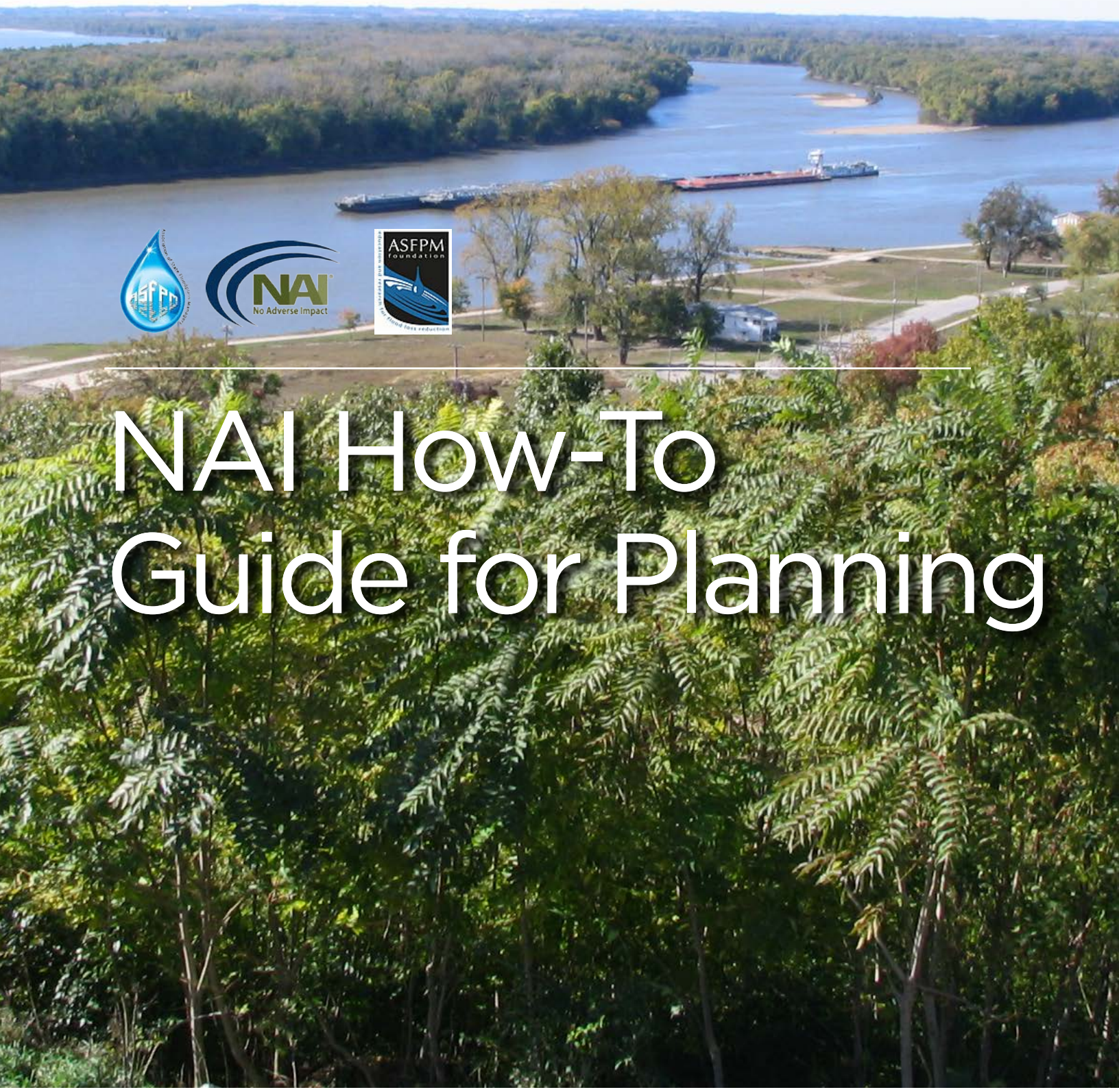
The NAI Approach to Floodplain Management

Planning and Floodplain Management

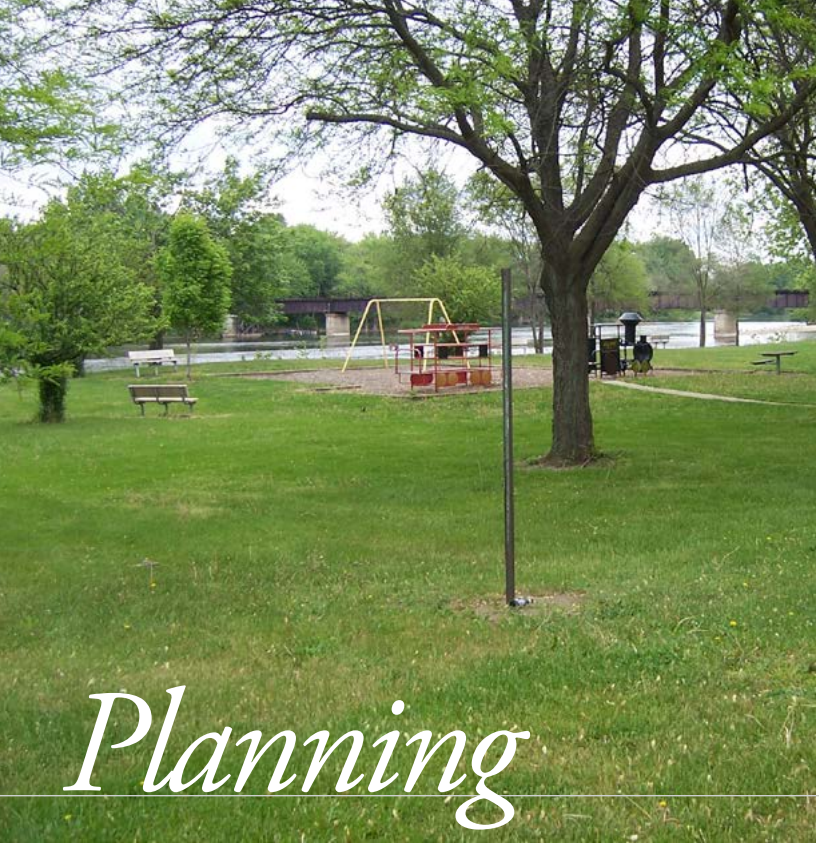
Planning Tools

Case Studies and Good Examples



NAI How-To Guide for Planning

Planning



Planning

This park in Aroma Park, IL, illustrates the NAI approach. Waterfront properties serve the community with open, green space, but damage is limited during a flood. Photo credits: "Dry" photo by French & Associates, "Wet" photo by Kankakee County Planning Department.

