Achieving Hazard-Resilient

Coastal & Waterfront Smart Growth

Coastal and Waterfront Smart Growth and Hazard Mitigation Roundtable Report

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About the Roundtable

Coastal and Waterfront Smart Growth and Hazard Mitigation Roundtable

In August 2011, the National Oceanic and Atmospheric Administration (NOAA), the U.S. Environmental Protection Agency (EPA), and the state Sea Grant College Programs of Hawaii, Rhode Island, and Texas hosted a two-day roundtable meeting of national experts from the fields of smart growth, hazard mitigation, climate change adaptation, and coastal management. The roundtable brought together these experts to share ideas about how coastal and waterfront communities could improve quality of life, use land and other resources efficiently, and create environmentally and economically sustainable neighborhoods while minimizing risks from natural hazards related to coastal and waterfront flooding. This report provides an overview of ideas shared during the roundtable. The information is intended for NOAA, EPA, other federal agencies, and National Sea Grant College Program partners, as well as organizations and practitioners working on smart growth and hazard mitigation issues to help them consider opportunities for further research, product development and services, and integration of the fields.

Introduction

Smart growth strategies and hazard mitigation measures have similar goals. Both aim to make communities safer, healthier, and fiscally responsible. Communities across the nation use smart growth strategies to ensure that new development or redevelopment benefits the entire community and that limited public resources are used as efficiently as possible. Hazard mitigation works to keep people and property safe by reducing risk.

Living near the water has historically been—and is expected to remain—desirable, yet this choice has inherent risks. Communities face the challenge of identifying the degrees of risk posed by hazards and determining where and how to accommodate new growth and redevelopment given those risks. Together, smart growth strategies and hazard mitigation measures can offer communities tools they can use to meet their safety, economic, environmental, quality of life, and transportation goals; however, the approaches are not always well integrated. Communities that better integrate smart growth approaches and hazard mitigation can use funds and staff time more effectively, make development rules clearer and more predictable for developers, and keep people and property safer.

To explore opportunities to better integrate smart growth and hazard mitigation strategies in coastal and waterfront communities, the roundtable focused on the following topics:

- Ways to avoid unintended conflicts between the strategies, as well as to support mutually beneficial opportunities,
- Options for compact communities that seek further growth and redevelopment when they are either already vulnerable to current hazards or will be vulnerable to future hazards,
- Approaches for (1) integrating smart growth strategies into hazard mitigation, and (2) integrating hazard mitigation into smart growth strategies, and
- Gaps and needs that organizations working on smart growth and hazard mitigation issues, including NOAA, EPA, and Sea Grant College Programs, could address.

Although there are many types of coastal hazards, participants were asked to focus on coastal and waterfront flooding when providing ideas. During the roundtable, participants often referenced the smart growth principles and the smart growth coastal and waterfront elements (see Table 1), alongside a range of hazard mitigation design guidelines, policies, and planning requirements.

NOAA and EPA organized the individual ideas that participants shared for potential strategies and policy approaches under four broad categories: (I) opportunities and challenges, (II) siting and design approaches, (III) plans and policies, and (IV) engagement, communication, and education. The following four sections describe common themes that emerged under these categories, as well as examples

of individual ideas. The fifth section describes the research and product needs related to these issues that participants identified. The report also includes a list of resources shared at the meeting.

As noted above, the roundtable focused on smart growth and hazard mitigation strategies specifically for coastal and waterfront communities. However, for simplicity, those strategies are often referred to as "coastal smart growth and hazard mitigation strategies" or just "smart growth and hazard mitigation strategies" throughout this report.

Smart Growth Principles	Smart Growth Coastal and Waterfront Elements
1. Mix land uses.	1. Mix land uses, including water-dependent uses.
2. Take advantage of compact building design.	2. Take advantage of compact community design that enhances, preserves, and provides access to waterfront resources.
3. Create a range of housing opportunities and choices.	3. Provide a range of housing opportunities and choices to meet the needs of both seasonal and permanent residents.
4. Create walkable communities.	4. Create walkable communities with physical and visual access to and along the waterfront for public use.
5. Foster distinctive, attractive communities with a strong sense of place.	5. Foster distinctive, attractive communities with a strong sense of place that capitalizes on the waterfront's heritage.
6. Preserve open space, farmland, natural beauty, and critical environmental areas.	6. Preserve open space, farmland, natural beauty, and the critical environmental areas that characterize and support coastal and waterfront communities.
7. Strengthen and direct development toward existing communities.	7. Strengthen and direct development toward existing communities, and encourage waterfront revitalization.
8. Provide a variety of transportation options.	8. Provide a variety of land- and water-based transportation options.
9. Make development decisions predictable, fair, and cost effective.	9. Make development decisions predictable, fair, and cost effective through consistent policies and coordinated permitting processes.
10. Encourage community and stakeholder collaboration in development decisions.	10. Encourage community and stakeholder collaboration in development decisions, ensuring that public interests in and rights of access to the waterfront and coastal waters are upheld.

