its alerting capabilities (www.noaa.gov)

A Hauula Tsunami Map is available in http://www5.hawaii.gov/tsunami/maps.asp. http://www.fema.gov/pdf/library/pfd.pdf contains a booklet published by FEMA and Red Cross that provides a family based emergency preparedness to natural hazard.

www.ready.gov. This site will give you all information and guidance about tool kids, make a plan, and get informed and other preparedness materials.

www.redcross.org

Emergency Responses

I. What is Emergency Response?

The desired outcome of this element of resilience is that mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.
(Source: How Resilient Is Your Coastal Community?)

An emergency response function incorporates a wide range of measures to manage risks to the community and the environment. In addition, an emergency response aims to address the potential occurrence of major emergency situations that requires a complete government approach to natural and human-induced hazards. All emergencies and crisis events are by definition chaotic and highly dynamic, creating physical, emotional, and social disorder. Therefore, the establishment of an emergency response system that indicates all of the institutions roles in responding to disasters is essential for addressing emergency needs at the community level. Since the first few hours of a disaster are the most crucial, it is important to recognize that the community provides the first response. Thus, community involvement is critical during the development of the emergency response plans. Normally, a central entity, such as an Emergency Operations Center, manages the emergency response effort. It is the central operational, tactical, or strategic point for the lead agency and supporting staff that would manage the emergency. Properly developed and implemented emergency response plans help to ensure the availability of shelter, food, transportation, medical services, and search and rescue operations during disaster events.

II. Why is Emergency Responses Important to Hau'ula?

Effective emergency response could enable Hau'ula to become a more resilient community and to absorb the shock associated with disaster events. Emergency response plans and mechanisms would help Hau'ula to provide the basis for the community to bounce back more quickly from the impacts of disasters. In addition, in the event of a disaster, effective emergency response procedures can reduce the loss of life and help to lessen the time and investment needed for a community to recover.

III. Current Analysis of Hau'ula Emergency Responses

Emergency responses relates to the community's capacity in response to any natural hazard. They encompass organization, infrastructure, and well-informed people. The analysis of the strengths and weaknesses below brings a conclusion that Hauula Community needs some improvements in hazard related public infrastructures.

Strengths	Weakness	Action
Predefine roles and responsibilities for immediate action at all levels		
Hau'ula Emergency Leadership Preparedness (HELP) has formed and has been trained for emergency responses	There is no clear roles of who will take care of disability people during hazard	
The availability of basic emergency and relief services.		
HELP obtained a 20 foot trailer which is up on a property on Hauula Homestead Road	There is no emergency places for disability people There are no supply kits available for people especially those who are vulnerable	Obtain supply kits Need additional trailer/ container Building of concrete pad for the current container Identify and obtain permits for the use and access of the roads leading to evacuation points
The preparedness activities (drills and simulations)		
Organizations and volunteers are in place with technical and financial resources to support emergency response activities		
Red Cross has trained Hauula residents to be qualified to serve as shelter operation personnel. ARC, Civil defense, UH, and Community Resilience Workshop held classes and trained Hau'ula residents on emergency response Neighborhood Security	Fire Department is not involved	Need to find ways to gain Hau'ula Fire Department involvement and support

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1: Predefine roles and responsibilities for immediate action at all levels								
Action 1:								
Action 2:								
Action 3:								
Objective 2: Provide basic emergency and relief services								
Action 1: Obtain supply kits								
Action 2: Need for additional trailer/ container								
Action 4: Identify, obtain permits for the use of and access to roads leading to evacuation points during emergency								
Objective 3: The preparedness activities (drills and simulations)								
Action 1:								
Action 2:								
Action 3:								
Objective 4: Organizations and volunteers are in place with technical and financial resources to support emergency response activities								
Action 1: Involving fire department								
Action 2:								
Action 3:								

V. Additional Information and Resources

Earthquake and Tsunami Preparedness
http://cwarn.org/tsunami/be-prepared:
This site provides specific information about tsunami preparedness on the following information: (i) plan for tsunami, (ii) how to protect your property, (iii) media and community education ideas, (iv) what to DO if you feel a coastal earthquake, (v) what to DO when a tsunami WATCH is issued, (vi) what to DO when a tsunami WARNING is issued, (v) what to do after a tsunami.

http://www.bt.cdc.gov/disasters/tsunamis/:
This site contains comprehensive information on hazard preparedness. Information about preparedness for all hazard and specific hazard can be found here (if you want to particularly know what you can do to be prepared, click menu "what you can do").