SECTION ONE
The NAI Approach

SECTION TWO
Planning & Floodplain Management

SECTION THREE
Planning Tools

ON THE COVER:

The Illinois River meets the Mississippi River at Grafton, IL. For many years, Grafton's homes and businesses would be flooded by these two rivers. In the 1980s, the city began a series of plans and buyouts that have cleared most of the hazardous areas. Residents and visitors can now enjoy the waterfront without fear of flood damage. Photo by Paul Osman.

This playground equipment was built using natural materials while providing fun features for kids to explore. Cedar River at the Charles City Riverfront Park, IA. Photo courtesy of the city of Charles City, IA.

SECTION FOUR
Case Studies

SECTION FIVE
Resources & Fact Sheet

Contents

Acknowledgements

The approach taken to develop the NAI How-to Guides was truly a partnership effort. Special appreciation is extended to the following who assisted in creating this publication:

- ASFPM NAI Committee Co-Chair and project lead Terri Turner, AICP, CFM, Development Administrator, Augusta (GA) Planning & Development
- ASFPM Executive Office, especially Drew Whitehair, CFM, as Project Manager for Science Services and Michele Mihalovich, PIO, who served as the editor.
- ASFPM Foundation

Technical Reviewers (Alphabetical Order):

- Chad Berginnis, CFM, Executive Director, Association of State Floodplain Managers
- Kimberly Berginnis, CFM, Wisconsin Department of Emergency Management
- Robert Freitag, CFM, Senior Instructor, Director, Institute for Hazards Mitigation Planning and Research, University of Washington
- Rebecca Haney, CFM, Coastal Geologist, Massachusetts Office of Coastal Zone Management
- Allison Hardin, CFM, Planner, City of Myrtle Beach, SC
- Sherry Harper, AICP, CFM, Insurance Services Office
- Larry Larson, PE, CFM, Senior Policy Advisor, ASFPM
- Crorey Lawton, CFM, US Army Corps of Engineers, Mississippi Valley Division
- Rob Olshansky, AICP, Professor and Head, Department of Urban and Regional Planning, University of Illinois
- Rich Roths, AICP, formerly with Northeastern Illinois Planning Commission and Illinois Department of Natural Resources, and semi-retired from URS
- Alisa Sauvageot, CFM, Michael Baker International (AZ) and NAI Committee Co-Chair
- Jim Schwab, AICP, Senior Research Associate, American Planning Association
- Gavin Smith, Ph.D., AICP, Executive Director of the Center for the Study of Natural Hazards and Disasters, University of North Carolina
- David Stroud, CFM, AMEC Earth & Environmental
- Andy Yung, P.E., CFM, Principal, Walter P. Moor, The Woodlands, TX

Introduction

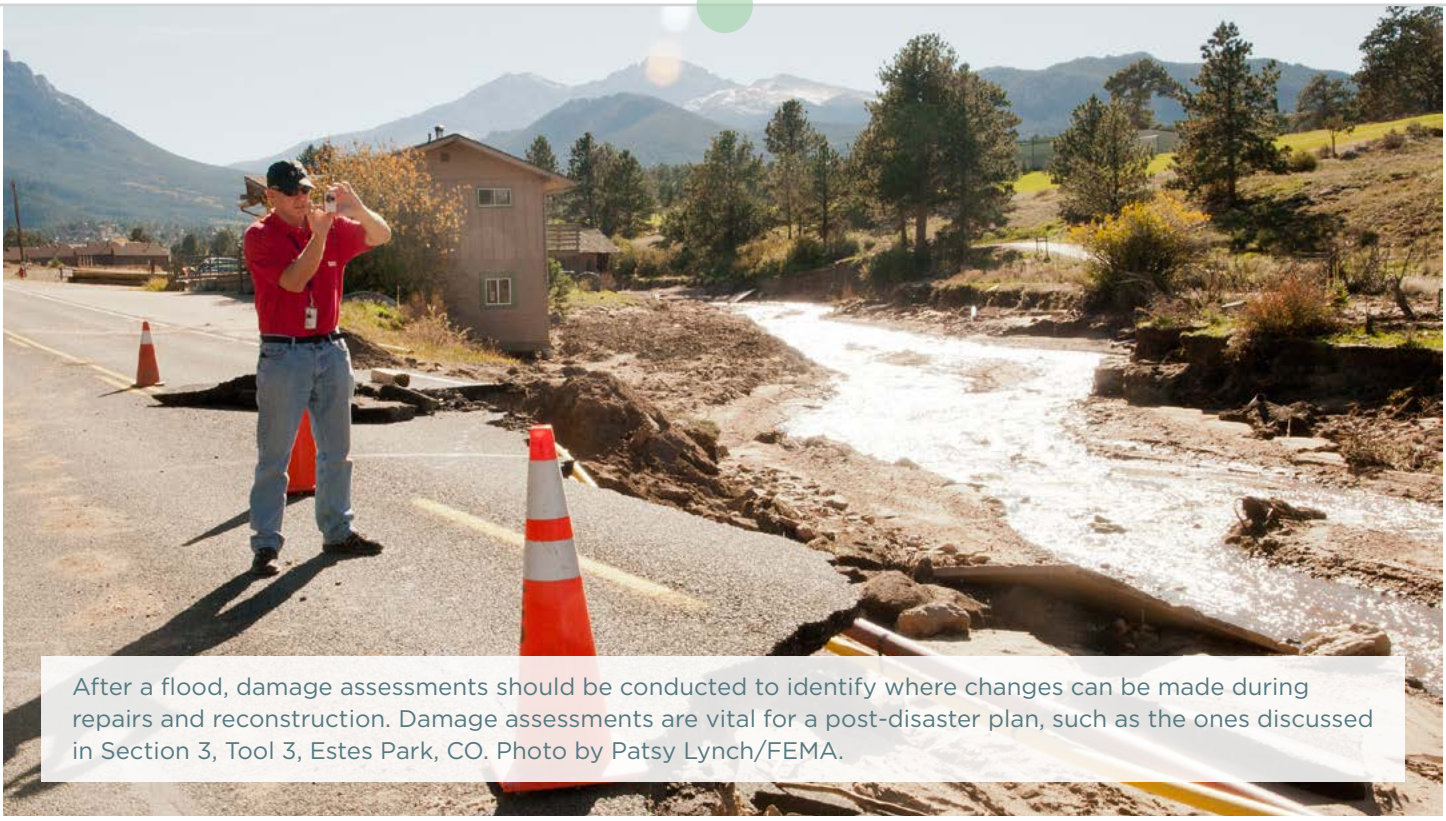
As a nation, we continue to build at-risk structures in or near floodplains, yet we don't spend as much time or effort considering the adverse impacts of these developments on adjacent properties or elsewhere in the watershed. The minimum standards we follow today – if, indeed, there are standards being utilized at all – are resulting in increasingly difficult flood issues and higher flood risk to our nation's communities and its citizens.