Table 1: The smart growth principles, developed in 1996 by the Smart Growth Network, a group of national organizations representing real estate, environmental protection, historic preservation, community design, and other interests, help guide communities as they determine how and where to grow (see www.smartgrowth.org/ for more information about the smart growth principles). The smart growth coastal and waterfront elements, based on the smart growth principles, provide coastal and waterfront-specific approaches that help manage development while balancing environmental, economic, and quality of life issues (see Appendix B for more information about the elements).

I. Opportunities and Challenges

Roundtable participants identified several opportunities and challenges that arise when coastal and waterfront communities consider both smart growth and hazard mitigation strategies. These two fields have their own vocabularies, planning guidance, and design elements, which create areas of beneficial overlap as well as potential disconnects. Practitioners can work together to achieve common goals, but integrating approaches and plans will require additional research and understanding of how the two disciplines can fully complement one another (see Sections I, II, III, IV, and V for participants' ideas on research and strategies for integration). One overarching suggestion various participants made was that the two fields could incorporate resilience and smart growth concepts more explicitly into the guidance provided by each.

Intersection of Smart Growth and Hazard Mitigation

Table 2 on the following page reflects some of the intersections between coastal smart growth and hazard mitigation strategies that participants noted during the roundtable. The columns on the right and left list different strategies and the middle column identifies potential intersections between them. The color of the boxes indicates how they could potentially complement (green) or counter (yellow) the goals of one another during implementation.

During the roundtable, participants repeatedly raised questions about how encouraging compact development might affect hazard risk, including risks exacerbated by climate change. How can communities determine what development, if any, is appropriate for hazard-prone areas? What benefits could compact development provide, and what challenges may it present? For example, some participants noted that compact development may allow communities to more cost-effectively invest in measures to protect people, buildings, infrastructure, and other assets that are clustered together in a smaller footprint, as well as provide emergency services. Some participants also cautioned that the hazard mitigation benefits that compact development could offer would depend on location and the level of risk present. And if the natural resources in the surrounding areas are not protected, the hazard mitigation benefits from compact development may be diminished. How smart growth development patterns could make communities more resilient is complicated and offers an opportunity for further thinking and research.

Examples of Hazard Mitigation Strategies	Potential Intersections	Examples of Coastal & Waterfront Smart Growth Strategies
Use green infrastructure to manage stormwater.	Green infrastructure has multiple benefits, including mitigating flood impacts, heat island effects, and other climate change risks, as well as providing open space for recreation.	Encourage green infrastructure at the site, community, and regional scales.
Protect hazard-prone areas along the water.	Keeping development out of flood-prone areas protects lives and property and allows alternative uses of the land, such as public waterfront parks and recreation areas.	Create walkable communities with physical and visual access to and along the waterfront for public use.
Protect hazardous areas and environmentally sensitive areas, such as wetlands and floodplains.	Protecting key natural resource areas supports and enhances ecosystem services and restricts development in hazard-prone and environmentally sensitive areas.	Protect critical environmental areas.
Plan in advance for emergency public transportation.	Well-connected street grids and transit systems may provide more options for evacuation during disasters.	Provide a variety of transportation options, including public transportation.
Elevate buildings to protect them from flooding.	Elevated buildings may counter efforts to encourage walkability and preserve historic character, and they may be difficult for elderly and disabled people to access.	Preserve and protect the sense of community and place, historical and cultural heritage, accessibility, and social equity.
Relocate development out of hazard-prone areas.	Infill development may increase risk if existing development is in a hazard-prone location, while relocation may encourage disinvestment in existing communities.	Direct development toward existing communities' investments and encourage waterfront revitalization.

Table 2: Samples of potential intersections between coastal smart growth and hazard mitigation strategies identified by participants during the roundtable. The columns on the right and left list different strategies and the middle column identifies potential intersections between them. The color of the boxes indicates how they could potentially complement (green) or counter (yellow) the goals of one another during implementation.

II. Siting and Design

Examples of suggestions on how to site and design development to meet coastal and waterfront communities' social, economic, environmental, and hazard mitigation goals are organized in the following three sections: siting strategies, design strategies, and mitigating risk to development by retrofitting or relocating. Various participants noted that planning processes associated with siting and design should involve multidisciplinary teams and engage community members with knowledge of local conditions.