Flood Preparedness
http://www.ready.gov/america/beinformed/floods.html:
Information about flood preparedness, and definition, causes of flooding and risks, steps to be prepared, Basic Emergency Supply Kit

http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay?catalogId=10001&storeId=10001&categoryId=12001&langId=-1&userType=G&type=1:
Improve your understanding of your area, especially about information of flood maps. Site also offers you the information via CD or online

http://www.pdc.org/hazards/tsunami/oahu/10_Hauula_to_Malaekahana.pdf:
Determine vacation safety zone for flood and tsunami. Tsunami and flood zone Hauula Map.

Hurricane Preparedness
http://www.fema.gov/hazard/hurricane/index.shtm
http://www.disastercenter.com/guide/hurricane.html
http://www.mass.gov/czm/hurricanes.htm
http://www.usatoday.com/weather/resources/safety/whurricane.htm
http://web.mit.edu/seagrant/hurricanes/index.html

Thunderstorm Preparedness
http://www.redcrosslv.org/news/2008/2008stormsafety.html
http://www.fema.gov/hazard/thunderstorm/index.shtm
http://www.fema.gov/hazard/thunderstorm/th_before.shtm

Fire Preparedness
http://www.fema.gov/areyouready/fire.shtm
http://www.redcross.org/portal/site/en/menuitem.86f46a12f382290517a8f210b80f78a0/?vgnextoid=5e06a5f0f013b110VgnVCM10000089f0870aRCRD
http://www.accem.org/fireprep.html
http://www.usfa.dhs.gov/citizens/

Disaster Recovery

I. What is Disaster Recovery?

The process of restoring and improving basic services, natural resources, and livelihoods in a community affected by a hazard event" (The booklet of U.S. Agency for International Development, 2007, p.60). "Community recovery suggests that something beyond physical reconstruction occurs and that the social institutions return to a familiar way of doing things. Health care, for example, can function at the levels necessary to maintain well being ranging from the individual to the broader public health levels and from routine services to trauma situations. (Dr. Brenda Phillips, Coastal Communities Resiliency Project NOAA Bibliography, p.73)

The desired outcome of this element of resilience is that plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.
(Source: How Resilient Is Your Coastal Community?)

II. Why is Disaster Recovery Important to Hau'ula ?

Disaster recovery is an essential for Hau'ula community resilience for the reason it provides an opportunity for communities to learn from the disaster experience and take actions to reduce risk. The period immediately following a disaster provides many opportunities for implementing strategies to mitigate the impacts of potential future disasters, especially while the political will remains strong. If the disaster recovery process is to be successful in building Hau'ula's community resilience, it is important to incorporate good practices and completely integrate the areas of disaster management, community development, and coastal resource management. If Hau'ula follows the process, is focused and recovery activities are coordinated across these three areas the disaster recovery process can result in a community that is less vulnerable and more resilient.

How to develop a disaster recovery plan?

Stage 1: Early Recovery Process "Assessment of damages and needs"

Information sharing among the community members

Coordination among agencies and organizations

Providing psychosocial care

Debris removal

Restoring critical facilities such as hospitals and schools

Constructing of transitional shelters

(The booklet of U.S. Agency for International Development, 2007, p.61)

How to develop a disaster recovery plan? *(cont.)*

Stage 2: Medium-Term Recovery Process: Restoring and Promoting Livelihoods

Reviving livelihoods

Getting the local economy back to normal

Recovering to the pre-disaster condition

Stage 3: Long-Term Recovery Process: Natural Resource Restoration

Recovering natural resources such as coral reefs, and vegetation to mitigate the impacts of potential future disasters

(The booklet of U.S. Agency for International Development, 2007, p.61)

