Resources

Introducing Green Infrastructure for Coastal Resilience

Green Infrastructure and Conservation Planning

Courses

- **Conservation Leadership Network Trainings**
  Offers a variety of courses through The Conservation Fund focused on different aspects of green infrastructure.
  www.conservationfund.org/what-we-do/conservation-leadership-network/upcoming-courses

Resources

- **Conservation Gateway**
  The Nature Conservancy provides information on conservation planning methods and practices, including Open Standards for the Practice of Conservation, Conservation by Design, and Conservation Action Planning.
  www.conservationgateway.org

- **Green Infrastructure Mapping Guide**
  The Green Infrastructure Mapping Guide shows spatial analysts how to incorporate green infrastructure strategies into their GIS work. This online guide offers a GIS work plan and easy access to examples, process guidance, case studies, and templates.
  coast.noaa.gov/digitalcoast/training/gi-mapping

- **Green Infrastructure Center**
  The Green Infrastructure Center is a nonprofit organization founded in December 2006 to assist communities in developing strategies for protecting and conserving their ecological and cultural assets through environmentally sensitive decisions, lifestyles, and planning.
  www.gicinc.org

- **Natural and Structural Measures for Shoreline Stabilization**
  This brochure presents information on a continuum of shoreline stabilization techniques—from "green" to "gray"—that can help reduce coastal risks and improve resilience.
  coast.noaa.gov/digitalcoast/publications/living-shorelines

- **U.S. Environmental Protection Agency (EPA) – Green Infrastructure**
  This EPA website provides basic information about green infrastructure along with tools, resources, funding opportunities, case studies, research, and reports on green infrastructure.
  http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

Reports

- **Assessing Green Infrastructure Costs and Benefits for Flood Reduction**
  This guide lays out a six-step watershed-based approach to documenting the costs of flooding, projecting increased flooding and associated costs under future land use and

climate conditions, and calculating benefits and costs of reducing flooding with green infrastructure over the long term.
coast.noaa.gov/digitalcoast/publications/gi-cost-benefit

- **Green Infrastructure and the Sustainable Communities Initiative**
Learn about green infrastructure projects implemented in communities across the U.S. that were funded by the HUD Sustainable Communities Initiative including information on best practices.
http://portal.hud.gov/hudportal/documents/huddoc?id=greeninfrastructsci.pdf

- **Guidance for Considering the Use of Living Shorelines**
Report developed by NOAA in 2015 that provides guidance and a conceptual framework for considering living shorelines.
www.habitat.noaa.gov/pdf/noaa_guidance_for_considering_the_use_of_living_shorelines_2015.pdf

- **Guide for Considering Climate Change in Coastal Conservation**
This guide provides a step-by-step approach to better connect theory and practice when considering climate in coastal land conservation. It includes links to relevant tools, information, and resources for each step.
coast.noaa.gov/digitalcoast/publications/considering-climate-change

- **Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States**
This report by the World Resources Institute serves as a reference and guidance document to help staff members in water utilities, municipalities, businesses, and local conservation groups to advance dialogue on the topic of investing in forests for source-water protection.
http://www.wri.org/publication/natural-infrastructure

- **Natural Defenses from Hurricanes and Floods: Protecting America's Communities and Ecosystems in an Era of Extreme Weather**
This report by the National Wildlife Federation and others discussion principles for increasing resilience to floods and hurricanes using natural infrastructure and some critical policies that could be reformed to address growing risks.
www.nwf.org/~/media/PDFs/Global-Warming/2014/Natural-Defenses-Final-Embargoed-Until-102114-10amET.pdf

- **Performance of Natural Infrastructure and Nature-based Measures as Coastal Risk Reduction Features**
Report developed by the Environmental Defense Fund in 2015 that assesses various natural infrastructure and nature-based strategies for reducing coastal risk. Findings provide information on methods, strengths and weaknesses, uncertainties around risk reduction, suitable conditions, performance, capacity and limitation, and examples of projects implemented.
www.edf.org/sites/default/files/summary_ni_literature_compilation_0.pdf