Some of these persistent flood risk issues are historical. Towns and cities were settled near watercourses for transportation, while others, especially in the arid west, were settled where precious water was available as a resource. However, today, poorly designed and constructed development and redevelopment, and a changing climate, are increasing flood risk to these communities. Many communities are dealing with persistent flood problems. Some of those same communities have residents and business owners attending board meetings after a heavy rain, complaining of flooding and demanding that the flood problems be fixed.

Communities can get ahead of these flooding issues, avoid causing problems for themselves and others, and ultimately lessen their flood risk, by embracing a new approach to managing their flood problems – the No Adverse Impact approach. In essence, NAI floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners.

continued on page 3

Who Should Use this Guide?



After a flood, damage assessments should be conducted to identify where changes can be made during repairs and reconstruction. Damage assessments are vital for a post-disaster plan, such as the ones discussed in Section 3, Tool 3, Estes Park, CO. Photo by Patsy Lynch/FEMA.

Anyone who wants a more resilient community that can withstand a major flood event should use this guide. That could mean anyone, from local officials, to elected officers, decision makers, floodplain managers, coastal managers, stormwater managers, emergency managers, planners, hazard mitigation specialists, public works and engineering staff, design professionals, concerned citizens, and various other groups in the community.

This *Guide* is one of a series of how-to guides that expand on the knowledge base within the *No Adverse Impact Toolkit* (link below), a 108-page document prepared by the Association of State Floodplain Managers. The *Toolkit* is ASFPM's reference on implementing the NAI approach. It identifies tools for incorporating NAI floodplain management into local regulations, policies and programs; while the *How-To Guides* break down, by subject matter, that information into compact, usable information communities can apply.

Link: No Averse Impact Toolkit: www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

This *Guide* reviews only five tools, but there are many more NAI tools for planning, and for each of the other building blocks found in the *NAI Toolkit*. The Toolkit, additional references, and more information can be found by clicking on the NAI icon at the bottom of ASFPM's homepage. www.floods.org

When the *How-to Guides* series is completed, there will be one guide for each of the seven building blocks found in the *NAI Toolkit* (hazard identification and floodplain mapping; education and outreach; planning; regulations and development standards; mitigation; infrastructure, and emergency services (links below)).

The *How-to Guides'* ultimate goals are to have communities take a different approach to managing development that prevents increasing flood risk, and to incorporate NAI concepts into other community activities. This *Guide* identifies just a few ways a community can incorporate the concepts into its planning activities.

Users should view NAI as a continuum – every community is somewhere on the path between not addressing minimum flood standards at all, addressing only the minimum standards of the National Flood Insurance Program, and being 100 percent resilient and sustainable in the face of a flood threat. The more NAI steps a community takes, the better prepared it is for the next flood.

THIS HOW-TO GUIDE IS DIVIDED INTO FIVE SECTIONS:

SECTION ONE: The NAI Approach to Floodplain Management

SECTION TWO: Planning and Floodplain Management

SECTION THREE: Planning Tools

SECTION FOUR: Case Studies and Good Examples

SECTION FIVE: Resources & Fact Sheet

After reading this *Guide*, it is recommended that a community conduct an assessment of its planning activities. A gap analysis would identify what is being done and what is not being done from an NAI perspective. It would lead to strengthening existing programs and implementation of new ones that can help reduce the community's flood risk. Similar assessments should be conducted after reviewing the other *Guides* in this series.

Link:
Mitigation How-to Guide: www.floods.org/NoAdverseImpact/NAI_How-to-Guide_Mitigation.pdf
Infrastructure How-to Guide: www.floods.org/NoAdverseImpact/NAI_How-to-Guide_Infrastructure.pdf
No Adverse Impact Toolkit: www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

Common Terminology used throughout this Guide

This is an example of following the NAI floodplain management approach, letting nature follow its course with no threat to life or property. The waterfront is a community asset, of open green space and parks, where people can relax and enjoy the view. Photo from the CRS Coordinator's Manual.

NFIP: National Flood Insurance Program. Most community floodplain maps and floodplain management standards have been adopted to meet the NFIP's criteria. Learn more at www.fema.gov.

Community: The NFIP definition of a community is a political subdivision that has authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction. The term usually means cities, counties, and Indian tribal governments. For the purposes of this *Guide*, a "community" also includes a neighborhood, unincorporated settlement, or other non-governmental subdivision where people live or work together.

CRS: NFIP's Community Rating System is a program that provides reduced flood insurance premiums for policyholders in communities that go above and beyond the NFIP criteria. For more information see www.FloodSmart.gov/crs or www.CRSResources.org. This *Guide* identifies how communities can receive CRS credits for implementing NAI tools and standards.

Floodplain: Nature's floodplain, which includes the Special Flood

Hazard Area (defined below), and other areas subject to flooding, includes:

- Areas subject to greater than the 1 percent annual chance flood, often referred to as the 100-year flood;
- Areas subject to smaller, more frequent, or repetitive flooding;
- Areas subject to shallow flooding, stormwater flooding, or drainage problems that do not meet the NFIP mapping criteria (but where 20 percent of flood insurance claims occur);
- Areas affected by flood-related hazards, such as coastal and riverine erosion or subsidence; and
- Areas that will be flooded when future conditions are accounted for, such as sea level rise and upstream watershed development.

