

Tools for Climate Change Adaptation Planning (California)

Tool Name	Adaptation Database for Planning Tool (ADAPT)	CRiSTAL (Community-based Risk Screening Tool – Adaptation and Livelihoods)	NOAA CSC Coastal Inundation Toolkit	NOAA CSC Roadmap	Ecosystem-Based Management Tools Network	Digital Coast
Tool Type	Process				Tool Portals	
Description	An online database that guides users through ICLEI's 5 Milestones for Climate Adaptation planning framework. ADAPT walks you through the process of assessing your vulnerabilities, setting resiliency goals, and developing plans that integrate into existing hazard and comprehensive planning efforts.	CRiSTAL enables local decision makers to assess the impact a project may have on the resources of a community, and modify projects to reduce vulnerability and enhance adaptive capacity by incorporating adaptation methods. CRiSTAL steps the user through a series of worksheets for each of these elements from the identification of impacts, through implementation and evaluation of strategies.	This toolkit provides guidance on how to prepare and map inundation estimates for your area. Website components include: Understand basic information about coastal inundation; Identify your county's exposure and examine potential impacts; Map inundation to "see" potential impacts; Assess your community's risks, vulnerability, and resilience; Communicate risk strategies to initiate change; and, Discover how other communities are addressing this issue.	A three hour training designed to help communities characterize their exposure to current and future hazard and climate threats and assess how existing planning and policy efforts may integrate this information to address community issues. After completing this course, participants will be able to: Identify key issues and impacts associated with current and future coastal hazard risks; Identify major elements of community vulnerability; and, Identify strategic "win-win" approaches for reducing risks and vulnerabilities while also addressing other community issues	A Network of tool providers and practitioners that works to bring geospatial and other tools to planning processes. At the EBM Tools Network website, you can find: an online database of tools, training resources, webinars, and links to case studies.	Digital Coast is a data and tool portal provide by NOAA Coastal Services Center. The Digital Coast also provides the tools, training, and information needed to turn these data into the information most needed by coastal resource management professionals. All tools and data provided on Digital Coast is freely available.
Other Functions	Process	Process	Process/Visualization	Process	Tool Portal	Data and Tool Portal
Skill Level	Low	Low	Medium to High	Low	Low	Low
Developer	ICLEI Sustainable Communities	International Institute for Sustainable Dev (IISD), World Conservation Union (IUCN), SEI-US	NOAA Coastal Services Center	NOAA Coastal Services Center	EBM Tools Network	NOAA Coastal Services Center
Price	Requires membership with ICLEI	Free	Free	Free	Free	Free
Additional Software Needed	NA	NA	ArcGIS, VDatum, or other geospatial models	NA	NA	NA
Link	http://www.icleiusa.org/	http://www.cristaltool.org	http://www.csc.noaa.gov/digitalcoast/inundation/	http://www.csc.noaa.gov/digitalcoast/raining/roadmap/	http://www.ebmtoolsdatabase.org/	http://www.csc.noaa.gov/digitalcoast/
Adaptation Process						
Inventory & Manage Data	*	*	*			
Assess Vulnerability	*	*	*	*		
Assess Risk	*	*	*	*		
Develop Plan	*	*		*		
Implement Plan	*	*		*		
Monitoring	*					
Engage Stakeholders				*		

The original version of this sheet was created by the Ecosystem-Based Management Tools Network and the San Francisco Bay National Estuarine Research Reserve.

More information and links to tools can also be found on the related EBM Tools page:
<http://ebmtoolsdatabase.org/resource/climate-change-vulnerability-assessment-and-adaptation-tools>



Corrections, comments, or additional information?
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Tools for Climate Change Adaptation Planning (California)