Transportation Planning

Resources

- **Georgetown Climate Center Adaptation Case Studies**
  This website provides over100 case studies about how communities are preparing their roads, airports, transit systems, and infrastructure for climate change.
  www.georgetownclimate.org/search/apachesolr_search?filters=tid%3A1024
- **U.S. Department of Transportation Federal Highway Administration: Land Use and Transportation**
  Provides information and resources to help planners link transportation planning and land use.
  www.fhwa.dot.gov/planning/processes/land_use/programs/
- **U.S. Department of Transportation Federal Highway Administration: Planning and Environment Linkages**
  State and local agencies can achieve significant benefits by incorporating environmental and community values into transportation decisions early in planning and carrying these considerations through project development and delivery. This website and report on the Department of Transportation's Eco-Logical approach offer a wealth of information developed by the highway administration and its partners to assist in strengthening planning and environment linkages.
  www.environment.fhwa.dot.gov/ecological/eco_entry.asp
- **U.S. Department of Transportation Federal Highway Administration: Virtual Framework for Vulnerability Assessment**
  Provides a framework and training modules to help planners determine the vulnerability of transportation infrastructure to hazards and climate change. Each module provides key steps, videos, case studies, tools, and other resources.
  www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/

Smart Growth Planning

Courses
- **Coastal Community Planning and Development**
  Offered by the NOAA Coastal Services Center, this two-day course, targeted at planners, elected officials, developers, business leaders, and other local decision makers, teaches participants about planning processes, current coastal development patterns and trends, and alternatives to conventional patterns of growth and development. It provides them with examples and strategies to implement alternative development principles in their coastal communities and introduces the importance of natural hazard resilience.
  coast.noaa.gov/digitalcoast/training/planning-development

Resources
- **U.S. Environmental Protection Agency (EPA) – Making Smart Growth Happen**
  EPA offers many tools and resources to help communities learn about and implement smart growth approaches.
  www.epa.gov/smartgrowth/sg_implementation.htm
- **U.S. Environmental Protection Agency/NOAA – Smart Growth for Coastal and Waterfront Communities**

The coastal and waterfront elements presented on this website augment the existing smart growth principles to reflect the specific challenges (including hazards and climate change) and opportunities characterizing the waterfront, be it on a coast, a river, or a lake. These elements provide guidance for communities to grow in ways that are compatible with their natural assets, creating great places for residents, visitors, and businesses.
coastalsmartgrowth.noaa.gov

Greenways Planning

Resources
- **National Park Service – Rivers, Trails, and Conservation Assistance Program**
  This program, also known as the Rivers and Trails Program, is the community assistance arm of the National Park Service. The program staff provides technical assistance to community groups and local, state, and federal government agencies so they can conserve rivers, preserve open space, and develop trails and greenways. The Rivers and Trails Program implements the natural resource conservation and outdoor recreation mission of the National Park Service in communities across America.
  www.nps.gov/ncrc/programs/rtca/whatwedo/rtcastrategicplan.pdf

Watershed Planning

Resources
- **Center for Watershed Protection**
  The Center for Watershed Protection, Inc. is dedicated to fostering responsible land and water management through applied research, direct assistance to communities, award-winning training, and access to a network of experienced professionals. As national experts in stormwater and watersheds, this organization takes a practical approach to complex, technical watershed management issues, providing collaborative leadership across disciplines and professions with a commitment to protect, restore, and enhance our streams, rivers, lakes, wetlands, and bays.
  www.cwp.org
- **Nonpoint Education for Municipal Officials (NEMO)**
  NEMO provides information, education, and assistance to local land use boards and commissions on how they can accommodate growth while protecting their natural resources and community character. NEMO focuses its message on the use of geographic information system and remote sensing technology as educational tools; the promotion of land use planning rather than mechanical devices as the primary weapon against water pollution; and the importance of local land use decision makers as the primary target audience.
  nemo.uconn.edu
- **U.S. Environmental Protection Agency – Healthy Watershed Initiative**
  The healthy watersheds concept is based on a holistic systems approach to watershed protection and conservation. Maintenance of aquatic ecological integrity requires that we

understand not only the biological, chemical, and physical condition of water bodies but also critical watershed functional attributes, such as hydroecology, geomorphology, and natural disturbance patterns.
www.epa.gov/healthywatersheds

