CITY COUNCIL
AGENDA REPORT

DATE: September 27, 2011

AGENDA OF: October 4, 2011

DEPARTMENT: Public Works

SUBJECT: Draft Climate Adaptation Plan and Vulnerability Study. (PW)

RECOMMENDATION: Motion to accept a report and presentation on the draft Climate Adaptation Plan and Vulnerability Study, hear public input, and provide comments.

BACKGROUND: With funding from the Federal Emergency Management Agency (FEMA), staff has prepared a draft Climate Adaptation Plan as a mandated update to our existing Local Hazard Mitigation Plan (LHMP). The LHMP was approved by FEMA and adopted by Council in 2007. Climate adaptation planning was identified as a critical action item within the initial LHMP. The City applied for and received FEMA Hazard Mitigation Planning funds to address potential impacts of climate change as an update to the adopted LHMP, focusing on the City's vulnerability to climate change impacts and identifying potential adaptation measures that might be taken to build a more climate resilient city. The completion of the Climate Adaptation Plan's required milestones by the grant deadline is critical to retaining the $90,000 in FEMA grant funds that the City was awarded to create this Plan.

Santa Cruz is committed to reduce greenhouse gas emissions in order to reduce the extent of climate change impacts, and is drafting a Climate *Action* Plan to identify strategies to reduce emissions. This Climate *Adaptation* Plan is a different arm of climate change planning, and recognizes that some degree of climate change impacts are already unavoidable and will impact our community; climate *adaptation* planning outlines a strategy to adapt and develop resilience to those impacts.

Over the past two months a brief overview of the climate adaptation planning process has been presented at the Water, Transportation and Public Works, Planning, and Parks and Recreation Commissions. Following the public comment period, which ends on October 31, 2011, the draft Climate Adaptation Plan will be forwarded to the California Emergency Management Agency (CalEMA) and then to FEMA for review, comment and approval. Once accepted by FEMA, the Plan will return to City Council for final approval and adoption. It is anticipated that the final Climate Adaptation Plan will return to City Council for approval and adoption in December.

DISCUSSION: The FEMA grant allowed the City to enter into an agreement with University of California at Santa Cruz (UCSC) to provide current climate science to inform the Climate Adaptation Plan. Dr. Gary Griggs, Director of the Institute of Marine Sciences, and Dr. Brent Haddad, Director of the UCSC Center for Integrated Water Research, co-authored the Vulnerability Study which is a key piece of the draft Plan. Dr. Griggs will present the findings of the Vulnerability Study at the October 4th Council Study Session. Staff will present a brief overview of the proposed Climate Adaptation Goals, Objectives and Actions. Time for questions and discussion from Council and the public will follow.

Adaptation planning is an ongoing process. Having a well thought out Climate Adaptation Plan in place creates the opportunity for the City to apply for future FEMA funding if it becomes available, to address potential adaptation priorities.

Staff invites the Council and public to review the draft Executive Summary and Proposed Goals, Objectives, and Actions of the draft Plan in advance of the Study Session in order to be better prepared to ask questions and provide comments.

Comments on the draft Plan may be submitted through October 31, 2011 as follows:
by email: catchison@cityofsantacruz.com

by mail: Climate Adaptation Plan
City of Santa Cruz
Attn.: Cathlin Atchison
809 Center Street, Room 201
Santa Cruz, CA 95060

FISCAL IMPACT: Retention of the $90,000 FEMA grant awarded to develop the Climate Adaptation Plan is dependent on successful completion of the Plan by the grant deadline. Actual implementation costs for the identified actions are unknown at this time.

Report prepared by Cathlin Atchison, Management Analyst/Project Manager.

Submitted by:

Mark R. Dettle
Director of Public Works

ATTACHMENTS:
~Executive Summary (expanded with goals, objectives and actions
~Climate Adaptation City Council Study Session web posting

ACKNOWLEDGEMENTS

Santa Cruz City Council

Ryan Coonerty, Mayor — Don Lane, Vice Mayor — Hilary Bryant
Tony Madrigal — Katherine Beiers — Lynn Robinson
David Terrazas

Climate Adaptation Team Leaders

Cathlin Atchison	Project Manager (Author)	Public Works
Robert Solick	Emergency Operations Center Manager	Public Works
Juliana Rebagliati	Planning Director	Planning
Ross Clark	Climate Action Coordinator	Planning
Mary Arman	Operations Manager	Public Works

Climate Adaptation Advisory Team Members

Member	Position	Department
Martin Bernal	City Manager	City Manager
Tina Shull	Assistant City Manager	City Manager
Ron Oliver	Fire Chief	Fire
Eric Aasen	Division Chief of Training	Fire
Mark Ramos	Division Chief of Operations	Fire
Dannettee Shoemaker	Parks and Recreation Director	Parks and Recreation
Carol Scurich	Recreation Superintendent	Parks and Recreation
Leslie Keedy	City Arborist	Parks and Recreation
Mauro Garcia	Parks Superintendent	Parks and Recreation
Ken Thomas	Principal Planner	Planning
Mark Dettle	Public Works Director	Public Works
Christophe Schneiter	Deputy Director/City Engineer	Public Works
Dan Seidel	Superintendent Wastewater Treatment	Public Works
Mike Sanders	Operations Manager	Public Works
Steve Wolfman	Associate Civil Engineer	Public Works
Bonnie Lipscomb	Economic and Redevelopment Director	Redevelopment
Katherine Donovan	Redevelopment Manager	Redevelopment
Bill Kocher	Water Department Director	Water
Linette Almond	Deputy Water Director/Engineering Manager	Water
Toby Goddard	Water Conservation Manager	Water

Scientific Advisors

	University of California • Santa Cruz
Gary Griggs	Director, UCSC Institute of Marine Sciences
Brent Haddad	Professor of Environmental Studies Director of the UCSC Center for Integrated Water Research

EXECUTIVE SUMMARY

The scientific community has reached a strong consensus that the climate is changing.[i] Climate change impacts include threats not only to our infrastructure but to our health, safety and to the economic vitality of our community. Climate scientists agree that there are only three approaches to addressing the impacts of climate change: retreat, resist or ignore. There is a cost associated with each of these paths.

Incorporating climate resilience planning into all that we do as a City allows us to address some of these difficult decisions in advance and take advantage of potential opportunities to protect our residents, infrastructure and economic well-being. This City of Santa Cruz Climate Adaptation Plan creates a framework for decision makers to build a more resilient and sustainable community, one that is informed by the most current climate science.