III. Current Analysis of Hau'ula Disaster Recovery

Strengths	Weakness	Action
Stakeholder coordination mechanisms with organizations and agencies responsible for recovery effort Partner with American Red Cross Hau'ula Emergency Leadership Preparedness Committee (HELP) Partner with University of Hawaii Manoa, Department of Urban and Regional Planning Partner with Civil defense Hau'ula Community Association Support of KHWC Neighborhood Security Watch	No pre-established disaster recovery plans No review, and analysis of the recovery process A significant amount of power outages, telephone outages, and cable service. No emergency backup for energy infrastructure No water if power goes out Water flow is dependent on pumps that need power Homeless people Drug abuse	Build evacuation shelter / community center To develop a disaster recovery plan Stage 1: Stage 2: Stage 3: Watershed management Education (Community/ Parents) Improving pedestrian paths for pedestrians and bikers Fire involved Collaborate with Park and Recreation and City and Country

Hau'ula schools	Prostitutions Security plan to mitigate theft, ect.	To put cables and electricity underground to prevent outage To work with our representatives to ensure Hau'ula is given equal priority regarding planning and developing backup protocol priorities of energy infrastructure

IV. Planning Framework

The below framework was created to continue the chart from section III or revise accordingly to meet Hau'ula's community needs. The goal of the chart is to identify the actions and prioritize them for future implementation by following the framework below.

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Action 1:								
Action 2:								
Action 3:								
Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

V. Additional Information and Resources

Organizations and Agencies
Hau'ula Community Association
Website: http://hauulacommunityassociation.org/index.html

America Red Cross Hawaii State Chapter
4155 Diamond Head Road, Honolulu, HI 96816
Phone: 808-734-2101
Website: http://www.hawaiiredcross.org/
Call for request for assistant with disaster relief: (808) 739-8147

Hawaii State Civil Defense
Website: http://www.scd.hawaii.gov/index.html

Habitat for Humanity
Honolulu, Hawaii:
Honolulu HFH 1136 Un Mall Ste 510
Honolulu, HI 96813 Phone: (808) 538-7070 Fax: (808) 538-7171
Website: http://www.honoluluhabitat.org/

Planning Framework Summary

I. Plan of Actions for Prioritization

The below framework was created by from combining all sectors section III. The goal of the chart is to identify the key actions and prioritize them for future implementation. Using the framework some items may reveal they can be delegated to other entities to provide the leadership. This was done since, the actions items from the workshop documented in section III of all sectors yielded an unwieldy list of over 42 items. The team suggests that the community reduce the priorities to 3 – 5 depending on the items.

Gov. – Governance
SE – Society & Economy
CRM – Coastal Resource Management
LU – Land Use & Infrastructure
RK – Risk Knowledge
WSEP – Warning System and Evacuation Plan
ER – Emergency Response
DR – Disaster Recovery

#s	Plan of Actions	Sectors	Priority Rating
1	Heighten people's awareness of disaster	Gov., RK, WSEP	
2	Assessment of community needs particularly on what to prepare for the supply trailer.	Gov., DR	
3	Need for additional trailer or container	WSEP, DR	
4	Building of concrete pad for the current container	WSEP, DR	
5	Formulate a master plan especially for coastal areas.	Gov., CRM, DR	
6	Develop master plan for park and garden	Gov.	
7	Develop general land use plan (especially coastal erosion plan, and watershed management)	Gov., CRM, LU,	
8	Develop a tsunami response plan.	Gov., DR, WSEP	
9	Tap appropriate agencies such as Queen Lili'uokalani Children's Center to find out what services are available	Gov., SE, DR	
10	Organize a workshop in Hauula with the Monk Seal	Gov., SE	

	organization		
11	Increase people's awareness on water conservation especially in summer months.	Gov., SE	
12	Master plan for Hauula to deal with water management	Gov., DR	
13	Work with our representatives to ensure Hauula is given equal priority regarding Planning for and developing backup protocol priorities that other communities have	Gov., DR	
14	Put in place emergency systems and protocols	Gov, DR	
15	Include disaster management in school curriculum	All	
16	Educate Community/Parents	All	
17	Research/contact appropriate agencies such as Queen Liliuokalani Children's Center to find out what services are available	Gov., SE, DR	
18	Close park for family camping but be kept open for group camping only on Fri., Sat., Sun.	Gov., SE	
19	Put a gate to the park	Gov, SE	
20	Improve locally produced food	SE	
21	Improve path for pedestrian and bikers	SE, DR	
22	Encourage community/parent's commitment to disaster preparedness/responses.	SE, WSEP, RK	
23	Needs a place for community meetings	Gov., SE	
24	Encourage local market	SE	
25	Encourage business collaboration	SE	
26	Collaborate with park & recreation management city and county levels.	Gov., DR, SE	
27	Conduct community mapping to identify vulnerable areas; evacuation zones/points; where to put signage; and public structures for rehabilitation and possible	Gov., RK, LU, SE, WSEP	