- **U.S. Environmental Protection Agency – Handbook for Development Watershed Plans to Restore and Protect Our Waters**
This handbook helps communities, organizations, and other stakeholders implement watershed plans to protect water resources and meet water quality standards.
http://water.epa.gov/polwaste/nps/handbook_index.cfm

Hazards Planning

Courses

- **Using Flood Exposure Maps**
This course is offered in a two-part, "blended webinar" format. Participants view Part 1, a recorded demonstration on how to use the Coastal Flood Exposure Mapper (about 1 hour). Later, they can join other participants for Part 2, a live, online session (about 1 hour) that includes both an opportunity to ask questions about the mapper and hear an interview with a guest speaker. Webinars offered quarterly.
coast.noaa.gov/digitalcoast/training/flood-exposure

Resources

- **Coastal Flood Exposure Mapper**
Resource that provides maps showing where people, places, and natural resources are exposed to coastal flood hazards including sea level rise, storm surge, shallowing coastal flooding, flood zones, and a composite flood hazard view. Can download maps or share online with others to help facilitate conversations around community resilience.
coast.noaa.gov/digitalcoast/tools/flood-exposure

- **Sea Level Rise and Coastal Flooding Impacts Viewer**
This viewer creates maps of potential impacts of sea level rise along the coast and provides related information and data for community officials.
coast.noaa.gov/digitalcoast/tools/slr

- **U.S. Environmental Protection Agency (EPA) – Managing Wet Weather**
Multiple sources of funding are available through the EPA's Managing Wet Weather with Green Infrastructure program, as well as trainings on how to implement green infrastructure for stormwater management.
http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

Reports

- **Achieving Hazard-Resilient Coastal AND Waterfront Smart Growth**
This report is the result of a two-day roundtable meeting of national experts in smart growth, climate change adaptation, hazard mitigation, and coastal management who came together to share ideas about how coastal and waterfront communities could become more resilient.
coastalsmartgrowth.noaa.gov/pdf/hazard_resilience.pdf

- **Natural Defenses from Hurricanes and Floods: Protecting America's Communities and Ecosystems in an Era of Extreme Weather**
  This report by the National Wildlife Federation and others discussion principles for increasing resilience to floods and hurricanes using natural infrastructure and some critical policies that could be reformed to address growing risks.
  www.nwf.org/~/media/PDFs/Global-Warming/2014/Natural-Defenses-Final-Embargoed-Until-102114-10amET.pdf

Stormwater Planning

Resources
- **Low Impact Development Center**
  The organization provides information on low impact development methods, examples, and provides access to related publications and manuals.
  www.lowimpactdevelopment.org
- **National Low Impact Development Atlas**
  This atlas highlights innovative low impact development practices around the country. Its goal is to encourage and educate local officials and others about these practices by providing specific, local examples of their use. The 31 member programs of the National NEMO Network have compiled the projects highlighted on this site and will continue to add new projects as they become available. Each project balloon contains project specifics, a summary of the project, photos (when available), and links to more information.
  http://lidmap.uconn.edu
- **U.S. Environmental Protection Agency (EPA) Green Infrastructure: Cost-Benefit Resources**
  The EPA provides cost analyses and cost-benefit resources related to green infrastructure techniques for managing stormwater.
  http://water.epa.gov/infrastructure/greeninfrastructure/gi_costbenefits.cfm#CaseStudiesAnalyzingEcon

Reports
- **Banking on Green**
  This report focuses on the economic impacts caused by polluted urban runoff, also known as "stormwater," a significantly growing source of water pollution in the United States. It's not intended to be an academic or technical document, but instead to be an "easy to read" compendium of current experiences, analysis and knowledge.
  www.asla.org/uploadedFiles/CMS/Government_Affairs/Federal_Government_Affairs/Banking%20on%20Green%20HighRes.pdf
- **Best Practices: Greenspace and Flood Protection Guidebook**
  Developed by the Georgia Environmental Protection Division, this guidebook provides best practices for developing a greenspace plan, leveraging partnerships, amending local codes to encourage permanent greenspace preservation, maximizing CRS points for floodplain protection, identifying funds for floodplain preservation, identifying compatible recreation uses, integrating stormwater management, and maintaining greenspaces in the floodplain.