Surrounded by a greenbelt of open space areas and the Pacific Ocean, Santa Cruz is a compact, vibrant beach community that preserves the diversity and quality of its natural and built environments, creates a satisfying quality of life for its residents and attracts visitors from around the world. Its unique position, along the Pacific Ocean cliffs and Monterey Bay beaches with a river running through its downtown and tourist-serving areas, is a part of its appeal, yet these features increase its vulnerability to the impacts of climate change. Every aspect of the city — its economic prosperity, social and cultural diversity, scenic beauty and historical character — is threatened by potential climate change impacts. While the time frame and severity of potential climate change impacts are uncertain, climate scientists agree that they will be significant.

The City of Santa Cruz has long been a leader in environmental sustainability and disaster recovery. Santa Cruz has extensive experience in preparing for and responding to disasters such as earthquakes, floods and drought. The community has come back from each experience stronger and better prepared for what lies ahead. We have not only recovered from these hazards but have strengthened our city by taking steps to avoid the impacts of these hazards should they occur again. As an example, our downtown corridor along Pacific Avenue was nearly totally destroyed by the 1989 Loma Prieta earthquake. The community rebuilt downtown to standards that make each building and the whole of downtown better prepared should another earthquake strike. Hazard mitigation planning contributes to the protection of lives, property and the economic vitality of our city. The 1989 earthquake was devastating but it was also an opportunity to create a safer and more disaster resistant city.

Our downtown, visitor-serving facilities, neighborhoods and vital municipal infrastructure are within a few feet of sea level. Awareness of potential climate change impacts, especially sea level rise, and planning for such impacts, is critical for Santa Cruz.

Climate change mitigation and adaptation planning was identified as a critical action item in the City's Local Hazard Mitigation Plan (LHMP, 2007).The Federal Emergency Management Agency (FEMA) reviews and approves LHMPs and requires an update on a five-year cycle. To accomplish this mandate, the City applied for and received FEMA Hazard Mitigation Planning funds to address potential impacts of climate change as our update to the adopted LHMP.

The intent of this Climate Adaptation Plan is to identify our most significant potential climate change risks and vulnerabilities, and to create an action plan that will guide current and future decision makers in protecting our natural and built environment, our residents and visitors, our economic base, and our quality of life. Having a well-researched and thought out Climate Adaptation Plan in place creates the opportunity for the City to apply for FEMA and other funding to address identified adaptation priorities.

The City used FEMA grant funding to enter into an agreement with University of California at Santa Cruz (UCSC) to provide the most current available local and regional climate change scientific information upon which to build the Climate Adaptation Plan. Professor Gary Griggs, Director of the Institute of Marine Sciences, and Brent Haddad, Professor of Environmental Studies and Director of the UCSC Center for Integrated Water Research, co-authored the Climate Adaptation Plan Vulnerability Study. Their recently completed "City of Santa Cruz Vulnerability Study" identified climate change impacts for which the community should prepare. Identified vulnerabilities include:

- sea level rise
- precipitation patterns that may lead to more extreme storm events
- flooding
- drought
- ocean acidification
- cliff erosion
- salt water intrusion
- urban/wild land fires
- ambient temperature changes which may result in species migration, ecosystem endangerment, and increased risk of wildfire

Sustainability includes a community's environmental, social and economic health as well as disaster resilience. Traditionally, we have viewed disaster resilience as preparation for immediate or sudden hazard events such as earthquakes or floods. This Climate Adaptation Plan expands disaster resilience to include climate change impacts which may occur gradually or in the future. Because of the more gradual and long term impacts of climate change, we have the opportunity to prepare and to take advantage of opportunities to incorporate climate adaptation into all of our actions. This Plan establishes specific Goals and Objectives for the City Santa Cruz to adapt to climate change impacts while maintaining the community's environmental, social and economic health.

Climate Adaptation Goals

1. Protect the unique character, scenic beauty and culture in the natural and built environment from being compromised by climate change impact
2. Support initiatives, legislation, and actions to respond to climate change
3. Build resilience into all programs, polices and infrastructure
4. Encourage climate change resilience planning and actions in private companies, institutions, and systems essential to a functioning City of Santa Cruz
5. Encourage community involvement and public-private partnerships to respond to potential climate impacts.
6. Insure that Santa Cruz remains a safe, healthy and attractive place with a high quality of life for its residents, businesses and visitors

ADOPTED CITY COUNCIL STRATEGIC GOALS

In 2011, the City Council developed a strategic three-year plan that identifies five goals for the community. These strategic goals (*below*) inform and support the goals and objectives presented in the Climate Adaptation Plan.

1. To enhance environmental sustainability and resources
2. To enhance community safety
3. To attract and retain businesses and jobs
4. To achieve financial stability and sustainability
5. To improve and maintain infrastructure and facilities

Climate adaptation will require actions by individuals, businesses, and government. This Plan identifies 40 Climate Adaptation Action Items to adapt our community infrastructure, businesses and neighborhoods to likely climate change impacts, and to prepare for changes to natural resources that impact our community.

[1]Pew Center on Global Climate Change — *Adaptation Planning — What U.S. States and Localities are Doing, 2/13/2008 www.pewclimate.org/docUploads/State_Adapation_Planning_02_11_08.pdf*

GOALS, OBJECTIVES AND ACTIONS

Goals

Goals are general guidelines that explain what is to be achieved. They are broad-based, long-term, policy statements, and represent global visions. Goals help define the benefits that the plan is trying to achieve. The success of this Climate Adaptation Plan will be measured by the degree to which its goals are accomplished to yield actual climate impact risk reductions.

OVERARCHING STRATEGIC GOALS FOR THE CITY OF SANTA CRUZ

The City Council recently developed and adopted a Strategic Plan for the next three years. The plan identified five strategic goals for the community which informs this Climate Adaptation Plan:

- To enhance environmental sustainability and resources
- To enhance community safety
- To attract and retain businesses and jobs
- To achieve financial stability and sustainability
- To improve and maintain infrastructure and facilities

The Climate Adaptation Plan is consistent with the three-year strategic plan and each of the identified goals. In support of the goals of sustainability, safety, resilience and protection of infrastructure, the climate adaptation team sought the best climate science available by requesting a Vulnerability Study, defining the scope of that study, and then communicating the scope to the UCSC scientific team. The draft Vulnerability Study was extensively reviewed. After several iterations it was accepted as the basis for development of the goals, objectives and actions necessary to build resilience into future policies, programs, projects and infrastructure. Financial stability and sustainability in conjunction with the maintenance of City infrastructure and facilities is best achieved through a careful consideration in advance of potential climate change impacts when making decisions about capital investment, infrastructure and facilities, not when the impact is actually occurring.