For these reasons, "floodplain" is the term that best reflects a community's true flood risk, and is used in this *Guide* instead of "SFHA."

Natural floodplain functions: The functions associated with the natural or relatively undisturbed floodplain that moderate flooding, maintain water quality, recharge groundwater, reduce erosion, redistribute sand and sediment, and provide fish and wildlife habitat. One goal of NAI floodplain management is to preserve and protect these functions, in addition to protecting human development.

Resilient: "Able to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies," as defined in FEMA's National Disaster Recovery Framework (*link below*).

SFHA: A Special Flood Hazard Area mapped on an NFIP Flood Insurance Rate Map that shows the area subject to the 1 percent annual chance flood caused by rivers, lakes, oceans, and other larger sources of flooding.

Sustainable: "Able to meet the needs of the present without compromising the ability of future generations to meet their own needs," as defined in FEMA's National Disaster Recovery Framework.

The *Toolkit*, additional references, and more information can be found by clicking on the NAI icon at the bottom of ASFPM's homepage. www.floods.org

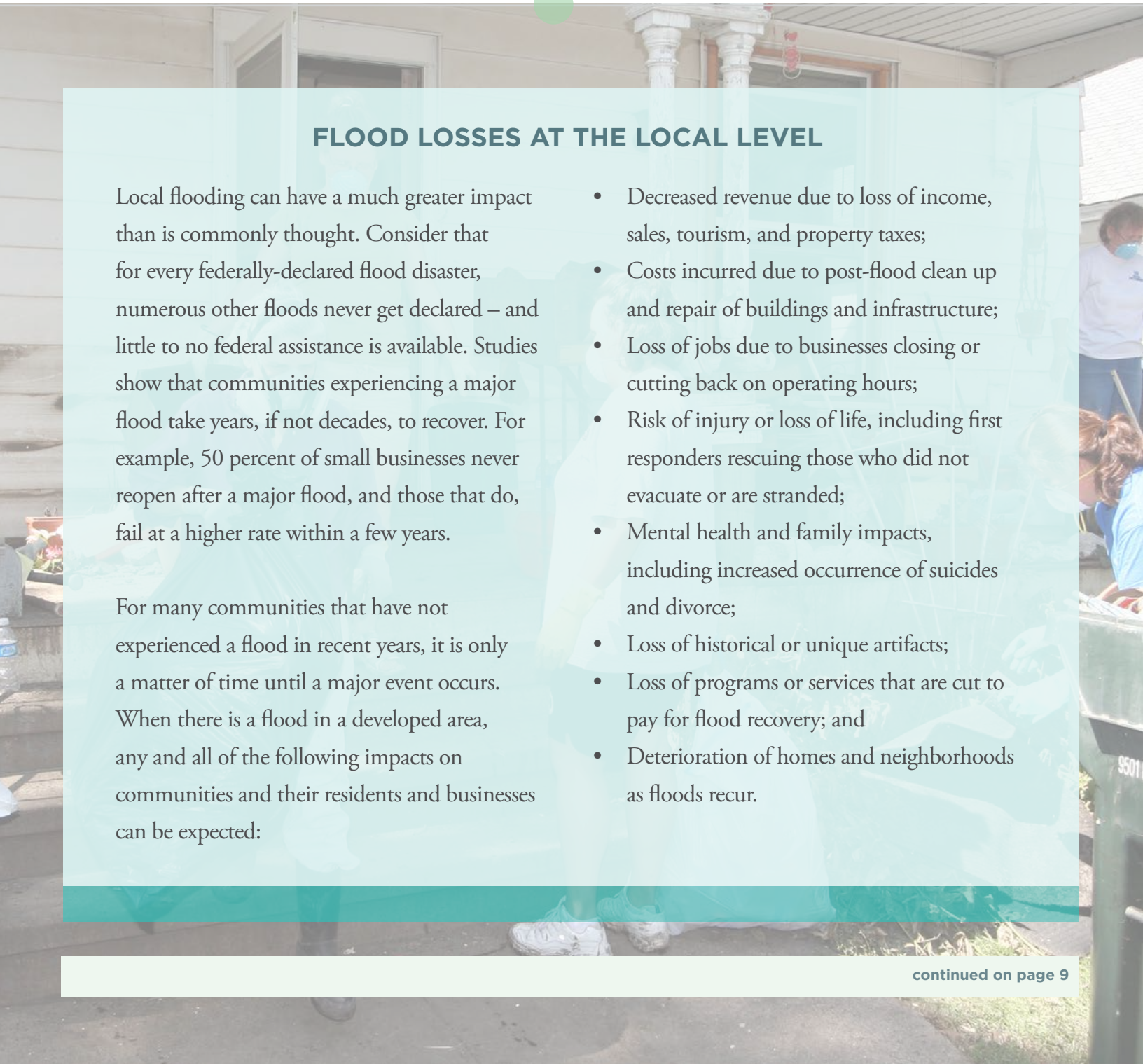
Link: FEMA's National Disaster Recovery Framework: www.fema.gov/media-library/assets/documents/24647

SECTION ONE

The NAI Approach to Floodplain Management

Cleaning up a flooded home can be a long and expensive process. Cedar Rapids, Iowa, June 2008. Photo from FEMA library. www.fema.gov/media-library/assets/images/52962