	relocation.		
28	Clearing of Mouths and Culverts (Ask for clean streams from agencies)	LU, CRM, DR	
29	Prepare supplies for the emergency container	ER, DR,	
30	Building one more accessible evacuation shelter	DR, ER, SE,	
31	Prioritize siren repair or replacement	DR, ER,	
32	Providing a special evacuation place equipped by medical supplies for people with disabilities	ER, SE,	
33	Put up signage and warnings in strategic places that tell everyone to go up higher grounds in tsunami events	ER, DR,	
34	Make fliers or brochures about hazard preparedness	ER, DR, SE	
35	Upload related information about hazard preparedness in Hauula website	SE	
36	Identify and obtain permits for the use of and access to road leading to evacuation points during emergency	DR, ER	
37	Need to find ways on involving the fire department	Gov., ER	
38	Organize a committee for the assessment of damages and needs, and providing reliable information to the community members.	ER, Gov., SE	
39	Collaboration with organization or government agencies which help to recover from disaster	Gov., DR, ER	
40	Watershed management	LU, CRM, DR	
41	Put cables and electricity underground to prevent outage	SE, DR, LU	
42	After school program via Native Hawaiian grant	SE, RK, CRM, WS	

3 Plan of Actions for Hau'ula Community to Begin Implementing

Plan of Actions	Budgetary Requirement	Agency, group, or individual In-charge	Period of Implementation (months or years)					
Objective 1:								
Action 1:								
Action 2:								
Action 3:								
Objective 2:								
Action 1:								
Action 2:								
Action 3:								
Objective 3:								
Action 1:								
Action 2:								
Action 3:								

Appendix
Coastal Resource Management

Potential Results from Unmanaged and Managed Coastal Resources

Resource	Unmanaged Resource (Creates Vulnerability)	Managed Resource (Creates Resilience)
Marine fisheries	Overfishing leads to: Food insecurity Loss of income to fishers Nonlocal communities getting benefits and local community suffering consequences	Marine protected areas (MPAs) and managed fishing, rules (quotas, size limits, etc.) provide: Food security Sustainable income Good distribution of benefits from resource among local community
Coral reefs	Destructive practices lead to: Food insecurity Loss of marine tourism income Loss of habitat for other coral food/resources Loss of adaptability of reef ecosystem for other stresses (population, climate change, etc) Loss of biodiversity (medicines) Loss of coastal protection	MPAs, zoning or managed resource use (population control, fishing gear) result in: Food security of accessible fish Continuity of nursery for fish and attraction for visitors Reef ecosystem able to adapt to climate change, recover from a pollution incident Continued biodiversity for research into sustainable uses (medicines) Continued shoreline protection from storms
Mangrove	Loss of mangrove quality or quantity by converted land use (buildings, shrimp ponds) leads to: Food insecurity through loss of nursery grounds Food insecurity due to loss of food	Mangroves managed through multiple use zoning for sustainable use and conservation leads to: Food security of edible organisms Provision of ecosystem services (e.g. breeding and nursery area for mangrove

Resource	Unmanaged Resource (Creates Vulnerability)	Managed Resource (Creates Resilience)
	resource (crabs, clams, fish, etc.) Lost absorption of soils that leads to flooding and erosion Loss of wood, fruits, and land animals that inhabit mangroves	dependent species and stabilization of shoreline sediments and prevention of erosion etc.) Buffering from storm surge and flooding Storage of rich biodiversity
Sea Grass Beds	Destruction of sea grass beds can lead to: Food insecurity through loss of nursery grounds for fisheries Loss of ecosystem goods and services and loss of biodiversity	Managed extraction and use, and zoning for protection of sea grass beds leads to: Grazing habitat for endangered species (green turtles, sea horses, dugong) Feeding grounds for many reef fishes and other animals
Beaches and Sand Dunes	Destruction of beaches and sand dunes results in: Loss of buffer zones, nesting habitat for turtles, beaches and scenic vistas important for tourism Increased shoreline erosion	Protection of beaches and sand dunes results in: Resistance to storms and wind Increased numbers and diversity of ecologically key species Increased values to nature-based tourism and to quality of life