CLIMATE ADAPTATION PLAN GOALS

1. Protect the unique character, scenic beauty and culture in the natural and built environment from being compromised by climate change impact
2. Support initiatives, legislation, and actions to respond to climate change
3. Build resilience into all programs, polices and infrastructure
4. Encourage climate change resilience planning and actions in private companies, institutions, and systems essential to a functioning City of Santa Cruz
5. Support initiatives, legislation and actions for reducing and responding to climate change
6. Encourage community involvement and public-private partnerships to respond to potential climate impacts.
7. Insure that Santa Cruz remains a safe, healthy and attractive place with a high quality of life for its residents, businesses and visitors

Objectives

The Climate Adaptation Team selected the objectives listed below to meet multiple goals. The objectives were also used to help establish priorities.
The City of Santa Cruz Climate Adaptation Team identified this list of objectives:

1. Consider potential climate change impacts in all planning and decision making processes
2. Coordinate adaptation planning with all other planning, including General Plan/ land use codes
3. Collaborate with others to raise awareness about climate change impacts
4. Seek opportunities to inform the community on potential climate change impacts
5. Incorporate ongoing monitoring processes to inform decisions
6. Seek opportunities to develop an environmentally sustainable economy
7. Continue Green House Gas (GHG) mitigation efforts
8. Minimize impacts of future sea level rise
9. Maintain and add to the city's urban tree canopy and increase tree diversity within urbanized areas
10. Support protection of the Monterey Bay Marine Sanctuary

IDENTIFICATION AND ANALYSIS OF ADAPTATION ACTIONS

Following is a list of Action items based on the Vulnerability Study that was completed by scientific consultants Gary Griggs and Brent Haddad. These are adaptation actions that could be undertaken to reduce potential losses or damages to people or property as a result of climate change impacts. The Climate Adaptation Team met and discussed priorities based on risks identified and potential losses as a result of those risks, reviewed in relation to funding, ability to implement, and consistency with other plans. To aid in the prioritization process, Department Heads applied the FEMA-recommended STAPLEE method to evaluate costs in relation to benefits of implementing a particular action over another. Results of this process are shown in the Appendices.

City staff, Council, Commission and community members had several opportunities to review draft Action prioritization and to comment on the Action items as well as other parts of the Plan. The Plan also provides for ongoing opportunities for community members to contribute during the annual review process.

Action items that address climate impacts with the highest risk to the community (as identified in the Vulnerability Study) were given priority rankings. The Vulnerability Study indicates that sea level rise and extreme storm events have the potential to cause the greatest economic and human losses.

Downtown Santa Cruz, the beach and tourist serving areas and the Wastewater Treatment Facility are all at risk from sea level rise and extreme storm events. Replacement of the Highway 1/Highway 9 bridge across the San Lorenzo River has also been identified as a very high priority. The bridge structure acts as a debris barrier during storms, creating a barrier or temporary dam and exacerbating flooding on the upper San Lorenzo River.

Water is essential to the survival of the City so drought and threats to the water system were also ranked as high or very high priorities. Urban/wild land fire is predicted to become a more extreme and significant event as climate conditions change. Finally, availability of funding (identified in the Capital Improvement Program or other source) was a determining factor in prioritization and appears to be the greatest barrier to implementing identified actions.

A formal cost-benefit analysis has not been done for any of the identified Actions. A primary next step in preparing for climate change is a complete cost-benefit analysis of potential actions to increase resilience of our Wastewater Treatment Facilities and supporting structures and replacement of the Highway 1/Highway 9 bridge. In reviewing the adaptation actions proposed, the costs and benefits of each action were also considered under the following criteria:

Cost ratings

High:	Existing funding levels are not adequate to cover the costs of the proposed action and would require an increase in revenue through an alternative source (for example, bonds, grants, and fee increases) to implement.
Medium:	The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
Low:	The action could be funded under the existing budget. The action is part of, or could be a part of, an existing, ongoing program.

Benefit ratings

High:	Action would have a significant impact on the reduction of risk exposure to life and property
Medium:	Action would have an impact on the reduction of risk exposure to life and property or action would provide an immediate reduction in the risk exposure to property
Low:	Long-term benefits of the action are difficult to quantify in the short term

The City will pursue the implementation of these actions to meet the goals set out above and continue to refine the cost-benefit analysis as funding becomes available.

Action items along with initial suggestions for implementation, identification of lead departments in the City, preliminary estimates of resources required and timeline are listed below:

Summary of action items by priority			Lead dept.
Very High Priority Actions			
# A-1		Upgrade/Relocate City buildings and infrastructure to protect and prepare for sea level rise, flooding and storm events from climate change	City Manager
# A-2		Prepare for potential sea level rise throughout the City	City Manager
# A-3		Evaluate all decisions through a climate change impact lens	City Manager
# A- 4		Protect wastewater facility from ground water infiltration	Public Works
# A-5		Seal wastewater pipes throughout system	Public Works
# A-6		Seal pump gallery at wastewater treatment facility	Public Works
# A-7		Monitor all wastewater and storm water pumping station sites	Public Works
#A-8		Replace Highway 1/9 bridge	Public Works
# A-9		Protect downtown and beach area from San Lorenzo River flooding	Public Works
# A-10		Protect adjacent neighborhoods and commercial areas from Branciforte Creek flooding	Public Works
# A-11		Diversify water portfolio	Water
# A-12		Monitor open space/watershed	Water
# A-13		Protect coastline-related water infrastructure	Water
# A-14		Conserve and curtail water usage	Water
# A-15		Reduce creek and/or river flooding to protect water infrastructure	Water
# A-16		Protect and Preserve City Buildings, Wharf and Infrastructure	P & R
# A-17		Protect Visitor Serving Venues and Natural Resources	P & R
# A-18		Protect and Preserve Tree Canopy	P & R
Priority Actions			
# B-1		Monitor wastewater facility ground water	Public Works
# B-2		Engineer a cut off wall to protect wastewater treatment facility	Public Works
#B-3		Protect adjacent neighborhoods & commercial areas from creek/stream flooding	Public Works
# B-4		Prepare for water emergency supply for climate related events	Water
# B-5		Protect watershed land and vegetation	Water
# B-6		Protect water system infrastructure from landslides and erosion	Water
# B-7		Minimize risks from dam failure	Water
# B-8		Prepare for potential changes in water quality due to climate change	Water
# B-9		Promote and preserve economic base and tourism industry in the face of a changing climate	ED & RD
# B-10		Prepare for opportunities/challenges in the tourism industry such as an increase in climate refugees	ED & RD
# B-11		Require setbacks for development adjacent to cliffs	Planning
# B-12		Protect natural shoreline processes from alteration	Planning
# B-13		Restrict development in flood plains	Planning
# B-14		Disseminate flood hazard information - encourage participation in Federal Flood Insurance Program	Planning
# B-15		Develop flood warning system for Newell Creek dam failure inundation	Planning
# B-16		Wildfire prevention through regulations of new development	Planning