Siting Strategies

Participants provided many ideas about coastal smart growth and hazard mitigation strategies that communities and others could consider when making siting decisions for buildings and infrastructure at the individual site and community scales. Specific ideas included the following:

- Integrate risk as a siting principle into land use planning. For example, a site suitability analysis could assess current and future risks from natural hazards. Geographic information systems (GIS) can be used to overlay areas subject to flooding and other hazards with areas where growth is planned.
- Identify areas exposed to different levels of risk and adjust, as needed, overtime as the level of risk changes. Overlay these areas of risk with smart growth priorities and areas for investment, and customize planning strategies and tools (legal, design, financial, and so forth) appropriately. For example, communities could:
    - plan to retreat from the areas of highest risk by discouraging or regulating development in these areas (for example, through financial mechanisms or building codes),
    - retrofit structures and infrastructure in hazard-prone areas to reduce vulnerabilities, and
    - focus and invest in development in the areas of lowest risk.
- Identify redevelopment opportunities that are within or adjacent to already developed areas but out of hazard-prone areas. In areas with minimal risk, consider making it easier to redevelop and encourage infill.
- Preserve green infrastructure and critical environmental areas in strategic locations to reduce risk. Additional benefits of such approaches could include protecting community assets, creating public recreation areas, and sequestering greenhouse gases.
- Consider how infrastructure siting decisions influence the location of other development. Will these decisions encourage additional development in hazard-prone areas? Will they encourage existing development to remain in place and at risk? If the infrastructure includes protective structures, how will those structures impact the shoreline processes and adjacent or nearby land?

Design Strategies

Beyond siting strategies, participants also offered ideas to be considered during the design phase to incorporate coastal smart growth and hazard mitigation strategies that enhance community resilience. The following are examples:

- Account for location and factors such as local needs, existing densities, walkability, building types, stormwater management, and hazard risk when establishing densities. Communities could revise zoning criteria to reflect these factors in lieu of setting specific densities.
- Design buildings to maximize resilience (for example, place commercial uses, utilities, and services that would be most impacted by flooding, or most expensive to replace, on upper levels).
- Design buildings to maintain critical functions during a flood event (for example, by including backup generators).
- Design infrastructure (for example, roads, sewers, and drinking water and electric utilities) to accommodate changes in natural conditions expected over the life of the project.
- Treat water as an amenity in community design, and integrate design for drinking water, stormwater, and recreational water needs.
- Think about how to maintain a community's sense of place, cultural and historical heritage, social interactions and cohesion, and accessibility if designing elevated buildings.

Mitigating Risks to Development by Retrofitting or Relocating

Where existing development is at risk, many participants noted the possibility of retrofitting or relocating structures and infrastructure and suggested actions, incentives, and challenges to consider, including the following:

- Retrofit and upgrade existing infrastructure, including evacuation routes, to address vulnerabilities, and consider how investments can be maximized to account for and accommodate changing natural conditions expected over the life of the investment.
- Prioritize critical community facilities (for example, emergency response centers and potential shelters) for retrofitting or relocating. If relocating a facility, the new location should be accessible (for example, by public transportation or on foot). Similarly, facilities in central locations that people can walk to and reach using transit could be prioritized for retrofits.
- Move commercial uses, utilities, and services that would be most impacted by flooding or most expensive to replace to upper levels when renovating buildings.
- Use buyouts, transfers of development rights, and other incentives in hazard-prone areas to promote relocation to safer areas, and develop those areas in a manner consistent with smart growth principles.
- Ensure that retrofit and relocation decisions are appropriate for the people most at risk, which often include disadvantaged low-income, elderly, or minority populations, and that everyone's interests and needs are considered equitably.
- Think about how to maintain sense of place, cultural and historical heritage, social interactions and cohesion, and accessibility if elevating buildings as part of a retrofitting process. If only a few buildings are elevated, consider how this would impact the existing streetscape and scale of the buildings in the community, as well as access to these buildings by people who are not able to climb stairs.

III. Plans and Policies

Roundtable participants noted ways practitioners could integrate coastal smart growth and hazard mitigation strategies through existing planning mechanisms and noted potential incentives and current disincentives for facilitating integration. In addition, participants noted opportunities to improve long-term resilience to climate change while also achieving near-term community, economic, and environmental benefits. These ideas are organized in the following three sections: coordinated plans and requirements, incentives and disincentives for integration, and considering climate change in all investments.

Coordinated Plans and Requirements

Participants suggested ways that plans and planning requirements could be better integrated:

- Link hazard mitigation and land use planning processes to more effectively address smart growth and hazard mitigation issues through a comprehensive approach.
- Identify how communities could prepare one plan to serve multiple purposes and planning requirements.
- Consider ways to reduce risk and plan ahead for how to recover after hazard events when making long-term infrastructure and land use decisions.
- Include more projects in hazard mitigation plans that address infrastructure investments that reduce risk and are aligned with other local plans.
- Include more explicit smart growth approaches to meet hazard mitigation and flood reduction goals in the Federal Emergency Management Agency's (FEMA) Community Rating System.
- Provide tools and technical assistance to better integrate plans at the local level. For example, conduct pilot projects that integrate smart growth and hazard mitigation strategies into pre-disaster recovery planning in hazard-prone areas.