Coastal Resource Management: Good Practices to Enhance Resilience

1. Resource assessments: Conducting a community-wide coastal resource assessment to determine the status of resources and what needs to be managed and protected.
2. Coastal profiles: Developing a coastal environmental profile based on the resource assessment and other sources of information as a precursor to the development of a management plan.
3. Coastal plans: Developing a coastal resource or an integrated coastal management plan through a participatory process based on available information.
4. Advisory body: Forming a Coastal Advisory/Management Committee to provide a means for involvement of either scientific experts or the community and stakeholder groups that are essential in the management process.
5. Zoning: Coastal Zoning (include marine zones) based on a management plan to minimize conflicts among resource users and to ensure that important resource areas are protected from overuse.

6. Marine protected areas: Establishing MPAs that encompass defined areas for management and protection within larger CRM or integrated coastal management programs. MPAs may have various zones ranging from no-take and no-entry zones to sustained fishing and use zones or zones designated for tourism and recreation.
7. Plan refinements: Periodically updating the integrated coastal management plan to address changes in physical, social, environmental, and climate conditions as appropriate for the planning area of concern.

Coastal Resource Management: Challenges and Lessons Learned to Enhance Resilience

1. Long-term support required: CMR programs are long term and require sufficient buy-in of local and national governments and resources to implement the program.
2. CRM needs to be considered a basic service of local government: If governments do not adhere to the need for a CRM program and do not incorporate these processes into their normal planning, budgeting, and implementation cycle, the opportunity to build resilience is limited.
3. Valuation of coastal resources helps build political support: Showing stakeholders and governments the economic and ecosystem services values of coastal resources is necessary to convince governments to adopt CRM as an operating process.
4. CRM is an opportunity to integrate environmental management with disaster management: CRM presents an opportunity to pursue ecosystem management objectives that are integrated with disaster preparedness through hazard mitigation.

Benchmarks for Resilience in Coastal Resource Management

Benchmarks for Resilience in Coastal Resource Management	Benchmark Description	Potential Assessment Questions
Coastal Resource Management Benchmark on Policy and Planning Capacity: Policies and plans are implemented and monitored to effectively manage natural coastal resources.	The status and condition of coastal resources in relation to threats must be assessed and monitored as a prerequisite to the development of management strategies and plans. Resource assessments and the resulting maps and plans must be appropriate for the community and its local government. Resilient communities need to be aware of their relation with and	Are coastal resources and priority hazards routinely assessed? Is assessment data used to characterize risks to community and to develop coastal resource management plans? Is the scale of maps and plans appropriate to the local community and government? Are CRM strategies and a CRM

Benchmarks for Resilience in Coastal Resource Management	Benchmark Description	Potential Assessment Questions
	dependence on coastal resources and to what extent the degradation of coastal resources puts them at risk. They can formulate plans to minimize the loss of resources and to maximize their protection for future uses and benefits. Reconstruction plans need to consider coastal resource issues and include incentives to restore resources to a viable state. Finally, national and local policies and political support must exist to support the planning and implementation processes.	plan (e.g. habitats, biodiversity, and hazard mitigation) developed? Is the CRM plan being implemented? Does a community-based or local government form guide decision-making and conflict resolution for CRM? Have local and national governments endorsed policies for CRM? Does a feedback mechanism exist to refine CRM plan(s) as new data is available?
Coastal Resource Management Benchmark on Physical and Natural Resource Capacity:	Coastal habitats, ecosystems, and natural features provide protection from coastal hazards and provide various economic benefits to human communities. It is necessary that these important coastal resources are known and mapped, and the threats to them assessed. Use patterns must be determined to develop sustainable use plans. Implementation of the sustainable use plans through MPAs or other approaches is needed to minimize degradation of the resources. Post-disaster pressures from fishing, building, the need for wood, etc., need to be identified and anticipated in plans as possible to minimize degradation. Finally, monitoring provides feedback to	Have sensitive coastal habitats been identified and mapped? Have regulations been established for resource extraction based on conservations, such as marine protected areas, been established? Does a long-term monitoring program for coastal resource baseline assessment and monitoring exist? Is the monitoring program functional? Have opportunities to reduce risks from coastal hazards through restoration been identified?