https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/EPDGreenspace-Flood-Guidebook.pdf

- **Enhancing Sustainable Communities with Green Infrastructure: A Guide to Help Communities Better Manage Stormwater While Achieving Other Environomental, Public Health, Social, and Economic Benefits**
  This guide developed by the Environmental Protection Agency (EPA) was developed to help communities better manage stormwater using green infrastructure.
  www.epa.gov/smartgrowth/pdf/gi-guidebook/gi-guidebook.pdf
- **Permitting Green Infrastructure: A Guide to Improving Municipal Stormwater Permits and Protecting Water Quality**
  This guide is intended to be a resource for community and watershed advocates that provides clear examples of new stormwater permits that encourage or require low impact development or green infrastructure.
  www.americanrivers.org/newsroom/resources/permitting-green-infrastructure-a-guide-to-improving-municipal-stormwater-permits-and-protecting-water-quality

Climate Change Adaptation

Courses

- **Climate Change for Coastal Communities**
  This course covers these essentials: understanding climate science and impacts, determining community vulnerabilities, communicating effectively, identifying adaptation strategies, and finding mechanisms to implement those strategies.
  coast.noaa.gov/digitalcoast/training/climate-adaptation
- **Climate Change Vulnerability Assessment**
  This course developed by the U.S. Fish and Wildlife Service and National Wildlife Federation is designed to guide conservation and resource management practitioners in essential elements of creating climate adaptation plans.
  http://nctc.fws.gov/NCTCWeb/catalog/CourseDetail.aspx?CourseCodeLong=FWS-ALC3184
- **Coastal Inundation Mapping**
  This course provides a better understanding of coastal inundation issues and mapping methods using GIS. Lecture topics include the different types of coastal inundation, the applications and limitations of various types of inundation products, elevation data sets and datums, and the spatial methods used to map flood areas in coastal environments.
  coast.noaa.gov/digitalcoast/training/inundationmap
- **U.S. Fish and Wildlife Service (USFWS) Climate Change Learning Center**
  USFWS provides access to climate training, workshops, webinars, and resources through its National Conservation Training.
  http://training.fws.gov/courses/programs/climate-change/

Resources

- **Coastal Flood Exposure Mapper**
  Resource that provides maps showing where people, places, and natural resources are exposed to coastal flood hazards including sea level rise, storm surge, shallowing coastal

flooding, flood zones, and a composite flood hazard view. Can download maps or share online with others to help facilitate conversations around community resilience.
coast.noaa.gov/digitalcoast/tools/flood-exposure

- **Coastal Resilience**
  This site integrates coastal hazard, ecological, and socioeconomic information in geographies where the Nature Conservancy and partners are working to implement ecosystem-based adaptation strategies, providing interactive maps and information to help decision makers.
  www.coastalresilience.org

- **Georgetown Climate Center Adaptation Clearinghouse**
  This website provides a wealth of case studies and access to resources to help communities with adaptation efforts. It also includes specific information by state.
  www.georgetownclimate.org/

- **Sea Level Rise and Coastal Flooding Impacts Viewer**
  This viewer creates maps of potential impacts of sea level rise along the coast and provides related information and data for community officials.
  coast.noaa.gov/digitalcoast/tools/slr

- **Template for Assessing Climate Change Impacts and Management Options (TACCIMO)**
  This web-based tool developed by the U.S. Forest Service provides a searchable repository of peer-reviewed literature on climate change impacts and management options, a geospatial mapping application that provides national-extent downscaled climate data and other models for evaluating climate change impacts to forests, and report generators for capturing information for a specific location.
  www.taccimo.sgcp.ncsu.edu