Incentives and Disincentives for Integration

Many existing programs, policies, funding mechanisms, and planning tools could be restructured to remove barriers and create incentives for approaches and plans that build hazard resilience and make communities more environmentally and economically sustainable. Participants offered several ideas on how this could be done:

- Analyze federal policies and regulations for potential unintended consequences that might discourage or hinder the use of smart growth or hazard mitigation strategies.
- Provide federal grants and other assistance to help communities integrate smart growth and hazard mitigation plans and strategies.

- Prioritize funding for hazard mitigation strategies that emphasize smart growth benefits while also protecting against future hazards.
- Make federal post-disaster recovery funding contingent upon having a pre-disaster recovery plan.
- Provide credits for smart growth strategies implemented outside of 100-year and 500-year flood zones that reduce impacts on the floodplain through FEMA's Community Rating System.
- Use FEMA's Community Rating System to encourage integration of hazard mitigation into smart growth planning and implementation.
- Ensure that spending decisions and public projects reinforce decisions that local jurisdictions have made about where and how growth should occur.

Considering Climate Change in All Investments

Another common theme was the need to consider climate change in coastal smart growth and hazard mitigation planning and design to minimize climate change impacts to the built and natural environments. A participant noted that land use planners often plan with uncertainty about population increases and future economic changes, which might make them more experienced dealing with the uncertainty of a range of potential future conditions resulting from climate change. Participants also suggested these actions:

- Identify investments that can result in near-term community, economic, or environmental benefits and meet long-term goals to reduce risk in a changing climate.
- Consider how future changes in the climate could impact hazard mitigation plans, land use plans, and infrastructure investments.
- Consider where and how development should occur based on projected changes to floodplains, precipitation, temperature, and storms and how those changes might affect people and property.
- Focus on a community's risk associated with long-term climate change as well as current hazards when developing hazard-resilient smart growth projects.
- Include information about projected future conditions (as opposed to only using historical data) for risks, such as floods and storm frequency, when developing risk assessments and conducting cost-benefit analyses for hazard mitigation activities. By considering the likelihood of future risks, the cost-benefit analysis may reveal the value of investing in measures that might not appear to be cost-effective when only current risks are considered.
- Consider long-term climate change impacts in planning, design, and cost determination for infrastructure, such as roads, water and wastewater systems, and electric utilities.
- Require the consideration of climate change impacts in federal grant applications for planning, infrastructure, and hazard mitigation.
- Consider adjusting FEMA's Community Rating System to provide credits for including activities that address climate change.[1]

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[1] *The Community Rating System's updated draft coordinator's manual incorporates additional acknowledgment of—and credit for—community efforts to anticipate the future as it relates to flood risk and natural floodplain functions (that is, given climate change and sea level rise), and to take actions that can mitigate adverse impacts that could materialize.*

IV. Engagement, Communication, and Education

Throughout the meeting, many participants identified the importance of engagement, communication, and education for encouraging coastal and waterfront communities to implement hazard-resilient smart growth approaches. Their comments are organized in the following four sections: stakeholder engagement, technical assistance techniques and tools, education and capacity building, and communications.

Several participants noted the importance of engaging the public, including the most vulnerable populations, early in smart growth and hazard mitigation planning and design to ensure the process is transparent, and to make the data accessible to everyone. Also, it is important to consider the source of the information and how that information is communicated. Many people receive information best when it comes from a trusted source (for example, a peer). Participants offered ideas on the various stakeholders to engage, including:

- Land use planners, hazard mitigation planners, and emergency managers
- Other local, regional, and state government officials involved in infrastructure and public works, building codes, transportation, public safety, environmental protection, social services, and housing
- Design professionals, including building and landscape architects
- Building industry
- Elected officials
- Developers and real estate professionals
- Local residents
- Traditionally underrepresented and vulnerable populations
- Students (K-12 to graduate school)
- Scientists and engineers
- Agricultural community
- Local media

Technical Assistance Techniques and Tools

Participants identified techniques and tools that engage, inform, and empower the public and decision makers in planning and developing projects to make communities resilient and sustainable. These techniques and tools included the following:

- Engage citizens in community visioning exercises to identify their values and vision for the future. Having a long-term vision is important; however, it is helpful to break the vision into smaller planning phases to make it manageable.
- Employ interactive, scenario-planning techniques with maps and other visual tools to explore and illustrate the impacts of different policy decisions and development patterns on hazard resilience.
- Use a decision-making framework to help communities assess risk to coastal hazards and determine the next steps to address vulnerabilities.
- Develop guidance documents for communities on hazard-resilient smart growth planning and development, such as how to prepare one plan for multiple purposes. Some guides could be applicable to all communities, while others may be location-specific.
- Develop educational material for the public, such as how homeowners can reduce their risk through retrofits.
- Use pilot projects that integrate smart growth and hazard mitigation strategies to engage and bring stakeholder groups together. Pilot projects provide important local context and can help gain stakeholder support. They also enable policy and planning ideas to be tested, and they provide opportunities to assess the costs and benefits, as well as to identify and understand implementation challenges.