Benchmarks for Resilience in Coastal Resource Management	Benchmark Description	Potential Assessment Questions
	management efforts and to assist in identifying additional efforts that may be required for restoration of resources.	
Coastal Resource Management Benchmark on Social and Cultural Capacity: Communities are actively engaged in planning and implementing coastal resource management activities.	Stakeholder participation in the coastal management planning and implementation process is important so that communities take ownership of management actions. It is also important that communities and local governments have a good working relationship so that there is an institutional base to support communities once plans are set and being implemented. The participation in implementation is also essential to build sustainable mechanisms for enforcement. Finally, the monitoring and evaluation process also must be highly participatory, so that feedback reflects stakeholder opinions and so that plans can be amended to improve effectiveness.	Have community groups been involved in all aspects of planning for CRM? Do implementation plans call for the participation of community stakeholders in the process? Is the community directly involved in the actual implementation? Are CRM plans responsive to the perceived needs of the communities? Does a process or procedure exist to review plans based on coastal resource issues and community feedback? Do policies and plans have political support for implementation from local government and communities?
Coastal Resource Management Benchmark on Technical and Financial Capacity: Communities and local governments value and invest in management and conservation to sustain their natural resources.	The benefits derived from healthy coastal ecosystems are multiple and can often be quantified in monetary terms. If is important that communities and local government understand the true values of their coastal resources so they will be encouraged to invest in the management and protection of natural resources. Valuation is also important for education to	Are coastal resources in the area of concern valued by the people? Is there an understanding of the ecological and/or monetary value of the ecosystems and resources? Are communities and their local governments investing in coastal management? Are actions sufficient to protect and management coastal

Benchmarks for Resilience in Coastal Resource Management	Benchmark Description	Potential Assessment Questions
	raise awareness about resources, their uses, and their importance. The valuation process may be a precursor to the development of management plans. After plans are developed, valuation is important to justify budget allocation for implementation of management.	resources? Do management policies and plans have political support for implementation? Do education programs exist that highlight the values of coastal ecosystems and resources?

Appendix
Society and Economy

Good Practices	Absorbing Shock	Bouncing Back	Adapting to Change
Society			
Establish programs that assist livelihood development for the poor and other vulnerable groups.	Help families create informal business to spread risks; focusing on the most vulnerable community members reduces vulnerability.	Help families be self-reliant during the recovery process.	Create new business opportunities that the poorest sector is well positioned to act on.
Develop community-driven planning activities.	Build support, trust and volunteerism to implement a plan; more likely to address the needs of all vulnerable groups.	Recovery will occur quicker with less conflict; meet the needs of the most vulnerable.	Community development that addresses the core needs of vulnerable populations for future hazards.
Establish financial services for families that need access to savings accounts, payment services, insurance, and small loans.	Encourage families to store fewer assets in homes located in vulnerable areas.	Extended family can send payments to those in need, Provide insurance coverage to rebuild and loans to rebuild personal property.	Small loans restart and change livelihoods; place savings in interest accounts for next hazard or emergency.
Form community volunteer groups to increase awareness and response.	Make more of the community, including the most vulnerable. Aware of and ready to react to hazards.	Enable community to become self-reliant to respond and recover using core volunteer community groups; outside aid is well managed.	Learn from experience of everyone and from the different livelihoods in the community.
Resolve conflicts between segments of the community regarding	Make hazard warnings and response serve everyone including the	Less time is spent on disagreements and political fighting; faster	Shared vision for increasing community resilience; all of the