The NAI Approach to Floodplain Management



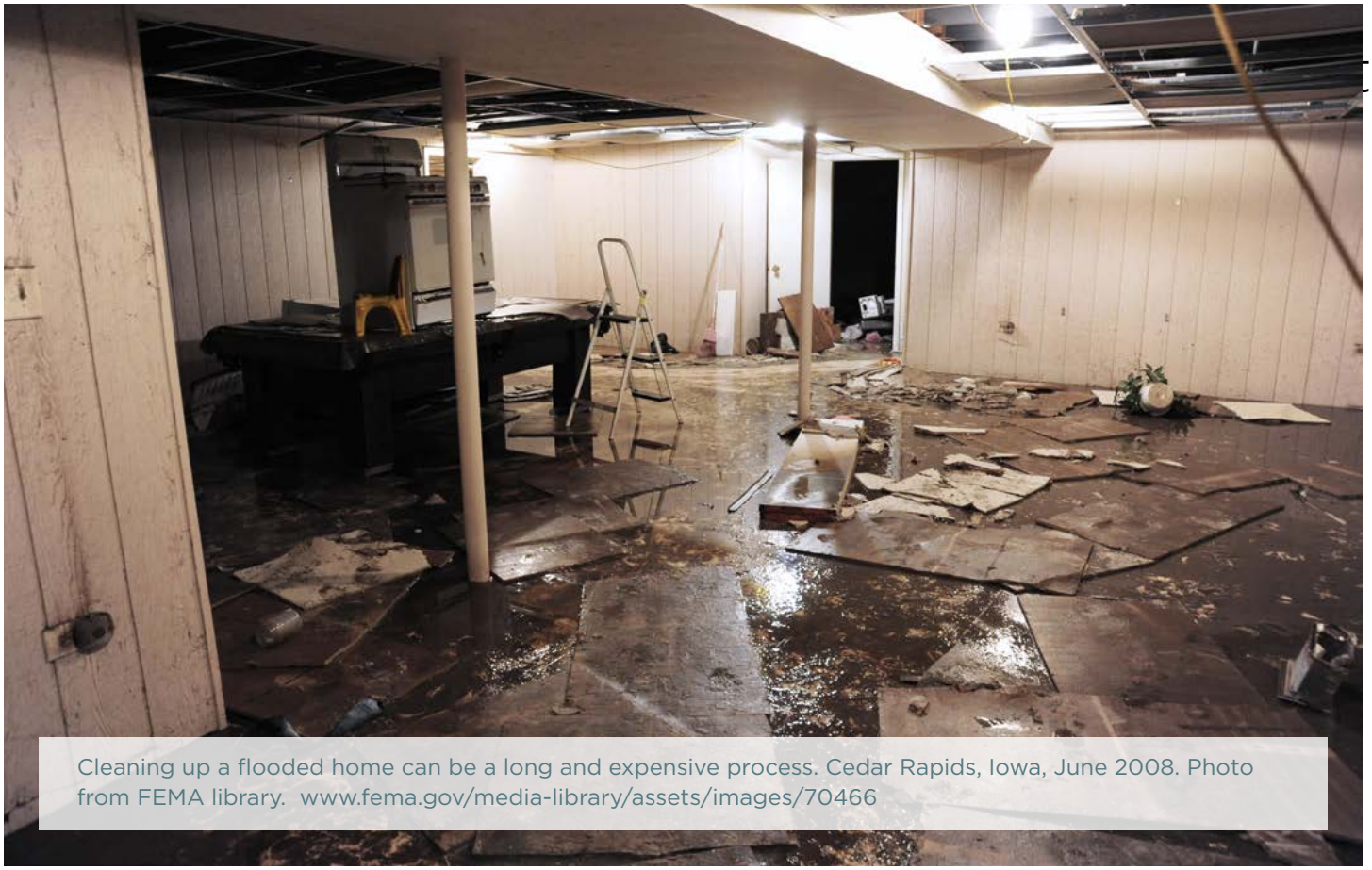
FLOOD LOSSES AT THE LOCAL LEVEL

Local flooding can have a much greater impact than is commonly thought. Consider that for every federally-declared flood disaster, numerous other floods never get declared – and little to no federal assistance is available. Studies show that communities experiencing a major flood take years, if not decades, to recover. For example, 50 percent of small businesses never reopen after a major flood, and those that do, fail at a higher rate within a few years.

For many communities that have not experienced a flood in recent years, it is only a matter of time until a major event occurs. When there is a flood in a developed area, any and all of the following impacts on communities and their residents and businesses can be expected:

- Decreased revenue due to loss of income, sales, tourism, and property taxes;
- Costs incurred due to post-flood clean up and repair of buildings and infrastructure;
- Loss of jobs due to businesses closing or cutting back on operating hours;
- Risk of injury or loss of life, including first responders rescuing those who did not evacuate or are stranded;
- Mental health and family impacts, including increased occurrence of suicides and divorce;
- Loss of historical or unique artifacts;
- Loss of programs or services that are cut to pay for flood recovery; and
- Deterioration of homes and neighborhoods as floods recur.