Education and Capacity Building

Participants provided ideas about building the capacity of smart growth and hazard mitigation practitioners and local decision makers to integrate smart growth and hazard mitigation strategies, as well as educating the public about these issues. Specific ideas included the following:

- Incorporate concepts in undergraduate and graduate school curricula (for example, in urban and regional planning programs and emergency management programs) about the importance of smart growth and hazard mitigation strategies, the commonalities between them, and the advantages of promoting integrated approaches.
- Develop continuing education curricula about how to integrate smart growth and hazard mitigation strategies for professionals, including construction managers, architects, developers, landscape architects, designers, land use and hazard mitigation planners, lawyers, and realtors.
- Conduct competitions to design hazard-resilient smart growth approaches.
- Inform planners, public utilities, economic development officials, local decision makers, and other departments about tools available to reduce risk and help communities become more environmentally and economically sustainable.
- Identify the challenges, opportunities, and trade-offs associated with different smart growth and hazard mitigation planning and design approaches so that practitioners, decision makers, and the public are well-informed. Also, consider what future land use options will be lost when a decision is made.
- Coordinate local capacity-building efforts among agencies, professional organizations, extension groups, and others.
- Train outreach specialists, such as extension agents, in smart growth and hazard mitigation strategies to help communities develop integrated plans.
- Create a forum, or add these topics to an existing forum, for local governments to facilitate discussion between planners and elected officials.

- Encourage community members, including underrepresented populations, to provide data that will help inform community plans that incorporate smart growth and hazard mitigation strategies.
- Sustain peer-to-peer mentoring, both pre- and post-disaster, that links smart growth and hazard mitigation strategies.
- Inspect properties before property transfer to analyze a site's hazard vulnerability and suggest options for reducing risk to potential homebuyers.
- Create community organizations to guide residents through site consultations that help them identify retrofit options to minimize risk and the costs and benefits of each option.
- Engage children about smart growth and hazard mitigation strategies through educational programs.

Communications

Another common theme was the need for effective communication strategies and messages to encourage the integration and implementation of coastal smart growth and hazard mitigation strategies. Ideas included the following:

- Develop a common language to bridge the smart growth and hazard mitigation fields, using terminology that is clear and consistent across the two professions.
- Develop consistent messages, sound bites, and locally relevant, short success stories about the benefits of integrating smart growth and hazard mitigation strategies, emphasizing economic and health benefits, and share these messages and stories with different stakeholders (for example, developers, land use planners, and local decision makers).
- Develop ways to effectively market the practices and tools that make communities both more resilient and more environmentally and fiscally sustainable. Concise concepts such as "safe and smart" or "durable and lovable"[2] could be options.
- Communicate the current and future risk of a community or site to natural hazards, including those exacerbated by climate change, and how hazard-resilient smart growth strategies could reduce that risk.
- Use a market-based approach to discourage investment in high-hazard areas by communicating the potential costs and cost savings of different development approaches.
- Convey the idea that considering climate change in hazard-resilient, smart growth planning and design is not an additional action, but rather a part of a comprehensive approach to minimize risk and increase environmental and economic sustainability.
- Form interdisciplinary communication teams to include traditional marketing and social marketing expertise.
- Add language about the importance of hazards resilience within the 10 smart growth principles or 10 smart growth coastal and waterfront elements.
- Discuss hazards resilience in coastal and waterfront smart growth planning and in publications, tools, and other resources for communities.

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[2] *"Durable and loveable" is a concept from Steve Mouzon's Original Green, which notes that sustainable buildings should be lovable because if they cannot be loved they will not last, and that they should be durable because if they cannot endure they are not sustainable. See www.originalgreen.org/.*

V. Gaps and Needs

As part of the roundtable, the experts identified what they believed were research and product needs for achieving integrated coastal smart growth and hazard mitigation strategies. These needs are organized into five sections. Many of the ideas originated from an exercise where participants noted their top three ideas for focusing efforts by NOAA, EPA, and state Sea Grant College Programs. Some of these also appear in earlier sections of the report, where applicable.

Economic and Effectiveness Research

One of the primary research needs identified by several participants during the workshop was the need to quantify the economic benefits of development approaches that incorporate both coastal smart growth and hazard mitigation strategies. The need to develop good evaluation metrics was also noted. Participants offered suggestions, including:

- Analyze the economic benefits of smart growth and hazard mitigation strategies for communities (including integrated approaches) and compare them to conventional development practices.
- Consider social and demographic information in economic analyses that inform development decisions, including how underserved and historically underrepresented communities might be impacted.
- Develop performance measures with well-defined outputs and outcomes to evaluate the success of projects integrating both smart growth and hazard mitigation strategies. Effective performance measures may need to cut across departments and levels of government.
- Develop standardized measurements for economic benefits of smart growth and hazard mitigation strategies to more effectively compare and communicate their economic values.