Summary of action items by priority			Lead dept.
Important Actions			
# C-1		Protect, repair/replace bridges crossing the San Lorenzo River	Public Works
# C-2		Prepare for Climate Change Related Short-Term Water Shortage	Water
# C-3		Establish and/or maintain cooperative fire agreements	Fire
# C-4		Increase vegetation management efforts to reduce wildfire potential	Fire
# C-5		Increase public awareness, education and enforcement of wild land fire threat	Fire
# C-6		Increase open space monitoring	Fire
# C-7		Prevent urban/wild land interface fire hazards in Parks	Fire

Climate Adaptation Action Item: Detail

Following is a listing of the Action Items categorized in the table above. Below, they are grouped as Very high, High and Important. The list includes detailed actions informed by lengthy review processes among subject matter experts within City departments and executive management.

Potential hazards ..... Sea level rise; flood; severe storm/weather events; drought, salt water intrusion, coastal erosion; increased wildfires; ocean acidification

Action Items rated "Very high"

A-1 ..... Upgrade or relocate city buildings and infrastructure including Emergency Operations Center to protect and prepare for sea level rise, flooding and storm events occurring as a result of climate change

Proposed Activities ..... Evaluate and upgrade infrastructure, including, but not limited to City Hall, Civic Auditorium, Police Department, Fire Department, Library, Corporation Yard, Wharf, Lighthouse, Wastewater Treatment Facility, water facilities and supply lines, storm water pipes, dams, roads, bridges, intakes, or pumps. Relocate or upgrade any facilities or infrastructure that may be impacted by ongoing or increased storm events, such as sea level rise, permanent coastline or cliff erosion, repetitive flooding or salt water intrusion. Conduct engineering evaluation of the City's primary Emergency Operations Center (located in Police Department building) for long term protective measures against sea level rise and flooding impacts.

Hazard ..... Flood, sea level rise, storm surge damage, erosion

Environmental concerns .... State and local agency review, information needs, community concerns

Lead department ..... City Manager, Public Works, Water, EOC

Additional departments ..... Planning, Redevelopment, Police, Fire, Parks and Recreation

Timeline ..... Ongoing

Resources required ..... Technical consultants (geologist, hydrologist, geotechnical and civil engineering) and engineering contractor, County Public Works

Funding Source ..... Federal, state, local funds

Priority ..... Very high

A-2 ..... Prepare for potential sea level rise throughout the City

Proposed activities ..... Install permanent tide gauges to monitor sea level or work conjunctively with agencies that intend to install gauges; install ground water monitoring wells to track water table rise; upgrade infrastructure to adapt to higher sea level and water table. Protect freshwater resources from saltwater intrusion. Prepare for redistribution of groundwater pumping away from coastal areas susceptible to salt intrusion.
Hazard ..... Sea level rise, higher water table, flooding
Lead department ..... City Manager, Public Works and Water
Additional departments ..... All departments; Port District
Timeline ..... Ongoing
Resources required ..... Technical and engineering consultants, materials
Funding source ..... Federal, state and local funds, operating budget
Priority ..... Very high

A-3 ..... Evaluate all decisions through a climate change impact lens

Proposed activities ..... Evaluate all project, program and infrastructure, and land use decisions in light of best available climate science. Ask, "What are the potential climate impacts and adaptation actions that might be considered," just as every proposed program or project defines potential fiscal impacts to the City. Address the effects of climate change through changes in land use and building codes for low-lying areas that may be flooded by increases in sea levels and storm violence.
Hazard ..... Sea level rise; flood; severe storm/weather events; ocean acidification salt water intrusion; coastal erosion; increased wildfires
Environmental concerns .... Protection of natural environment. Coastal and riparian habitat
Lead department ..... City Manager, Planning Department
Additional departments ..... All departments
Timeline ..... Ongoing
Resources required ..... Staff time, technical and engineering consultants, materials
Funding source ..... Federal, state and local funds, operating budget, General Plan Maintenance Fund
Priority ..... Very high

A- 4 ..... Protect wastewater facility from ground water infiltration

Proposed activities ..... Rehabilitate the City's wastewater facility to isolate and dewater continuing water table rise beneath facility from the rest of Neary Lagoon area.
Hazard ..... Flood, storm surge, sea level rise infrastructure damage to process units and associated equipment.
Environmental concerns .... Ability to treat raw sewage to required discharge standards for safe ocean disposal
Lead Dept ..... Public Works
Timeline ..... Ongoing
Resources required ..... $3 – 6 million; regulatory review
Funding source ..... Unidentified grant funds, sewer fund, storm water fund
Priority ..... Very high

A-5 ..... Seal wastewater pipes throughout system

Proposed activities ..... Seal wastewater pipes throughout system that are at or below existing groundwater levels to protect system against rising groundwater.
Hazard ..... Sea level rise, flooding, storm surge
Lead department ..... Public Works
Additional departments ..... Water
Timeline ..... 2010 – 2020
Resources required ..... Approximately $1 – 2 million/year
Funding source ..... Operating budget and unidentified outside funding
Priority ..... Very high

A-6 ..... Seal pump gallery at wastewater treatment facility
Proposed activities ..... Seal pump gallery under the wastewater treatment facility to protect against a rise in groundwater, plus possible improvement to secondary clarifiers to protect against groundwater rise.
Hazard ..... Sea level rise, flooding, storm surge
Lead department ..... Public Works
Timeline ..... 2010 – 2020
Resources required ..... $40,000 per year with possible $1 – 5 million onetime expenditure to secondary clarifiers within next 10 years.
Funding source ..... Operating budget and unidentified outside funding
Priority ..... Very high