Tool Name	ClimateWizard	Climate Sensitivity Database	Cal-Adapt	San Francisco Bay Area Conservation Commons	HAZUS-MH (Hazards U.S, Multi-Hazard)	Land Use Portfolio Model (LUPM)	CommunityViz
Tool Type	Data portals				Analytical: Built Environment		
Description	With ClimateWizard you can: - view historic temperature and rainfall maps for anywhere in the world - view state-of-the-art future predictions of temperature and rainfall around the world - view and download climate change maps in a few easy steps ClimateWizard enables technical and non-technical audiences alike to access leading climate change information and visualize the impacts anywhere on Earth.	The Climate Sensitivity Database is designed to evaluate the sensitivity of the species and ecological systems of the Pacific Northwest to climate change. This digital database summarizes the inherent climate-change sensitivities for species and habitats of concern throughout the Pacific Northwest and will provide resource managers and decision makers with some of the most basic and most important information about how species and systems will likely respond to climate change.	Cal-Adapt has been designed to provide access to data and information produced by California's scientific and research community. The site allows users to visualize how climate change might affect local communities. The site provides visualization tools, allows access to data and participation in online communities where you can contribute your own information.	The Commons provides access to environmental information useful for conservation of natural resources. The site is a portal to a myriad of data sources and case studies that can help address data needs for climate adaptation planning.	FEMA's HAZUS-MH is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds and earthquakes. Scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs. Potential loss estimates analyzed include: physical damage, economic loss, and social impacts	A tool for modeling, mapping, and communicating risk. It is designed to help public agencies and communities understand and reduce their vulnerability to, and risk of, natural hazards. LUPM calculates estimates for the total cost, number of locations mitigated, return on investment, expected loss, and community wealth retained. Finally, the user can display maps showing the results of each mitigation policy, and compare and rank the policies according to their own priorities.	CommunityViz (CViz) is an ArcGIS extension that adds interactive analysis tools and a decision-making framework to the ArcGIS platform. CViz supports scenario planning, sketch planning, 3-D visualization, suitability analysis, impact assessment, growth modeling and other popular techniques. Its many layers of functionality make it useful for a wide range of skill levels and applications.
Other Functions	Climate data access, visualization, analysis	On-line database and index	Visualization		GIS/Socio-economic Model	Modeling/Analysis Tool, GIS-based	GIS-based DST
Skill Level	Low	Low-Medium	Low	Low	High		Medium
Developer	C. Zganjar (TNC); E. Girvetz (then U. Washington, now TNC), and G. Raber (U. Southern Mississippi)	Univ. Washington / TNC	University of California Berkeley's Geospatial Innovation Facility	SF Commons	FEMA	USGS-Western Geographic Science Center	Orton Foundation, Placeways LLC
Price	Free	Free	Free	Free	Free	Free	\$350-850 dependent on Package
Additional Software Needed	None	None	None	None	GIS	GIS	GIS
Link	http://www.climatewizard.org/	http://courses.washington.edu/cdb/drupal/	http://cal-adapt.org	http://sfcommons.org	http://www.fema.gov/plan/prevent/hazus/	http://geography.wr.usgs.gov/science/lupm.html	http://placeways.com/communityviz/
Adaptation Process							
Inventory & Manage Data	*	*	*	*		*	*
Assess Vulnerability	*	*	*		*	*	*
Assess Risk	*	*	*		*	*	*
Develop Plan						*	*
Implement Plan							
Monitoring							
Engage Stakeholders						*	*

Tools for Climate Change Adaptation Planning (California)

Tool Name	NatureServe Vista	Sea Level Rise Affecting Marshes Model (SLAMM)	Maxent	NEAFWA Regional Vulnerability Modeling
Tool Type	Analytical: Natural Environment			
Description	NatureServe Vista 2.5 is a decision support system for conducting conservation planning and integrating conservation with other assessment and planning activities such as land use, transportation, energy, natural resource, and ecosystem-based management. NatureServe Vista enables users to evaluate, create, implement, and monitor land use and resource management scenarios that operate within the existing economic, social, and political context to achieve conservation goals.	SLAMM is a model that accounts for dominant processes in wetland conversion and shoreline modifications during long-term sea level rise (SLR). It provides more detail than static coastal topography alone, e.g. assessing the contribution of sea water inundation to the conversion of one habitat type to another based on elevation, habitat type, the presence of structures such as dikes, and other variables. SLAMM also accounts for relative SLR calculated as the sum of historic global sea level trends, site-specific coastal elevation changes due to subsidence and other factors, and accelerated global SLR due to global warming.	Maxent is a program that produces models of species geographic distributions based on presence-only data. It was designed specifically for modeling distributions when users have access to historical and/or current species localities, but do not have data on sites where the species is known to be absent. When climate-related factors are believed to drive the current distribution of a species, these variables can be used to generate a model of the current climate envelope, and then the software can project that preference onto models of future climates.	This modeling process will provide us with estimates of how the vulnerabilities of important fish and wildlife habitats vary geographically across the northeastern states - an important regional context within which to make conservation planning decisions. The vulnerability model has now been developed and is currently being applied to a sample of 22 habitat types.
Other Functions	GIS-based DST, ArcView Extension	GIS/Geophysical model	GIS/Geophysical model	Habitat vulnerability modeling framework and tool
Skill Level	Medium-High	Medium-High	Medium-High	Low-medium
Developer	NatureServe	Warren Pinnacle Consulting, Inc.	Phlips, Dudik & Schapiro, supported by AT&T Labs; Princeton U.; the Center for Biodiversity & Conservation, AMNH	Manomet Center for Conservation Sciences/NEAFWA
Price	Free	Free	Free	Free
Additional Software Needed	GIS	GIS	GIS	None
Link	http://www.natureserve.org/prodServices/vista/overview.jsp	http://warrenpinnacle.com/prof/SLAMM/	http://www.cs.princeton.edu/~schapire/maxent/	None, yet
Adaptation Process				
Inventory & Manage Data	*			*
Assess Vulnerability	*	*	*	*
Assess Risk	*	*		*
Develop Plan	*	*		*
Implement Plan				
Monitoring				
Engage Stakeholders	*			