Tools, Technical Assistance, and Training

Participants also voiced their opinions that it is important to provide additional tools, technical assistance, and training to build capacity and help integrate coastal smart growth and hazard mitigation strategies. The idea of creating a "design palette" of smart and hazard-resilient coastal development options was endorsed by many of the experts. This and other specific ideas are captured below:

- Develop a smart growth and hazard mitigation land-use suitability and priority analysis method adaptable to local contexts and local resources.
- Develop a design palette of smart and resilient coastal development options for different scenarios (for example, retreat or adapt), consolidating effective tools that can be easily understood by local decision makers. Tools should address a variety of issues, including design, policy, socio-economic, communication, and legal implications. They should also be locally or regionally appropriate and include "outside-the-box" ideas, checklists, scorecards, and case studies.

- Develop scenario-planning tools to communicate the costs avoided by making decisions at key points in time as risks increase.
- Develop and train outreach specialists and extension agents in both smart growth and hazard mitigation strategies so they can help communities integrate these concepts into land use plans and ordinances.
- Hold cross-training sessions for smart growth and hazard mitigation experts so they understand the benefits of each other's field as it relates to their own.
- Use maps and other visual tools to represent different hazard and development scenarios to engage decision makers.

Policy and Funding Options

The importance of aligning policies (especially those related to grant funding) to promote coastal smart growth and hazard mitigation strategies and removing disincentives was mentioned by many as a critical need. Participants offered specific ideas, including:

- Analyze federal policies and regulations for potential unintended consequences that might discourage the use of smart growth or hazard mitigation strategies.
- Identify linkages between severe repetitive loss properties and foreclosures, and prioritize these properties for hazard mitigation acquisition funding.
- Use federal funding and policies to promote smart growth and hazard mitigation best practices, integration of smart growth and hazard mitigation strategies, and climate change adaptation.
- Include socio-economic considerations to address social equity as part of risk assessment and planning.
- Consider climate change when integrating smart growth and hazard mitigation plans.

Communications

Participants generally felt that communication about existing coastal smart growth and hazard mitigation tools and policies could be more effective to inspire widespread use and adoption. Several participants supported the implementation of pilot projects or "showcase communities" as effective communication tools. Participants noted that the pilots, which perhaps garnered the greatest support among all needs shared during the workshop, would enable theoretical policy and planning ideas to be tested. Pilots would also provide opportunities to assess the costs and benefits and identify and understand challenges that may be encountered during implementation. Other suggestions included the following:

- Develop consistent messaging about the benefits of smart growth and hazard mitigation, emphasizing the economic benefits, and communicate these messages to different stakeholders (for example, developers, real estate agents, land use planners, and local decision makers).
- Create short publications (for example, brochures) on how implementing smart growth principles can help make communities more resilient to hazards.
- Compile and share success stories that illustrate the benefits, including economic and health, of integrating smart growth and hazard mitigation strategies.

- Develop ways to more effectively market existing tools (for example, using existing networks such as StormSmart Coasts and the Digital Coast Partnership).
- Integrate hazard mitigation concepts into the smart growth principles or smart growth coastal and waterfront elements.

Coordination and Collaboration

Many participants gave examples of how coordination and collaboration could be improved, both within the government and among other sectors, to more effectively help coastal communities integrate smart growth and hazard mitigation strategies. Participants provided specific ideas, including:

- Improve coordination among governmental and nonprofit organizations to enhance local government capacity building.
- Track and monitor existing efforts to assess interagency coordination, such as the Federal Interagency Floodplain Management Task Force, which has begun to look at federal agencies' existing tools and overlaps.
- Facilitate collaboration among planners, academics, and communicators to ensure research is designed to address specific planning needs and results are communicated effectively to improve decision-making.
- Improve interagency and intergovernmental coordination on issues spanning multiple federal, state, and local agencies, such as transportation.

Moving Forward

Land use policies, programs, and investments at all levels of government have played an important role in shaping existing development patterns along the coast and will continue to shape future growth. As coastal and waterfront communities continue to develop, hazard-resilient smart growth can expand economic opportunities; protect lives, property, and the environment; use resources more efficiently; and create and enhance places people love.

This roundtable helped increase the understanding of hazard-resilient smart growth and the opportunities and challenges with implementing it. The participants provided ideas that NOAA, EPA, other federal agencies, National Sea Grant College Program partners, and other organizations could consider to better integrate smart growth and hazard mitigation strategies. Moving forward, there are many opportunities to build on these ideas by developing tools, conducting research, implementing pilot studies, improving communication, and integrating smart growth and hazard mitigation concepts into practices, programs, and policies. Continued work on integrating smart growth and hazard mitigation strategies can help coastal and waterfront communities achieve safe, productive places where people enjoy living and visiting.