continued on page 9

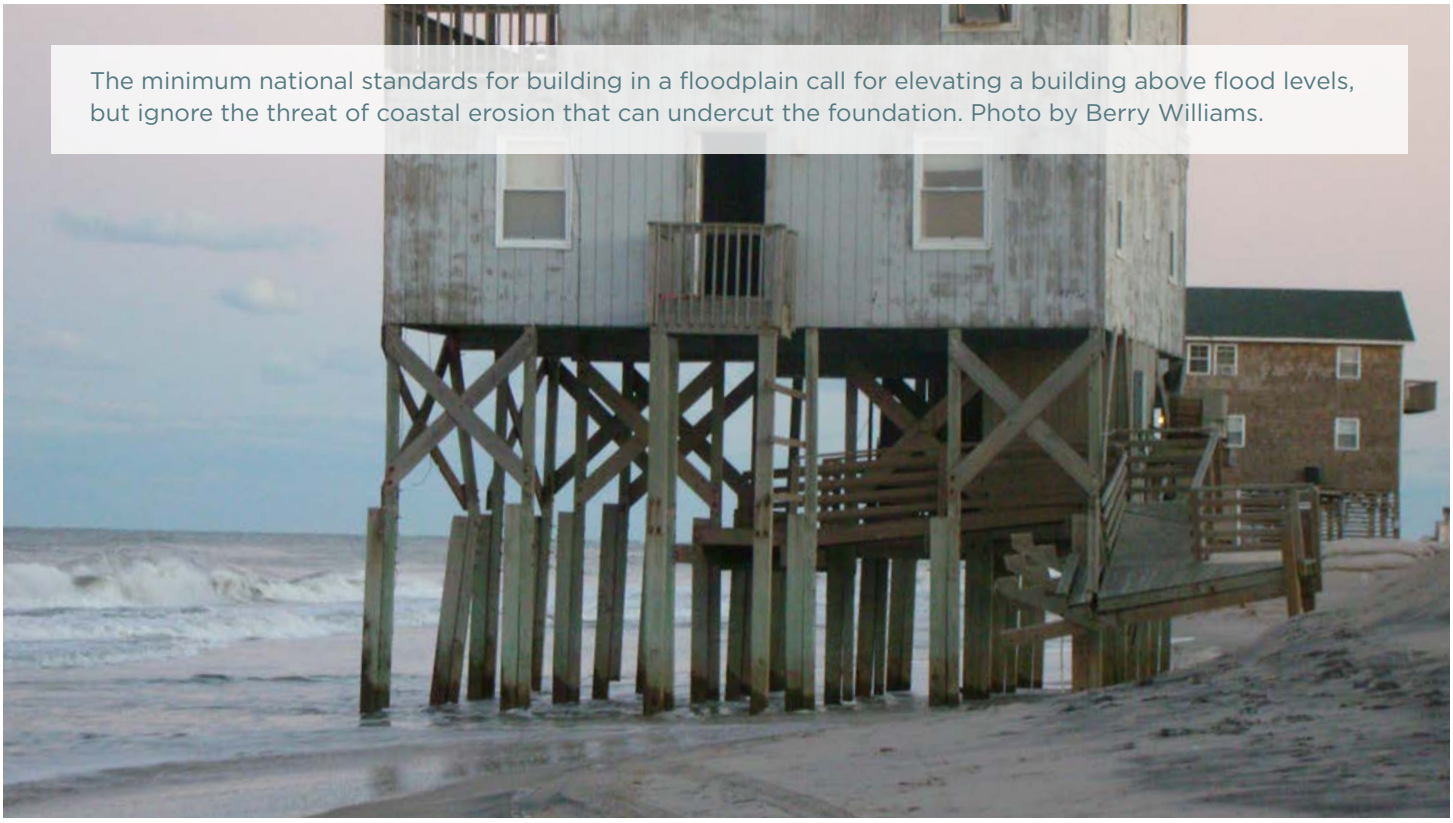


Cleaning up a flooded home can be a long and expensive process. Cedar Rapids, Iowa, June 2008. Photo from FEMA library. www.fema.gov/media-library/assets/images/70466

NATIONAL STANDARDS

The NFIP's *minimum* standards have been accepted by many as the default standards for communities' floodplain management programs. However, they were designed for the purposes of an insurance program and not to control our escalating flood losses. The NFIP sets minimum construction standards for communities' regulations in the mapped SFHA. These minimum standards are inadequate to stop and reverse the long-term trend toward increasing flood damage because:

- They do not address the entire floodplain. In other words, they neglect the potential for larger floods, other unmapped local flood hazards, or the effects of urbanization and a changing climate on future flood levels.
- They focus on how to build in a floodplain rather than how to avoid unsafe locations.
- They allow floodwater conveyance areas to be reduced, essential valley storage to be filled, and/or velocities to be increased – all of which can adversely affect others.
- The standards are flood-oriented and some construction techniques may increase exposure to damage from other hazards, such as wind and earthquakes.
- They assume the ground is stable, and that if a building is high enough, it will be protected from damage. This



The minimum national standards for building in a floodplain call for elevating a building above flood levels, but ignore the threat of coastal erosion that can undercut the foundation. Photo by Berry Williams.

is not the case in areas subject to erosion or mudslides.

- There are no accepted national flood loss reduction standards for levees.
- While standards for dam safety are good as they relate to the protection level of the dam from failure or overtopping, there is a continued problem of increasing development downstream, necessitating a dam to be retrofitted to a higher protection standard.
- There are no commonly-applied flood loss reduction standards for infrastructure and critical facilities, such as wastewater treatment plants and emergency operations centers.
- Sedimentation, erosion, channel migration, ice jams in rivers, and coastal erosion, often cause flood hazards that are not adequately reflected in the NFIP's Flood Insurance Rate Maps.
- In areas subject to subsidence, floodplain maps lose their accuracy when the ground settles over the years.
- NFIP regulatory standards may not work adjacent to lakes where water levels may remain high for months or years.

For these reasons, relying on minimum national standards will not reduce flood losses or even stop the increases in flood losses.

continued on page 11

Links:

Mitigation How-to Guide: www.floods.org/NoAdverseImpact/NAI_How-to-Guide_Mitigation.pdf
Infrastructure How-to Guide: www.floods.org/NoAdverseImpact/NAI_How-to-Guide_Infrastructure.pdf
No Adverse Impact Toolkit: www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

The NAI Approach to Floodplain Management, cont.