A-7 ..... Monitor all pumping station sites
Proposed activities ..... Monitor, repair enhance and replace (when necessary) all system pump stations including the one at Neary Lagoon as well as five storm water pump stations along the San Lorenzo River
Hazard ..... sea level rise, flood, storm surge
Environmental concerns .... Habitat preservation
Lead department ..... Public Works
Additional departments ..... Parks and Recreation
Timeline ..... 2010 – 2020
Resources required ..... $50,000 per year plus possible capital expenditure at Pump Station 2 of $200,000 within next 10 years.
Funding source ..... Operating budget, Measure E funds, unidentified outside funds
Priority ..... Very high

A-8 ..... Replace Highway 1/9 Bridge
Proposed activities ..... Work with Caltrans to replace and raise bridge to reduce flooding hazard potential due to its low flood clearance, and number and angle of piers in the river.
Hazard ..... Flood
Environmental concerns .... Habitat maintenance , community concerns
Lead department ..... Public Works , Caltrans
Additional departments ..... Redevelopment, federal, state and local agencies,
Timeline ..... 5 – 20 years
Resources required ..... Funding, staffing, technical consultants and engineering contractor
Funding source ..... State, Federal and Redevelopment funds
Priority ..... Very high

A-9 ..... Protect downtown and beach area from San Lorenzo River flooding
Proposed activities ..... Evaluate and raise levees and/or dredge river to improve water flow and protect the downtown and beach area from flooding.
Hazard ..... Flood, sea level rise, extreme storm/surge events, erosion
Environmental concerns .... Habitat maintenance, community concerns
Lead department ..... Public Works, Army Corps of Engineers
Additional departments ..... Water, Redevelopment, Parks and Recreation, federal, state and local agencies
Timeline ..... Ongoing project
Resources required ..... Funding, staffing, technical consultants and engineering contractor
Funding source ..... Federal, state, local funds
Priority ..... Very high

A-10 ..... Protect adjacent neighborhoods and commercial areas from Branciforte Creek flooding
Proposed activities ..... Evaluate Branciforte Creek flooding potential, and monitor and improve natural creek conditions to improve flood flow, reduce erosion, improve habitat and protect the adjacent neighborhoods and commercial areas. Raise improved concrete creek channel to improve flood flow and protect the adjacent neighborhoods and commercial areas.
Hazard ..... Flood, sea level rise, erosion
Environmental concerns .... Habitat maintenance , community concerns, restrictive permit requirements
Lead department ..... Public Works
Additional departments ..... Water, Redevelopment, Parks and Recreation, federal, state and local agencies
Timeline ..... Ongoing
Resources required ..... Funding, staffing, technical consultants and engineering contractor
Funding source ..... Federal, state, local funds
Priority ..... Very high

A-11 ..... Diversify water portfolio
Proposed activities ..... Enhance or improve current water supply by providing a reliable water supply that meets long term needs while ensuring protection of public health and safety; desalination facility.
Hazard ..... Drought, climate change-related altered precipitation, seawater intrusion into groundwater, changing air temperature
Environmental concerns .... Wildlife habitat, energy consumption, growth inducement
Lead department ..... Water
Additional departments ..... Soquel Creek Water District
Timeline ..... Estimated timeline to be operational 2016
Resources required ..... Estimated $60 million, 3 – 5 full time positions, plus team of outside technical consultants (engineering and environmental)
Funding source ..... Water fund, water system development fees fund, shared funding with Soquel Creek Water District and external funding
Priority ..... Very high

A-12 ..... Monitor open space/watershed
Proposed activities ..... Review and revise usage of open space to reduce incidence of human-caused wildfire; increase surveillance or security measures to ensure prompt response to emergencies, such as fire or flood; add weather monitoring stations to track temperature rise; increase ability to monitor fuel moisture content in all watershed and water department asset areas.
Hazard ..... Fire, flooding
Environmental concerns .... Vegetation Management Plan approval
Lead department ..... Water
Additional departments ..... Fire, Parks and Recreation, Police, CalFire, County Sheriff
Timeline ..... Ongoing
Resources required ..... Citywide effort, consultant, personnel, equipment
Funding source ..... Various, operating budget, general fund, unidentified outside funds
Priority ..... Very high

A-13 ..... Protect coastline and infrastructure
Proposed activities ..... Protect current infrastructure or assets through coastal restoration efforts as related to reinforcing, replacing, relocating, or otherwise safeguarding current and future pipelines, assets, or other water department holdings.
Hazard ..... Flood, sea level rise, storm damage, coastal erosion
Environmental concerns .... Coastal Commission review, community concerns
Lead department ..... Water
Additional departments ..... Public Works
Timeline ..... Ongoing
Resources required ..... Technical consultants , County Public Works
Funding source ..... Federal, state, local funds
Priority ..... Very high

A-14 ..... Conserve and curtail water usage
Proposed activities ..... Reduce near term drought shortages through water conservation and curtailment of water use; revise Emergency Water Rationing Plan; review and revise water department emergency plans to reflect climate change-related hazards.
Hazard ..... Drought, climate change impacts on resources, long-term water shortages
Lead department ..... Water
Timeline ..... Conservation: ongoing, curtailment: during water shortages/drought
Resources required ..... Conservation: outside consultants, $100K; Curtailment temporary additional staff depending on level of curtailment
Funding source ..... Water fund, Water system development fees fund, and external funding
Priority ..... Very high

A-15 ..... Reduce creek and/or river flooding
Proposed activities ..... Provide flood protection for key water facilities and assets. Reduce flooding hazard potential along creeks, river, or other flowing water sources; stabilize, augment, raise levees or floodwalls, improve structures or features at water department sites; minimize debris that could increase flood potential where permitted and applicable. Protect vulnerable assets in flood risk or low-lying areas, such as the Coast Pump Station and Tait Wells.
Hazard ..... Flood
Environmental concerns .... Land use issues
Lead department ..... Water
Additional departments ..... Public Works, California Department of Fish and Game
Timeline ..... Ongoing
Resources required ..... Technical consultants (geologist, hydrologist, geotechnical and civil engineering) and engineering contractor
Funding source ..... Federal, state, local funds, grants and loans
Priority ..... Very high