Appendix A: Resources

Throughout the meeting, participants provided examples of programs and resources that could be helpful for integrating smart growth and hazard mitigation. Many of the programs and resources are captured below.

Potential Models and Partners for Outreach

For improving outreach and capacity building for integrated smart growth and hazard mitigation, participants provided several examples of existing extension programs that could be useful models or partners:

- National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant College Program Extension Network: *www.seagrant.noaa.gov/roe/outreach.html*
- U.S. Department of Agriculture's Cooperative Extension System: *www.csrees.usda.gov/ Extension*
- U.S. Department of Agriculture's Extension Disaster Education Network: *www.eden.lsu.edu/Pages/default.aspx*
- U.S. Department of Agriculture's Natural Resources Conservation Service: *www.nrcs.usda.gov/wps/portal/nrcs/main/national/home*
- U.S. Department of Homeland Security's Centers of Excellence: *www.dhs.gov/files/ programs/editorial_0498.shtm*

Programs, Publications, and Websites

The following are many of the publications, websites, and Web-based tools participants mentioned during the roundtable that could be helpful for achieving hazard-resilient smart growth:

- Association of State Floodplain Managers, *No Adverse Impact: www.floods.org/index.asp?menuID=349&firstlevelmenuID=187&siteID=1*
- Association of State Floodplain Managers, *No Adverse Impact in the Coastal Zone*: *www.floods.org/index.asp?menuid=340*
- Beatley, T., *Planning for Coastal Resilience: Best Practices for Calamitous Times*, Island Press, 2009 (book)
- Center for Planning Excellence, *Louisiana Land Use Toolkit*: *www.landusetoolkit.com*
- Center for Planning Excellence and the Coastal Protection and Restoration Authority, *Best Practices Manual for Development in Coastal Louisiana*: *www.coastal.cpex.org*
- Environmental Protection Agency (EPA) smart growth website: *www.epa.gov/ smartgrowth*
- Federal Emergency Management Agency (FEMA), *Coastal Construction Manual, 4th Edition, 2011: www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=1671*
- FEMA, Community Rating System website: *www.fema.gov/business/nfip/crs.shtm*

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Appendix B: Roundtable Background

Roundtable Details

The roundtable consisted of 20 experts representing academia, the nonprofit and private sectors, and local, state, and federal government. Additional experts from NOAA and EPA also observed and participated in the meeting. The meeting was structured to capture participants' individual ideas on these topics using a variety of methods, including question-and-answer round robins, scenario planning in small groups, and presentations.

Leading Up to the Roundtable

In 2009, NOAA, EPA, Rhode Island Sea Grant, and the International City/County Management Association released *Smart Growth for Coastal and Waterfront Communities*, which presents 10 coastal and waterfront smart growth elements (see Table 1).[3] These elements took the original smart growth principles developed by the Smart Growth Network and adapted them to reflect the unique challenges and opportunities posed by coastal and waterfront development.

Given the dynamic nature of the land and water interface, coastal and waterfront development cannot be environmentally and economically sustainable if planners do not consider coastal hazards. Resilience to natural hazards should be inextricably linked to the siting and design of development, as well as to the built and green infrastructure that supports it.[4]

Smart Growth for Coastal and Waterfront Communities provides an overview of coastal and waterfront smart growth approaches. Some of these approaches can help communities become more resilient to natural hazards such as storms, erosion, and flooding. For example, open space can help buffer development from storms. However, the document does not include an in-depth discussion of how smart growth strategies can help communities address coastal hazards. In addition, the connection between a smart growth strategy and how it promotes hazard resilience is not always apparent and, at times, the smart growth strategy may appear at odds with hazard mitigation techniques. For example, smart growth policies generally encourage directing development toward existing communities while hazard mitigation discourages infill development in hazard-prone areas. In a scenario where part or all of a community is at risk from hazards, decision makers need strategies or tools they can use to help them understand and minimize risk and achieve community goals.

Recognizing the opportunity for more effectively integrating both approaches to achieve complementary goals, NOAA, EPA, and Sea Grant College Programs identified the need to further explore these issues. The roundtable emerged as a way to bring together experts from the smart growth, hazard mitigation, and coastal management communities to highlight important ideas, needs, and potential solutions to help answer the questions: what does hazard-resilient smart growth look like and how can communities implement it?

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[3] For more information on the publication, Smart Growth for Coastal and Waterfront Communities, see www.coastalsmartgrowth.noaa.gov.
[4] Jacob, J., and S. Showalter. The Resilient Coast: Policy Frameworks for Adapting the Built Environment to Climate Change and Growth in Coastal Areas of the U.S. Gulf of Mexico. Texas Sea Grant and National Sea Grant Law Center, 2007, pages 8 and 25. Available at www.urban-nature.org/publications/documents/TheBuiltEnvironment08-sm_000.pdf9.