Reports

- **National Fish, Wildlife, and Plants Climate Adaptation Strategy**
  This report provides effective steps to help natural resources and the communities that depend on them be more resilient and adaptable to a changing climate. These steps are the result of collaboration among federal, state, and tribal governments.
  Strategy Highlights – www.wildlifeadaptationstrategy.gov/pdf/Strategy-Highlights-Brochure.pdf
  Full Strategy - www.wildlifeadaptationstrategy.gov/pdf/NFWPCAS-Final.pdf

- **Reducing Climate Risks with Natural Infrastructure**
  This publication by the Nature Conservancy provides details on nine case studies that illustrate the variety of ways to use green infrastructure to reduce the impacts of hazards and sea level rise.
  www.nature.org/ourinitiatives/regions/northamerica/unitedstates/california/ca-green-vs-gray-report-2.pdf

- **The State of Climate Change Adaptation in the United States: An Overview**
  This 2013 synthesis report was written by EcoAdapt, the Climate Impacts Group at the University of Washington, the Georgetown Climate Center at Georgetown University, and the University of California-Davis. The report provides examples of societal responses to climate change in planning and management of cities, agriculture, and natural resources.

www.ecoadapt.org/data/documents/TheStateofAdaptationintheUnitedStates2013.pdf
- **U.S. Environmental Protection Agency Green Infrastructure for Climate Resiliency Factsheet**
  http://water.epa.gov/infrastructure/greeninfrastructure/upload/climate_res_fs.pdf
- **Using Nature to Reduce Climate and Disaster Risk**
  This brochure provides information on how nature can play a role in reducing climate and hazard risks to society, the economy, and environment.
  www.conservationgateway.org/ConservationPractices/Marine/crr/library/Documents/Using%20Nature%20To%20Reduce%20Climate%20and%20Disaster%20Risks%20-%20TNC%20Brochure.pdf
- **What will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure**
  This report provides a framework that community leaders and planners can use to make more economically informed decisions about adapting to sea level rise and storm flooding.
  coast.noaa.gov/digitalcoast/publications/adaptation

Ecosystem Services

Resources
- **Ecological Society of America Ecosystem Services Factsheet**
  www.esa.org/ecoservices/comm/body.comm.fact.ecos.html
- **Econ 120: Two Minutes of Economic Sense, Ecosystem Services – What's the value of something that's free?**
  These short videos explain economic principles in everyday terms and how they relate to important decisions faced by those who manage the resources of the coasts and oceans.
  coast.noaa.gov/digitalcoast/socialcoast/econ120
- **Final Ecosystem Goods and Services Classification System (FEGS-CS)**
  This report introduces, defines, and describes a classification system for final ecosystem goods and services.
  http://ecosystemcommons.org/sites/default/files/fegs-cs_final_v_2_8a.pdf
- **Green Infrastructure Protective Services Visualization**
  Short animation that explains ecosystem services for coastal hazard resilience and provides examples of the various natural resources that can provide protective benefits for coastal communities.
  coast.noaa.gov/greeninfrastructurevis/
- **Gulf of Mexico Ecosystem Services Database**
  This site provides searchable information about ecosystem service valuation studies for habitats relevant to the Gulf region, although the studies may have been conducted elsewhere.
  www.gecoserv.org
- **National Ocean Economics Program Environmental and Recreational Values**
  This site provides a searchable library of environmental and recreational (nonmarket) research studies and value estimates of ocean and coastal resources.

www.oceaneconomics.org/nonmarket/NMsearch2.asp
- **U.S. Department of Agriculture Forest Service Ecosystem Services Program**
  The Forest Service is working to advance market-based approaches to conservation and stewardship on private and community lands.
  www.fs.fed.us/ecosystemservices