A-16 ..... Protect and preserve city buildings, wharf and infrastructure
Proposed activities ..... Protect, preserve and reinforce City buildings, Municipal Wharf and infrastructure from impacts of climate change
Hazard ..... Sea level rise, increased storm events, flood, drought, coastal erosion, ocean acidification and salt water intrusion
Lead department ..... Parks and Recreation
Additional departments ..... Public Works, Redevelopment and Economic Development
Timeline ..... Ongoing with annual status reviews
Resources required ..... Staff time, outside experts and consultants, funding
Funding source ..... General Fund and unidentified outside funding
Priority ..... Very high

A-17 ..... Protect visitor serving venues and natural resources
Proposed activities ..... Protect, maintain and preserve visitor serving venues, museums, facilities, parks, beaches and other natural resources including the lighthouse and West Cliff Drive, pathways, infrastructure, open space and parks
Hazard ..... Coastal erosion, flooding, sea level rise, increased storm events, flood, ocean acidification, salt water intrusion and heat
Environmental concerns .... Coastal impacts
Lead department ..... Parks and Recreation
Additional departments ..... Redevelopment and Economic Development, Public Works
Timeline ..... Ongoing with annual status reviews
Resources required ..... Staff time, outside experts and consultants, funding
Funding source ..... General Fund and unidentified outside funding
Priority ..... Very high

A-18 ..... Protect and preserve tree canopy
Proposed activities ..... Evaluate, preserve and protect tree canopy including species evaluation and replacement with resilient trees that can withstand extreme weather events, salt water intrusion, and drought.
Hazard ..... Drought, salt water intrusion, extreme weather events, sea level rise, and heat
Environmental concerns .... Animal habitats
Lead department ..... Parks and Recreation
Additional departments ..... Redevelopment and Economic Development, Planning
Timeline ..... Ongoing with annual status reviews
Resources required ..... Staff time, outside experts and consultants, funding
Funding source ..... General Fund and unidentified outside funding
Priority ..... Very high

Action Items rated "High"

B-1 ..... Monitor wastewater facility ground water
Proposed activities ..... Provide ground water monitoring wells to monitor level of ground water rise.
Hazard ..... Sea level rise
Environmental concerns .... Ability to treat raw sewage to required discharge standards for safe ocean disposal
Lead department ..... Public Works
Timeline ..... Ongoing
Resources required ..... $1 – 2 million
Funding source ..... Unidentified grant funds, sewer fund, storm water fund
Priority ..... High

B-2 ..... Engineer a cut off wall to protect wastewater treatment facility
Proposed activities ..... Engineer a cut-off wall such as a steel sheet pile barrier or grout curtain and pump system to isolate ground water beneath the wastewater treatment facility from Neary Lagoon.
Hazard ..... Sea level rise, flooding, storm surge
Lead department ..... Public Works
Timeline ..... 4 – 10 years
Resources required ..... $5,000,000 onetime expenditure within next 10 years if needed.
Funding source ..... Operating budget and unidentified outside funding
Priority ..... High

B-3 ..... Protect adjacent neighborhoods and commercial areas from creek and stream flooding
Proposed activities ..... Evaluate creek flooding potential, and monitor and improve natural creek conditions to improve flood flow reduce erosion, improve habitat and protect the adjacent neighborhoods and commercial areas.
Hazard ..... Flood, sea level rise, erosion
Environmental concerns .... Habitat maintenance , community concerns, restrictive permit requirements
Lead department ..... Public Works
Additional departments ..... Water, Redevelopment, Parks and Recreation, Federal, State and Local Agencies
Timeline ..... Ongoing
Resources required ..... Funding, staffing, technical consultants and engineering contractor
Funding source ..... Federal, state, local funds
Priority ..... High

B-4 ..... Prepare for water emergency supply for climate related events
Proposed activities ..... Ensure completeness and availability of identified emergency supplies and resources; including, but not limited to items such as water main repair parts, generators, pumps, sandbags, road clearing, medical, and communication. Identify/catalogue current supply; procure additional items/services to ensure preparedness in the event of a climate event.
Hazard ..... All
Lead department ..... Water
Timeline ..... Ongoing
Resources required ..... Staff time, funds for emergency supplies
Funding source ..... Operating budget
Priority ..... High

B-5 ..... Protect watershed land and vegetation
Proposed activities ..... Increase efforts to reduce fire risk in watershed, near water supply lines where applicable, and around water department assets to mitigate potential increase in wildfire risk due to climate change; replant post-wildfire to decrease risk of erosion or landslide.
Hazard ..... Wildfire, wildfire-caused erosion or landslide
Environmental concerns .... Vegetation Management Plan approval
Lead department ..... Water
Additional departments ..... Fire Departments, CalFire
Timeline ..... Ongoing
Resources required ..... Outside forestry consulting services, staff time, contractor, materials/supplies/equipment
Funding source ..... Unidentified outside funding
Priority ..... High

B-6 ..... Protect water system infrastructure
Proposed activities ..... Protect water system infrastructure, access roads, and reservoirs from landslides and other failure; implement or continue landslide monitoring and stabilization; evaluate and/or improve access roads, relocate infrastructure where applicable.
Hazard ..... Landslide, mudslide, slope erosion
Environmental concerns .... Geologic, hydrologic
Lead department ..... Water
Timeline ..... Ongoing
Resources required ..... Technical consultants (geologist, hydrologist, geotechnical and civil engineering) and engineering contractor
Funding source ..... Federal, state, local funds, grants and loans
Priority ..... High

B-7 ..... Minimize risks from dam failure
Proposed activities ..... Monitor dams, diversions, and infrastructure to protect water resources and minimize risks to people and property resulting from a failure of any of these structures.
Hazard ..... Landslide, fire, or any disaster that could cause structure failure
Environmental concerns .... Flooding, habitat impacts
Lead department ..... Water
Additional departments ..... CA Division of Safety of Dams
Timeline ..... Ongoing
Resources required ..... $150k/year, outside consultants (geologists, geotechnical and civil engineers)
Funding source ..... State and local funds
Priority ..... High

B-8 ..... Prepare for potential changes in water quality due to climate change
Proposed activities ..... Evaluate options for mitigating future water quality problems, such as increased turbidity in flowing sources due to intensifying storm activity or salt intrusion into groundwater due to advancing sea levels. Examine potential need to relocate intake pipelines. Evaluate potential changes or increases needed in treatment levels, new technology to handle poorer quality raw water. Prepare for increase in nuisance algae blooms in Loch Lomond. Prepare for redistribution of groundwater pumping away from coastal areas susceptible to salt intrusion.
Hazard ..... Decreased source water quality
Environmental concerns .... Water use rights, habitat or sensitive species protections
Lead department ..... Water
Additional departments ..... Parks and Recreation
Timeline ..... Ongoing
Resources required ..... Consulting engineers for water treatment improvements, chemical supplies and services
Funding source ..... Operating budget
Priority ..... High