Good Practices	Absorbing Shock	Bouncing Back	Adapting to Change
equity of services and redevelopment focus.	most vulnerable.	transfer toward recovery and rebuilding.	community can benefit from changes.
Address the needs of the weaker segments of the public such as elderly, sick, and poor.	Minor hazard events are less likely to impact community since the weakest segments are protected or serviced.	Weaker members of society are in greatest need during recovery process; having plans in place before a hazard creates more effective recoveries.	Future hazards will not be isolated to a few people; these weaker members of society will have a fair chance to get out of poverty.
Economy			
Establish social and ecological limits on resource extraction and allowable impacts.	Resources are in a healthier state to absorb the shock to the system and protect community assets and lives.	Community has local resources available to seek food, shelter, and clean water during the recovery phase, and businesses can resume.	Economy and social pressures at levels to allow major political changes to increase sustainable development goals.
Use existing businesses to mitigate current vulnerabilities.	Exposure and vulnerability of assets are reduced.	Less to clean up, replace, fund and close operations.	Expenses for recovery diverted to proper redevelopment and spread good practices to other businesses.
Prepare business response and redevelopment plans.	Vital assets and workers are protected as much as possible.	Less recovery work; faster responses due to coordination, preparations and partnerships.	Knowledge of good practices and options available to act effectively during crises.
Establish microfinance institutions at the local/regional level to provide financial loan services.	Having institutions offer services prior to disaster increases likelihood that small businesses are prepared for impact.	Existing institutions allow faster processing of applications, knowledge of local business members.	After donor aid is gone, micro financing provides the needed capital for long-term redevelopment.
Establish microfinance loans for formal and informal business (focus capital to	Small businesses can make necessary mitigation actions to protect assets.	Access to vital credit that gets them back quickly to production; small businesses recover	Loans at reasonable rates enable small businesses and families to improve their assets.

Good Practices	Absorbing Shock	Bouncing Back	Adapting to Change
reduce hazards).		quickly.	
Establish startup grants, technical assistance, and loans for new and alternative enterprises.	Diversifies the economy to spread risk vulnerabilities.	Small businesses can recover and service local community as other businesses rebuild.	Technical assistance guides small business owners toward options and new market potential.
Increase community input on economic development strategies.	Businesses develop based on community input; shared vision for development decreases vulnerability of businesses and citizens.	Recovery process can get local support and volunteers to rebuild quickly and appropriately.	Social and environmental criteria included in development plan for community; greater support and trust possible.
Increase awareness of risks to businesses.	Locate and build appropriately based on risks.	Results in less damage to repair and enhanced ability to begin preplanned recovery process.	Adapt business plan and strategy based on known risks.
Change laws, policies, and regulations to facilitate the creation and operation of microenterprises.	Diversification of the formal business sector reduces vulnerability to economy and spreads risks.	Businesses that are registered can get aid; new businesses can form quickly and legally.	Innovative business ideas can be acted upon to build a stronger community.

Analysis of Challenges and Lessons Learned, Enhancing Resilience in Hau'ula

1. Very few business
2. Very few jobs
3. Not using film industry
4. No market place
5. No contingency plan

Benchmarks for Resilience in Society and Economy

Benchmarks for Resilience in Society and Economy	Benchmark Description	Potential Assessment Questions
Society and Economy Benchmark on Policy and Planning Capacity: Development policies and plans build social capital and skills for economic diversity and self -reliance.	Community development policies, plans, and programs are important in building the capacity for economic diversification and self-reliance. Community goals identified through a transparent and participatory process are used to guide development policies, plans, and programs that are socially responsible and promote environmentally sustainable livelihoods in a diversified economy.	Do community development plans exist? Are there skills-training programs for alternative livelihoods? What types of social safety nets exist to help vulnerable sectors of society?
Society and Economy Benchmark on Physical and Natural Resource Capacity: Local economies are characterized by diverse and environmentally sustainable livelihoods.	Resilient coastal communities have local economies characterized by environmentally sustainable and diverse livelihoods. Sustainable livelihoods are based on sound management of natural resources and the environment and do not result in degradation of the natural resource base upon which the livelihood depends. Local entrepreneurs, businesses, farmers, and fishers are knowledgeable of the risks of coastal hazards that may affect their livelihood and take steps to reduce these risks by planning and preparedness activities. Diverse livelihoods are characterized by employment across a range of economic sectors with multiple sources of	Is the local economy dominated by one sector (e.g. tourism)? Are local economies and livelihoods linked to internal and external markets? Are resource-extracting livelihoods based on a managed and sustainable natural resource base? Are the socioeconomic and environmental impacts of planned economic development projects assessed? Do businesses mitigate current vulnerabilities to costal hazards? Do community development plans promote environment-friendly and diverse livelihoods and incorporate strategies to address risks from natural