FLOOD LOSSES IN THE NATION

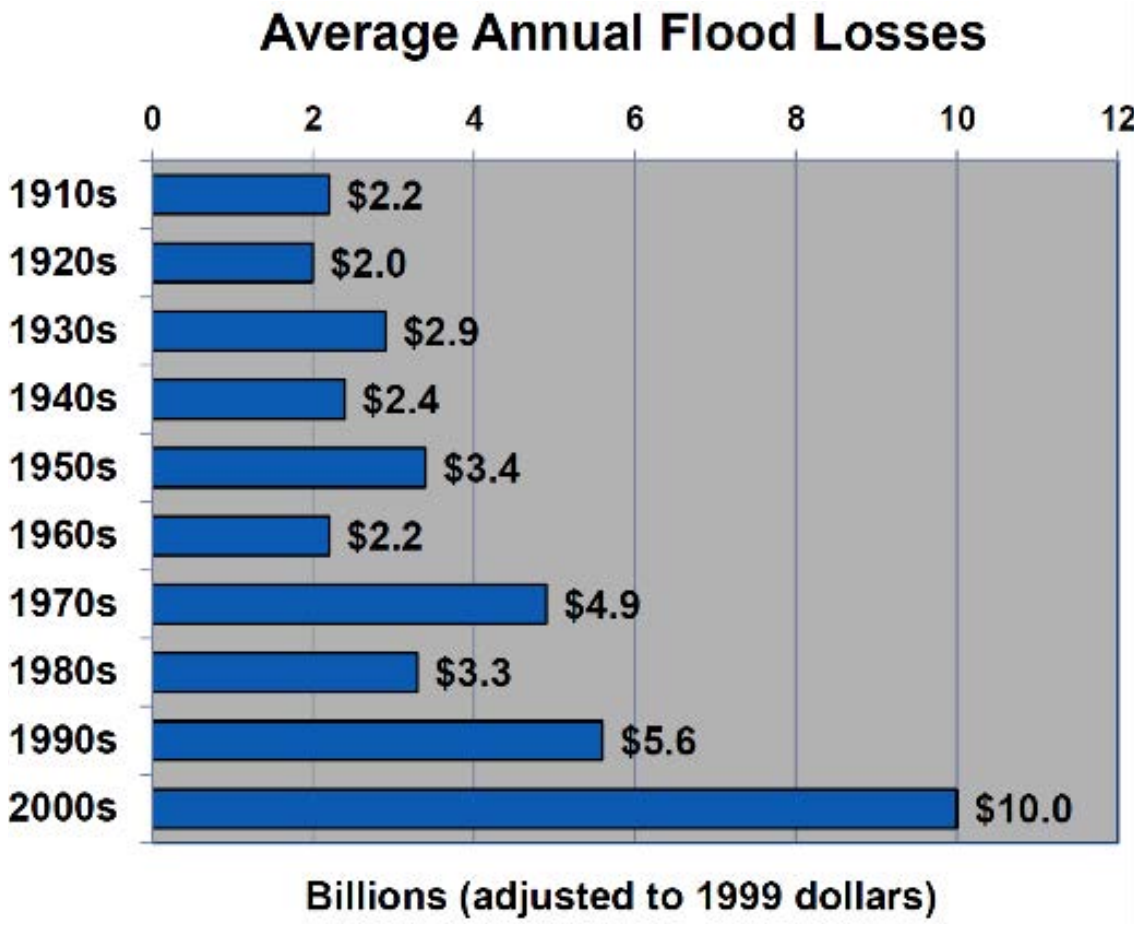
Local flood losses add up to very large numbers at the national level, and those numbers are getting bigger. Since the early 1900s, the nation's flood losses have increased five-fold. Since 2000, that figure has averaged $10 billion annually. Hurricanes Katrina and Sandy occurred within seven years of each other. They were the two largest flood-related disasters in U.S. history and together caused more than $200 billion in direct losses (see the graph on page 12).

This continued pattern of destruction has persisted despite the investment of billions of dollars in structural flood control projects during the last 100 years, as well as the development of many other flood protection measures. Yet, even in the face of increasing flood losses, development continues in high risk locations. For example, it is predicted that the U.S. population near the water will increase by 50 million more people by 2050 – putting more people and property in harm's way. The federal government's programs are not curbing the increases in flood losses as floodprone areas keep developing at what many believe to be an alarming rate. Consider the following:

Comic created by Rob Pudim, and appeared in Natural Hazards Observer, May 2014.

- Funding for flood protection programs, especially structural flood control projects, has declined over recent years.
- Tax incentives and funding for disaster assistance have encouraged, and often subsidized, floodplain occupancy and development and reduced local and individual accountability for flood losses.
- The NFIP's national standards for managing floodplain development have not changed in more than 20 years and are assumed by many communities to be adequate for their floodplain management program, without regard to implementing other or higher standards that would address the hazard(s) they face.

The NAI Approach to Floodplain Management, cont.



Jeff Stone with ASFPM's Science Services Dept. created the graph above. Source: Flood Loss Data, National Weather Service, Hydrologic Information Center (www.nws.noaa.gov/hic/).

Further Information: Flood Damage in the United States 1926-2003 A Reanalysis of National Weather Service Estimates (www.flooddamagedata.org/).

The No Adverse Impact Approach

NAI floodplain management is a principle that is easy to communicate and, from legal and policy perspectives, tough to challenge. In essence, ***No Adverse Impact floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners.*** The adverse effects or impacts of unwise community development decisions can be measured by increased flood peaks, increased flood stages, increased flood volumes, higher flood velocities, increased erosion and sedimentation, deterioration of natural floodplain functions, or other impacts to a community's well-being.

NAI philosophy can shape a community's floodplain management approach if the community:

- Identifies acceptable levels of impact;
- Specifies appropriate measures to mitigate adverse impacts; and
- Establishes a plan for implementation of multiple tools to reduce or eliminate those impacts.

> "…insisting that landowners internalize the negative externalities of their conduct is a hallmark of responsible land-use policy…" – Justice Samuel A. Alito Jr., in the majority opinion for the Supreme Court's ruling in Koontz v. St. Johns River Water Management, 133 S. Ct. 2586 (2013). The Koontz case is very important to floodplain management. For more information on it, see www.americanbar.org/content/dam/aba/administrative/state_local_government/land_use.authcheckdam.pdf

continued on page 14

The No Adverse Impact Approach, cont.

THE COMMUNITY'S ROLE

NAI principles give communities a way to promote *responsible* development measures through community-based decision making. Under NAI floodplain management, communities identify potential impacts of new development proposals, and implement actions to mitigate those adverse impacts before they occur.

A community's approach could be specific to flood damage or encompass related objectives, such as water quality protection, groundwater recharge, and protection of wetlands and riparian zones. NAI criteria can be extended to entire watersheds to support regional stormwater management methods to mitigate the adverse impacts caused by increased runoff from urban areas.
At the community level, the NAI floodplain management approach and implementation plan should be comprehensive and address all the NAI building blocks:

- Hazard identification and floodplain mapping
- Education and outreach
- Planning
- Development standards and regulations
- Mitigation
- Infrastructure
- Emergency services

NAI ADVANTAGES:

Local empowerment: The NAI approach removes the impression that floodplain management is something imposed by federal or state government. Communities become accountable and accept responsibility for what happens. It also encourages development of a better informed public and a constituency for wise development.

More effective programs and projects: Floodplain management programs and flood mitigation projects are better tailored to local needs and conditions with the NAI approach. Communities are able to better utilize federal and state programs to support their own local initiatives.

Lower long-term costs: Over time, the NAI approach will reduce local government expenditures. For example: a mitigation project that relocates buildings out of a floodprone area not only can result in a community open space amenity, but in less maintenance of roads and public utilities, less risk to first responders who must conduct search and rescue operations when it floods, and lower disaster recovery costs.