B-9 ..... Promote and preserve economic base and tourism industry in the face of changing climate
Proposed activities ..... Promote and preserve economic base and tourism in the face of a changing climate through collaboration with Visitor Center, Downtown Association and other community groups to promote tourism. Monitoring and proactive steps should be taken as information becomes available.
Hazard ..... Sea level rise, extreme heat events
Lead department ..... Redevelopment and Economic Development
Additional departments ..... Public Works, Parks and Recreation
Timeline ..... Ongoing
Resources required ..... Staff time; possibly consultants
Funding source ..... Unknown
Priority ..... High

B-10 ..... Prepare for new opportunities and challenges in the tourism industry such as an increase in climate refugees
Proposed activities ..... Prepare for new opportunities and challenges in the tourism industry such as an increase in climate refugees including review of properties available for lodging and other new development. Continue to work with Parks and Recreation Department and the lodging industry to insure that a variety and adequate quantity of lodging and camping options are provided.
Hazard ..... Extreme storm and temperature events, sea level rise
Environmental concerns .... Unknown until prospective properties are identified
Lead department ..... Redevelopment and Economic Development
Additional departments ..... Parks and Recreation
Timeline ..... Ongoing with a view to 20 – 25 years out
Resources required ..... Staff time, consultants, unidentified funding partners
Funding source ..... Unknown
Priority ..... High

B-11 ..... Require setbacks adjacent to cliffs
Proposed activities ..... development adjacent to cliffs, require setbacks for buildings equal to 50 years of anticipated cliff retreat.
Hazard ..... Coastal erosion
Environmental concerns .... Coastal habitat
Lead department ..... Planning
Additional departments ..... Coastal Commission
Timeline ..... 2005 – 2030
Resources required ..... Staff time
Funding source ..... Permit fee revenue, general fund
Priority ..... High

B-12 ..... Protect natural shoreline
Proposed activities ..... Allow construction that alters natural shoreline processes only when required to serve coastal-dependent uses or to protect existing structures or public beaches from erosion, and when designated to eliminate or mitigate adverse impacts on local shoreline sand supply.
Hazard ..... Coastal erosion
Environmental concerns .... Coastal habitat
Lead department ..... Planning
Additional departments ..... Coastal Commission
Timeline ..... 2005 – 2030
Resources required ..... Staff time
Funding source ..... General Fund/General Plan Maintenance Fund
Priority ..... High

B-13 ..... Restrict development in flood plains
Proposed activities ..... Restrict or prohibit uses in underdeveloped flood areas, and maintain flood plain and floodway regulations in developed flood areas.
Hazard ..... Flood
Environmental concerns .... Riparian habitat
Lead department ..... Planning
Additional departments ..... Federal Emergency Management Agency
Timeline ..... 2005 – 2030
Resources required ..... Staff time
Funding source ..... General Fund, General Plan Maintenance Fund
Priority ..... High

B-14 ..... Disseminate flood hazard information and encourage participation in Federal Flood Insurance Program
Proposed activities ..... Ensure that flood information is made available to property owners, potential buyers, and residents living in flood plains and coastal inundation areas, and encourage them to participate in the Federal Flood Insurance Program.
Hazard ..... Flood
Environmental concerns .... None
Lead department ..... Planning
Additional departments ..... Federal Emergency Management Agency, Coastal Commission, Redevelopment
Timeline ..... 2005 – 2030
Resources required ..... Staff time.
Funding source ..... General Fund, General Plan Maintenance Fund
Priority ..... High

B-15 ..... Develop flood warning system for Newell Creek dam failure inundation
Proposed activities ..... Institute a flood warning system for developed areas in floodplains, tsunami inundation areas, and areas affected by Newell Creek dam failure.
Hazard ..... Flood severe storm events
Environmental concerns .... None
Lead department ..... Planning
Additional departments ..... Public Works, Fire, Police
Timeline ..... 2005 – 2030
Resources required ..... Staff time and capital for warning system
Funding source ..... General Fund, General Plan Maintenance Fund
Priority ..... High

B-16 ..... Wildfire prevention through regulations of new development
Proposed activities ..... Regulate development in and adjacent to areas with steep canyons, arroyos and fire prone vegetation. Require new development in areas susceptible to wildfires to be responsible for fire prevention activities (visible house numbering and use of fire-resistant and fire retardant building and landscape materials) and to also provide a defensible zone to inhibit the spread of wildfires.
Hazard ..... Urban wild land interface fires
Environmental concerns .... Woodland and riparian habitat
Lead department ..... Planning
Additional departments ..... City Fire, Cal Fire
Timeline ..... 2005 – 2030
Resources required ..... Staff time
Funding source ..... Permit fee revenue, general fund, General Plan Maintenance Fund
Priority ..... High

Action Items rated "Important"

C-1 ..... Protect, repair/replace bridges crossing the San Lorenzo River
Proposed activities ..... Evaluate and raise bridges or implement other methods to improve water flow as needed to reduce flooding hazard potential along the San Lorenzo River, Water Street, Soquel Avenue, Laurel Street, Riverside Avenue, and two pedestrian bridges.
Hazard ..... Flood
Environmental concerns .... Federal, State and Local Agencies, habitat maintenance, community concerns
Lead department ..... Public Works, Army Corps of Engineers ongoing project
Timeline ..... Long Term
Resources required ..... Funding, staffing, technical consultants and engineering contractor
Funding source ..... Grants, Gas Tax and Storm Water funds
Priority ..... Important (bridges have been raised in the past)

C-2 ..... Prepare for climate change related short-term water shortage
Proposed activities ..... Develop multi-agency response protocol for emergency drinking water procurement and distribution; coordinate with county, regional, state, and/or federal entities to create response plan for emergency — such as a flood or storm event — or short-term water shortage — potentially caused by hazards such as blackouts due to heat waves or supply disruption due to weather change.
Hazard ..... Drought, water supply disruption, water shortage
Environmental concerns .... None
Lead department ..... Water
Additional departments ..... Local, county, regional, state, federal agencies
Timeline ..... Ongoing
Resources required ..... Staff time
Funding source ..... Unidentified outside funding
Priority ..... Important