Appendix C: Roundtable Participants

Roundtable Participants	
Name	**Organization**
Martin Bierbaum	Fellow, University of Maryland Smart Growth Center and Baruch College
Vicky Carrasco	Coastal Communities Specialist, University of Maryland Sea Grant College Program
Laine Cidlowski	Urban Sustainability Planner, District of Columbia Office of Planning
Julie Dennis	Planning Analyst, Florida Department of Community Affairs, Division of Community Planning
Lee Einsweiler	Principal, Code Studio
Theodore Eisenman	Steering Committee Member, Hudson River Watershed Alliance
Ann-Margaret Esnard	Professor of Urban and Regional Planning, Florida Atlantic University
Steve Goldbeck	Chief Deputy Director, San Francisco Bay Conservation and Development Commission
Abby Hall	Policy Analyst, U.S. EPA Office of Sustainable Communities
John Jacob	Professor and Extension Specialist, Texas Sea Grant and Texas Agrilife Extension
John Kuriawa	Coastal Management Specialist, NOAA Office of Ocean and Coastal Resource Management at the Chesapeake Bay
Sophie Lambert	Director, LEED for Neighborhood Development, U.S. Green Building Council
Joe MacDonald	Senior Research Associate, American Planning Association
Christa Rabenold	Coastal Management and Hazards Specialist, NOAA Office of Ocean and Coastal Resource Management
Joel D. Scheraga	Senior Advisor for Climate Adaptation, U.S. EPA Office of the Administrator, Office of Policy
Elizabeth Schilling	Policy Manager, Smart Growth America
Gavin Smith	Executive Director, Department of Homeland Security's Center of Excellence for the Study of Natural Disasters, Coastal Infrastructure, and Emergency Management
Aaron Todd	Executive Director, Center on Sustainable Communities
Berry Williams	Mitigation Consultant, Berry A. Williams and Associates, Inc
Roy Wright	Deputy Director, Risk Analysis, FEMA's Federal Insurance and Mitigation Administration

Additional Attendees Who Observed and Participated in the Meeting	
Name	**Organization**
Rina Aviram	Program Analyst, NOAA Office of Ocean and Coastal Resource Management
Kate Barba	Chief, National Policy and Evaluation Division, NOAA Office of Ocean and Coastal Resource Management
Chrysanthe B. Broikos	Curator, National Building Museum
Allison Castellan	Coastal Management Specialist, NOAA Office of Ocean and Coastal Resource Management
Leah Cohen	Policy Analyst on Climate Change Adaptation, U.S. EPA Office of Policy
Chris Conger	Coastal Lands Program Manager, University of Hawaii Sea Grant College Program
Michael Craghan	Co-lead, Climate Ready Estuaries, U.S. EPA Office of Wetlands, Oceans and Watersheds
Lynn Desautels	Senior Policy Analyst, U.S. EPA Office of Sustainable Communities
Rebecca Feldman	Coastal Management Specialist, NOAA Office of Ocean and Coastal Resource Management
Tyler Felgenhauer	Post-Doctoral Research Fellow, U.S. EPA Office of Research and Development
Susan Fox	Coastal Management Specialist, NOAA Coastal Services Center
John Frece	Director, U.S. EPA Office of Sustainable Communities
Joelle Gore	Acting Chief, Coastal Programs Division, NOAA Office of Ocean and Coastal Resource Management
Chris Hayes	Policy and Evaluation Coordinator, NOAA National Sea Grant College Program

Additional Attendees Who Observed and Participated in the Meeting	
Name	**Organization**
Susan Julius	Senior Researcher, Global Change Research Program, National Center for Environmental Assessment, U.S. EPA Office of Research and Development
Lauren Land	2011 Sea Grant Knauss Fellow, NOAA National Sea Grant College Program
Josh Lott	Coastal Management Specialist, NOAA Office of Ocean and Coastal Resource Management
John McShane	Environment Scientist, U.S. EPA Office of Wetlands, Oceans and Watersheds
Kim Penn	Program Analyst, NOAA Office of Ocean and Coastal Resource Management
Pam Rubinoff	Coastal Management Specialist, Rhode Island Sea Grant
Randall Schneider	Team Lead, Atlantic Coastal Management Programs, NOAA Office of Ocean and Coastal Resource Management
Heidi Stiller	Human Dimensions Specialist, NOAA Coastal Services Center, Gulf Coast Services Center
Megan Susman	Senior Policy Analyst, U.S. EPA Office of Sustainable Communities
Sarah van der Schalie	Coastal Management Specialist, NOAA Office of Ocean and Coastal Resource Management
Kenneth Walker	Program Analyst, NOAA Office of Ocean and Coastal Resource Management
John Whitler	Environmental Protection Specialist, Climate Ready Water Utilities, U.S. EPA Office of Water
Donna Wieting	Acting Director, NOAA Office of Ocean and Coastal Resource Management