Tools for Climate Change Adaptation Planning (California)

Tool Name	CanVis	NOAA Coastal County Snapshots	Sea Level Rise and Coastal Flooding Impacts Viewer	Our Coast, Our Future	Online Mapping	Sea Level Rise Affecting Marshes Model (SLAMM-Viewer)
Tool Type	Visualization					
Description	CanVis is a visualization program used to simulate potential impacts from coastal development or sea level rise. The software is used by municipalities to brainstorm new ideas and policies, undertake project planning, and make presentations. Incorporates docks, buildings, rising waters, and other objects into user photographs to see potential scenarios. Allows users to quickly brainstorm "what if" scenarios with this easy-to-use tool.	The Coastal County Snapshots tool provides local officials with a quick look at a county's demographics, infrastructure, and environment within the flood zone. These are snapshots in time and were made with the best available national data. Use the map or pull-down menus to select the county of interest and see county-specific data. The data characterize a county's demographics, infrastructure, and environment within the flood zone. Download a full county report to get more information on what steps a community can take to plan for hazards.	The Sea Level Rise Viewer allows coastal communities to visualize potential impacts from sea level rise. A slider bar is used to show how various levels of sea level rise will impact coastal communities. Visuals and the accompanying data and information cover sea level rise inundation, uncertainty, flood frequency, marsh impacts, and socioeconomics. Available for U.S. West and Gulf Coasts	Our Coast-Our Future (OCOF) provides Bay Area natural resource managers, local governments and others with science-based decision support tools to help understand, visualize and anticipate local coastal climate change impacts. OCOF will: <ul style="list-style-type: none"> •Model vulnerabilities from sea level rise and storm hazards; •Include coastal processes such as wave heights, water levels, flooding, land movement, salinity changes, and erosion; •Provide data in user-friendly formats. Outer Coast Available: Fall 2012 San Francisco Bay Available: 2014	Utilize online services to create unique interactive maps for your websites. This method is for anyone who wishes to effectively convey geographic data and information over the web. The most widely used services include Google Maps, Google Earth and ESRI's ArcGIS.com. Useful for stakeholder engagement and public outreach.	SLAMM-View is a web-mapping application that portrays pairs of simulation results from the Sea Level Affects Marshes Model (SLAMM) with other contextual layers such as state and county boundaries, roads, and National Wetland Inventory data via web mapping services. SLAMM-View utilizes a combination of server and client software (Java and JavaScript) based on Image Matters' userSmarts® technology to provide functionality for interactive layer display selectivity and ordering, and adjustable transparency.
Other Functions	Scenario Visualization	Online Visualization and data interpretation	Data Portal	Data Portal	Online Mapping Visualization	Geophysical Model, Visualization
Skill Level	Low	Low	Low	Low-Medium	Low-Medium	Medium-High
Developer	NOAA Coastal Services Center	NOAA Coastal Services Center	NOAA Coastal Services Center	Gulf of Farallons National Marine Sanctuary, U.S. Geological Survey, SF Bay National Estuarine Research Reserve, National Park Service	Google/ESRI	Image Matters LLC/USGS
Price	Free	Free	Free	Free	Free	Free
Additional Software Needed	None	None	None	None	None	GIS
Link	http://www.csc.noaa.gov/digitalcoast/tools/canvis/	http://csc-s-maps-q.csc.noaa.gov/CountySnapshots/	http://www.csc.noaa.gov/digitalcoast/tools/slrviewer	http://data.prbo.org/apps/ocof/	http://www.google.com/earth/ http://arcgis.com	http://www.slamview.org
Adaptation Process						
Inventory & Manage Data		*				
Assess Vulnerability		*	*	*	*	*
Assess Risk		*	*	*		
Develop Plan		*	*	*		*
Implement Plan					*	
Monitoring					*	
Engage Stakeholders	*	*	*	*	*	*