Reports

- **An Ecological Economic Assessment of King County's Flood Hazard Management Plan**
  www.floods.org/ace-files/documentlibrary/committees/Ecological_Economics_Assessment_of_King_County_Flood_Hazard_Management_Plan.pdf
- **Assessing Green Infrastructure Costs and Benefits for Flood Reduction**
  This guide lays out a six-step watershed-based approach to documenting the costs of flooding, projecting increased flooding and associated costs under future land use and climate conditions, and calculating benefits and costs of reducing flooding with green infrastructure over the long term.
  coast.noaa.gov/digitalcoast/publications/gi-cost-benefit
- **Coastal Habitats Shield People and Property from Sea Level Rise and Storms**
  www.nature.com/nclimate/journal/v3/n10/full/nclimate1944.html
- **Economic Benefits of Natural Land Conservation: Case Study of Northeast Florida**
  www.defenders.org/resources/publications/programs_and_policy/science_and_economics/conservation_economics/valuation/investing_in_nature.pdf
- **Putting a Price on Riparian Corridors as Water Treatment Facilities**
  www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/watershed/Riley_2009.pdf
- **The Value of Open Space: How Preserving North Carolina's Natural Heritage Benefits Our Economy and Quality of Life**
  cdn.publicinterestnetwork.org/assets/oSOvKX4zq-Dh5BDq01lZDw/Value_Open_Spaces.pdf
- **The Value of Wetlands in Protecting Southeast Louisiana from Hurricane Storm Surges**
  www.plosone.org/article/info:doi/10.1371/journal.pone.0058715

Stakeholder Engagement and Communication

Courses

- **Fostering Behavior Change for Coastal Management: An Introduction to Community-Based Social Marketing**
  This one-and-a-half-hour Web-based training course introduces participants to a basic approach that has been used in coastal management projects to influence the way people interact with their environment.
  coast.noaa.gov/digitalcoast/training/social-marketing
- **Planning and Facilitating Collaborative Meetings**
  This two-day instructor-led course is designed to increase participants' ability to plan and facilitate a meeting (or a series of meetings) that minimize conflict and enhance problem solving. Collaboration is often cited as a good way to address coastal resource management

issues, but the collaborative process is complicated, requiring a systematic approach. This course provides the skills and tools to design and implement collaborative approaches. The skills will be useful even when attending, but not running, a collaborative meeting. *coast.noaa.gov/digitalcoast/training/planning-and-facilitating*

- **Seven Best Practices for Risk Communication**
  This 90-minute interactive webinar introduces participants to seven best practices, numerous techniques, and examples for how to more effectively communicate about coastal hazards. The webpage provides great resources to help as well. *www.coast.noaa.gov/digitalcoast/training/risk-communication*

Resources

- **CanVis**
  Developed by the U.S. Department of Agriculture's National Agroforestry Center, CanVis is a visualization program used to "see" potential impacts from coastal development or sea level rise.
  coast.noaa.gov/digitalcoast/tools/canvis
- **Climate Communication Science and Outreach (Susan Hassol)**
  For more information on climate communication, visit this website.
  www.climatecommunication.org
- **Econ 120: Two Minutes of Economic Sense, Ecosystem Services – What's the value of something that's free?**
  These short videos explain economic principles in everyday terms and how they relate to important decisions faced by those who manage the resources of the coasts and oceans. *coast.noaa.gov/digitalcoast/socialcoast/econ120*
- **Green Infrastructure Protective Services Visualization**
  Short animation that explains ecosystem services for coastal hazard resilience and provides examples of the various natural resources that can provide protective benefits for coastal communities.
  coast.noaa.gov/greeninfrastructurevis/
- **Storm Surge Fast Draw**
  Short animation that explains storm surge and impacts.
  coast.noaa.gov/gallery/videos/stormsurgefastdraw/video.html
- **Tidal Flooding Impacts Animation**
  Short animation that explains tidal flooding, potential increases in events, impacts, and adaptation strategies.
  coast.noaa.gov/tidalfloodingvis/

Reports

- **Communicating the Science of Climate Change**
  This article provides background on the public perception of climate change and ways that climate scientists can improve the ways they convey their findings to the public. *climatecommunication.org/wp-content/uploads/2011/10/Somerville-Hassol-Physics-Today-2011.pdf*
- **How To Communicate Successfully Regarding Nature-Based Solutions: Key Lessons from Research with American Voters and Elites**

Report funded by The Nature Conservancy to gain insight on the most preferred terms and messages to use when communicating to the public about nature-based solutions. *www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/Pages/nature-based-solutions.aspx*

- **Introduction to Stakeholder Participation**
  This publication discusses some of the most important considerations in stakeholder participation and offers a guide to the most common techniques. *coast.noaa.gov/digitalcoast/publications/stakeholder*