Benchmarks for Resilience in Society and Economy	Benchmark Description	Potential Assessment Questions
	external and internal revenues to the community. No one economic sector dominates the local economy and there is a vibrant internally driven economy that is fueled by the regular infusion of external sources of revenue.	hazards? Are there pre-established strategies to address economic recovery resulting from a disaster, including loss of employment, loss of services, and products and impact to the tax base?
Society and Economy Benchmark on Social and Cultural Capacity	Social and cultural networks may be formal or informal mechanisms involving community, cultural, private, and nongovernmental groups that support a range of resilience-related activities. These can include poverty alleviation, gender and minority equality, conflict resolution, peace, cultural preservation, livelihood diversification, financial and food assistance, housing, environmental management, health programs, emergency response, disaster management, and other social and cultural needs. These networks promote self-reliant communities through a variety of strategies such as self-help programs, capacity building, and sharing of lessons learned. Social and cultural networks can also serve as safety nets for disaster-stricken communities through emergency medical supplies, shelter, and food.	Is a significant portion of the community economically and/or socially marginalized? Are there social networks that address the needs of the weaker segments of the public such as elderly, sick and poor? Are social networks or organized civic groups established with the capacity to assist communities during or after disaster? Are there conflict resolution mechanisms to support peace and order in the community? Are mechanisms used to increase community participation in community development planning?

Benchmarks for Resilience in Society and Economy	Benchmark Description	Potential Assessment Questions
Society and Economy Benchmark on Technical and Financial Capacity	Resilient local economies require an enabling environment to prosper. Technical resources are needed to provide guidance on natural resource management, coastal hazard mitigation, technological developments, market linkages, and other topics to promote environment-friendly economic diversification. Financial resources, such as grants, credit, and investment capital are needed at various scales from micro- to macro finance to promote environmentally sustainable economic diversification. Finally, national and local laws, policies, and programs are needed to provide incentives and disincentives that encourage local economies to develop in an environmentally sustainable manner, to incorporate knowledge of risks and plans to reduce risks from coastal hazards, and to plan for emergencies and disaster recovery.	Are there technical resources, such as universities, government programs, or donor projects that provide assistance to communities in developing environment-friendly livelihood diversification? Are startup grants, technical assistance, and loans available for new and alternative enterprises? Are small business development or micro financing programs or institutions (e.g. assistance, extension, and training) providing support to the community to promote sustainable livelihoods? Are businesses owners and employees aware and informed of coastal hazards (including long-term effects to businesses from erosion and sea level rise)? Are small business loan programs established to recapitalize for disaster recovery? Are there business response and redevelopment plans in case of a disaster? Are there insurance services for production losses in the event of a disaster?

Resources

Dr. Brenda Phillips, A website of Coastal Communities Resiliency Project NOAA Risk Knowledge

Natural Disaster Preparedness Training Center, University of Hawaii 2010, Coastal Community Resilience, Building Resilience from the Inside Out

U.S. Agency for International Development, 2007, How Resilient is your coastal community? A guide for evaluating coastal community resilience to tsunamis and other hazards.

Website Resources

- Flood hazard map of Hau'ula, http://gis.hawaiinfip.org/fhat/
- Flood Map site (Date provide by NASA) : http://flood.firetree.net/?ll=43.3251,-101.6015&z=13&m=7
- Hawaii Coastal Zoon Management Program: http://hawaii.gov/dbedt/czm/initiative/hazard.php
- Hurricane Map: https://hurricanemapping.com//index.cfm
- National Hurricane center: http://wwBibliography, http://chart.uno.edu/docs/Coastal_Bibliography_3-16-10.pdf
- NOAA Tsunami website: http://www.tsunami.noaa.gov/tsunami_story.html
- PRIMO : http://tsunami.csc.noaa.gov/preparedness.html
- The Great Wave: http://hawaii.gov/dbedt/czm/initiative/hazard/TheGreatWave.pdf
- Tsunami hazard map of Hau'ula can be accessed through this site, www.pdc.org/hazards/tsunami/oahu/10_Hauula_to_Malaekahana.pdf.
- Tsunami hazard map: http://tsunami.csc.noaa.gov/map.html?mapname=O_AHU-HAUULA+TO+MALAEKAHANA&submit1=Search+Island+Area
- Tsunami Information Center: http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1327%3Atsunami-awareness-posters&catid=1075%3Aawareness-a-education&Itemid=2034&lang=en
- w.nhc.noaa.gov/HAW2/english/intro.shtml