C-3 ..... Establish and/or maintain cooperative fire agreements
Proposed activities ..... Continue to maintain and/or establish agreements with local fire agencies for emergency response to increased Wild land incidents which may occur as the result of climate change.
Hazard (potential threat) ..... Wild land fire
Environmental concerns .... None
Lead department ..... Fire Department
Additional departments ..... County Fire Agencies
Timeline ..... Ongoing
Resources required ..... Administrative staff time
Funding source ..... General Fund
Priority ..... Important

C-4 ..... Increase vegetation management efforts
Proposed activities ..... Increase efforts to reduce the increased fire risks a result of climate change in wild land/urban interface areas through vegetation management and code enforcement.
Hazard (potential threat)..... Wildfire
Environmental concerns .... Vegetation Management
Lead department ..... Fire Department
Additional departments ..... Public Works, Parks and Recreation
Timeline ..... Ongoing
Resources required ..... Staff time, outside resources, funding
Funding source ..... General Fund, outside grants
Priority ..... Important

C-5 ..... Increase public awareness, education and enforcement of wild land fire threat
Proposed activities ..... Educate the public in the maintenance of adequate clearance of residential property as outlined in the LHMP; enforce adequate clearance through codes and ordinances.
Hazard (potential threat)..... Fire
Environmental concerns .... Vegetation Management Plan approval, continued approval and enforcement of the California Fire Code
Lead department ..... Fire Department
Additional departments ..... Parks and Recreation
Timeline ..... Ongoing
Resources required ..... Staff time
Funding source ..... General Fund
Priority ..... Important

C-6 ..... Increase open space monitoring
Proposed activities ..... Review and revise usage of open space to reduce incidence of human caused wild land fire
Hazard (potential threat)..... Fire risk increases as the result of climate change
Environmental concerns .... Vegetation Management Plan approval
Lead department ..... Fire
Additional departments ..... Parks and Recreation, Police
Timeline ..... Ongoing
Resources required ..... Staff time
Funding source ..... General Fund, outside grants
Priority ..... Important

C-7 ..... Prevent urban/wild land interface fire hazards in Parks
Proposed activities ..... Protect parks and facilities from the increased risk of urban/Wild land fire through increased underbrush clearing, perimeter protection, adequate patrol and staffing
Hazard ..... Urban/wild land fire
Environmental concerns .... Threats to forest and animal habitat
Lead department ..... Parks and Recreation, Fire Department
Additional departments ..... Water, Public Works, Police
Timeline ..... Ongoing with annual status reviews
Resources required ..... Staff time, outside consultants, funds
Funding source ..... General Fund and unidentified outside funding
Priority..... Important

[i] Pew Center on Global Climate Change — *Adaptation Planning — What U.S. States and Localities are Doing, 2/13/2008*www.pewclimate.org/docUploads/State_Adapation_Planning_02_11_08.pdf

The California Ocean Protection Council, working with the Coast and Ocean Climate Action Team (CO-CAT), which consists of representatives from 15 different state agencies that have some responsibilities or authority over issues affected by climate change, have adopted interim sea level rise projections for the decades ahead using the high scenarios in all cases for 2030, 2050 and 2100.

Year		Average of Models	Range of Models
2030		7 in (18 cm)	5– 8 in (13–21 cm)
2050		14 in (36 cm)	10–17 in (26–43 cm)
2070	Low	23 in (59 cm)	17–27 in (43–70 cm)
	Medium	24 in (62 cm)	18–29 in (46–74 cm)
	High	27 in (69 cm)	20–32 in (51–81 cm)
2100	Low	40 in (101cm)	31–50 in (78–128 cm)
	Medium	47 in (121 cm)	37–60 in (95–152 cm)
	High	55 in (140 cm)	43–69 in (110–176 cm)
Sea-Level Rise Projections using 2000 as the Baseline adopted by California Ocean Protection Council			

For the dates after 2050, the table above includes three different values for sea level rise — based on low, medium, and high greenhouse gas emission scenarios. These values are based on the Intergovernmental Panel on Climate Change emission.

Climate Adaptation Planning

The public is invited to attend a Climate Adaptation Council Study Session which is scheduled for October 4, 2011 at 7 PM in the Council chambers to review the City of Santa Cruz draft Climate Adaptation Plan. One of the state's most prominent climate scientists, Professor Gary Griggs, Director of the UCSC Institute of Marine Sciences will be presenting the results of the City of Santa Cruz Vulnerability Study that he conducted in partnership with Brett Haddad, Professor of Environmental Studies at UCSC to evaluate and provide a basic understanding of the community's vulnerabilities to the impacts of climate change. The workshop will provide an opportunity for community members to learn more about the city's Climate Adaptation Planning efforts and to share ideas on building a climate resilient community. The draft Climate Adaptation Plan is available on the City website along with an Executive Summary and the Vulnerability Study.

Motivated by community values and mindful of our scenic, yet potentially vulnerable, location on the Monterey Bay, the City of Santa Cruz has built a reputation as a leader in sustainability efforts. Potential threats from climate change include sea level rise, drought, increased flooding and wildfire threat, salt water intrusion and ocean acidification. Local efforts are supported by ongoing scientific research throughout the State of California. A new state website, Cal-Adapt (cal-adapt.org) provides visualization tools using current scientific information to see how climate change might impact Californians at the local level. Building resilience into programs, policies and infrastructure using the best scientific information available will assist our community in protecting our natural and built resources.

The first step in the climate adaptation planning process was to identify the city's potential risks. University of California Santa Cruz scientists, Gary Griggs and Brent Haddad, assisted in this effort working along with city staff. The result was a Vulnerability Study that provides a basic understanding of our community's vulnerabilities to the impacts of climate change. The study formed the basis for further development of a range of goals, objectives and actions that will help build adaptive capacity into City policies, programs and infrastructure. The Climate Adaptation Plan will provide a framework for current and future decision makers in building a climate resilient community. The public is invited and encouraged to attend the October 4 workshop to hear about the Climate Adaption Plan and share ideas.

For more information on Climate Adaptation please contact: Cathlin Atchison at (420-5086) or visit the City of Santa Cruz website**:** www.cityofsantacruz.com**.**

Mitigation vs. Adaptation

Climate mitigation is any action taken to permanently eliminate or reduce the long-term risk and hazards of climate change to human life and property such as reducing Green House Gas (GHG) emissions.

Climate adaptation is defined by the IPCC* as the, "...adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities."

*International Panel on Climate Change