- **The Language of Conservation: How to Communicate Effectively to Build Support for Conservation**
  This document provides recommendations on how to communicate effectively to build support for conservation and is based on a national survey conducted by two polling firms: Fairbank, Maslin, Maullin, Metz and Associates; and Public Opinion Strategies. *www.rivernetwork.org/resource-library/language-conservation-how-effectively-build-support-conservation-2009*

Visualization and Analysis Tools

- **CanVis**
  Developed by the U.S. Department of Agriculture's National Agroforestry Center, CanVis is a visualization program used to "see" potential impacts from coastal development or sea level rise. *coast.noaa.gov/digitalcoast/tools/canvis*

- **Coastal Change Analysis Program Land Cover Atlas**
  This online data viewer provides user-friendly access to regional land cover and land cover change information developed through NOAA's Coastal Change Analysis Program (C-CAP). *coast.noaa.gov/digitalcoast/data/ccapregional*

- **Coastal County Snapshots**
  The online tool turns complex data into easy-to-understand stories, complete with charts and graphs. Users select a coastal county of interest and the website provides information on flood zones, coastal economies, wetlands, and stormwater management (coming soon). *coast.noaa.gov/digitalcoast/tools/snapshots/*

- **Coastal Flood Exposure Mapper**
  Resource that provides maps showing where people, places, and natural resources are exposed to coastal flood hazards including sea level rise, storm surge, shallowing coastal flooding, flood zones, and a composite flood hazard view. Can download maps or share online with others to help facilitate conversations around community resilience. *coast.noaa.gov/digitalcoast/tools/flood-exposure*

- **Coastal Resilience Network**
  The Nature Conservancy's Coastal Resilience network supports a community of practitioners who are applying planning innovations to coastal hazard and adaptation issues. The network provides access to peer practitioners, tools, information, and training

focused on nature-based solutions, and interactive maps to help assess hazard risks and opportunities for natural solutions.
http://maps.coastalresilience.org/network

- **CorridorDesigner**
CorridorDesigner includes an ArcToolbox toolbox for creating habitat and corridor models with ArcGIS and an ArcMap extension for evaluating corridors.
www.corridordesign.org
- **Habitat Priority Planner**
This tool helps identify high priority locations for conservation and restoration planning.
coast.noaa.gov/digitalcoast/tools/hpp
- **InVEST**
InVEST, created by the Natural Capital Project, is a family of tools to map and value the goods and services from nature that are essential for sustaining and fulfilling human life.
naturalcapitalproject.org
- **Sea Level Rise and Coastal Flooding Impacts Viewer**
This viewer creates maps of potential impacts of sea level rise along the coast and provides related information and data for community officials.
coast.noaa.gov/digitalcoast/tools/slr
- **Template for Assessing Climate Change Impacts and Management Options (TACCIMO)**
This web-based tool, developed by the U.S. Forest Service, provides a searchable repository of peer-reviewed literature on climate change impacts and management options, a geospatial mapping application that provides national-extent downscaled climate data and other models for evaluating climate change impacts to forests, and report generators for capturing information for a specific location.
www.taccimo.sgcp.ncsu.edu

Funding Opportunities

- **Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Program**
FEMA's Hazard Mitigation Assistance grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages.
www.fema.gov/hazard-mitigation-assistance
- **Smart Growth Implementation Assistance**
EPA program that is an annual, competitive solicitation open to state, local, regional, and tribal governments (and nonprofits that have partnered with a governmental entity) that want to incorporate smart growth techniques into their future development.
http://epa.gov/smartgrowth/sgia.htm#back
- **U.S. DOT Federal Highway Administration**
Green infrastructure techniques for coastal highway resilience. Proposals due June 1, 2016
www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/greener_infrastructure/index.cfm
- **U.S. Environmental Protection Agency (EPA)**

The EPA offers a number of grant and funding resources for green-infrastructure-related projects. For a complete list of available funding opportunities, visit the EPA website. *http://water.epa.gov/infrastructure/greeninfrastructure/gi_funding.cfm*