Tools for Climate Change Adaptation Planning (California)

Tool Name	Spatial Trends in Coastal Socioeconomics (STICS)	SoVi (Social Vulnerability Index)	System for Assessing Vulnerability of Species (SAVS) to Climate Change	Framework for categorizing the relative vulnerability of threatened & endangered species to climate change	Climate Change Vulnerability Index
Tool Type	Socioeconomic		Species Indices		
Description	The Spatial Trends in Coastal Socioeconomics (STICS) website includes information for all 50 states and provides a set of Web-based data analysis and display tools to facilitate data retrieval, mapping, analysis, assessments, and comparative studies. The primary objective of this website is to increase awareness and provide socioeconomic information to the coastal stewardship community in a timely fashion. Coastal professionals can use income and employment data found on the website to gain insights into the socioeconomic trends in the nation's rapidly developing coastal regions.	SoVi is a comparative metric that facilitates the examination of the differences in social vulnerability among counties. It graphically illustrates the geographic variation in social vulnerability. It shows where there is uneven capacity for preparedness and response and where resources might be used most effectively to reduce the pre-existing vulnerability. The index synthesizes 32 socioeconomic variables, which the research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. The data were culled from national data sources, primarily those from the United States Census Bureau.	The System for Assessing Vulnerability of Species (SAVS) quantifies the relative impact of expected climate change effects for terrestrial vertebrate species. The SAVS uses 22 criteria related to expected response or vulnerability of species in a questionnaire to provide a framework for assessing vulnerability to climate change. The online questionnaire is completed using information gathered from published materials, personal knowledge, or expert consultation.	This tool is actually a method without associated software. The method involves an evaluative framework composed of four modules. Module 1 categorizes baseline vulnerability to extinction or major population reduction. Module 2 scores the likely vulnerability of a species to future climate change, including the species' potential physiological, behavioral, demographic, and ecological response to climate change. Module 3 combines the results of Modules 1 and 2 into a matrix to produce an overall score of the species' vulnerability to climate change. Module 4 is a qualitative determination of uncertainty of overall vulnerability based on evaluations of uncertainty done in each of the first 3 modules.	The Climate Change Vulnerability Index uses a scoring system that integrates a species' predicted exposure to climate change within an assessment area and three sets of factors associated with climate change sensitivity, each supported by published studies: 1) indirect exposure to climate change, 2) species-specific factors (including dispersal ability, temperature and precipitation sensitivity, physical habitat specificity, interspecific interactions, and genetic factors), and 3) documented response to climate change. Assessing species with this Index facilitates grouping taxa by their relative risk to climate change, and by sensitivity factors, which we expect will help users to identify adaptation options that could benefit multiple species.
Other Functions	Online Visualization and data interpretation	Data Visualization	Species Assessment	Species Assessment	Species Assessment
Skill Level	Low	Low	Low	Low	Low
Developer	NOAA Coastal Services Center	University of South Carolina	US Forest Service	EPA	NatureServe
Price	Free	Free	Free	Free	Free
Additional Software Needed	None	None	None	None	MS Excel; GIS helpful
Link	http://marineeconomics.noaa.gov/socioeconomics/	http://webra.cas.sc.edu/hvri/products/sovi.aspx	www.fs.fed.us/rm/grassland-shrubland-desert/products/species-vulnerability	http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=203743	www.natureserve.org/climatechange
Adaptation Process					
Inventory & Manage Data	*	*	*	*	*
Assess Vulnerability	*	*	*	*	*
Assess Risk	*	*	*	*	*
Develop Plan	*	*			
Implement Plan					
Monitoring					
Engage Stakeholders					