Improved partnerships: Informed local officials can make the right decisions about protecting their community. Economic development organizations, transportation and public works departments, and local utilities do better when they work with planners and floodplain managers to implement an NAI based approach. This is especially true when everyone realizes that they have a role and a responsibility to address their own flood problems. Once people agree that flooding is a local problem and their department is affected, they are more willing to work together and share the workload.

continued on page 15

The No Adverse Impact Approach, cont.

Source: Natural Hazards Informer, July 1999, Natural Hazards Center, University of Colorado.

Reduced liability: NAI doesn't take away property rights – it protects them by preventing one person from harming another's property. One of the most important options a government typically has for reducing liability for flood losses is the prevention of increasing flood levels and erosion hazards due to government actions (or inaction). To do this, governments can adopt NAI standards for private development (through its regulations) and public infrastructure (through its design standards).

Meet community needs. NAI floodplain management is about communities being proactive toward understanding potential impacts and implementing preventive measures and mitigation activities. The NAI concept offers communities a framework to design programs and standards that meet their true needs, not just the minimum requirements of a federal or state governmental agency.

Greener floodplain: Flooding is a natural phenomenon and one goal of NAI floodplain management is to preserve and protect natural floodplain functions in addition to protecting buildings and infrastructure. An NAI emphasis will result in protection of natural buffers and environmentally sensitive areas, improvement in the biological, ecological and geomorphologic functions of riverine and coastal areas, improved water quality, more open spaces, protected fish and wildlife

The No Adverse Impact Approach, cont.

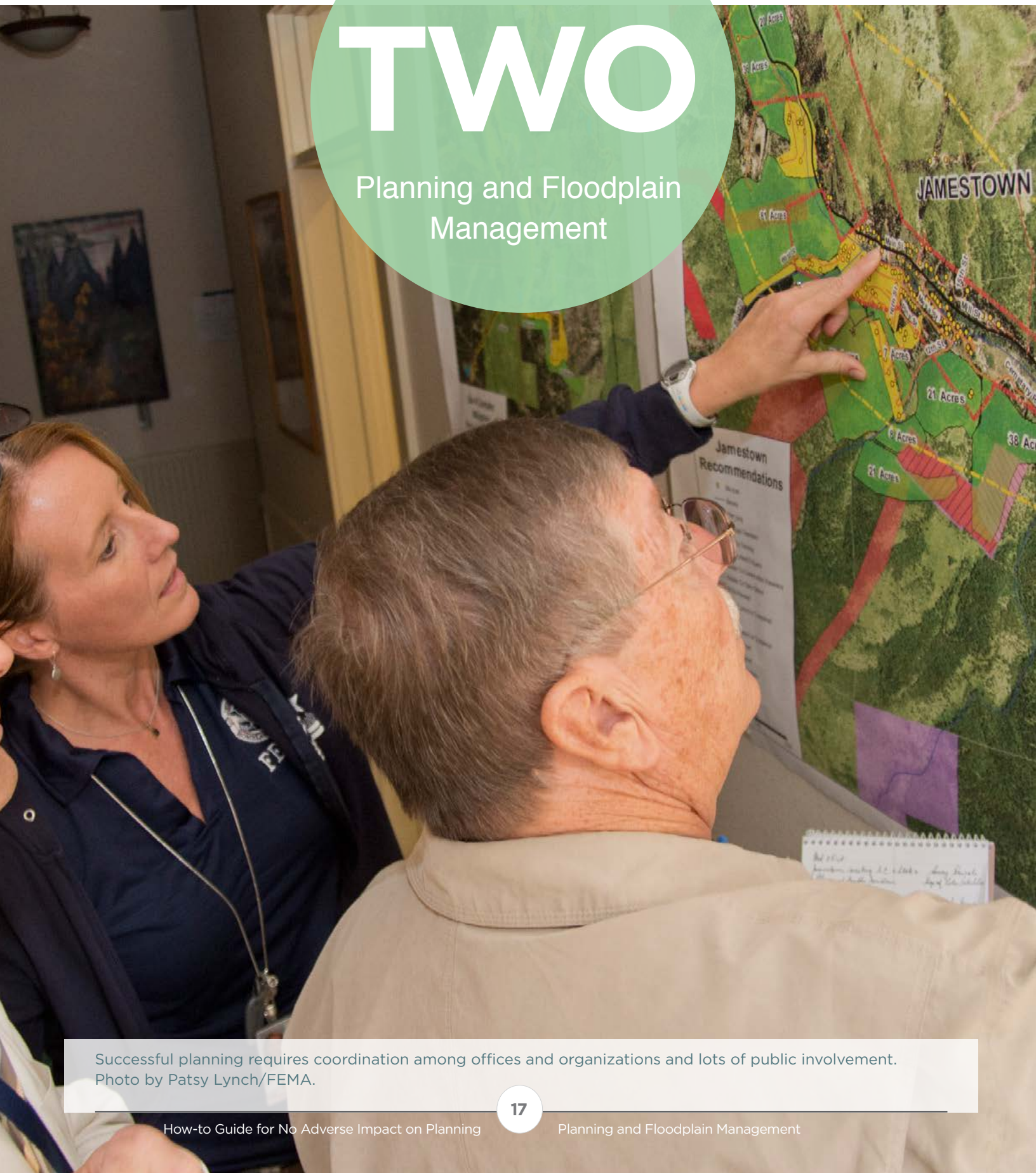
habitat, and similar benefits that come with maintaining an environmentally sustainable ecosystem.

CRS credits: By continually seeking to meet local needs, a community will implement programs and projects that are above and beyond the minimum requirements of the NFIP. Such activities are encouraged by the NFIP because they do a more effective job of preventing and reducing flood losses. This encouragement is accomplished through the CRS, which provides reduced flood insurance premiums in communities that implement NAI floodplain management activities.

On the whole, the NAI approach has many benefits at the local and national levels. With these benefits in mind, the remainder of this *Guide* explores how to take advantage of the NAI approach in a community's planning programs.

SECTION TWO

Planning and Floodplain Management



Successful planning requires coordination among offices and organizations and lots of public involvement. Photo by Patsy Lynch/FEMA.

Planning and Floodplain Management

> "Make no little plans. They have no magic to stir men's blood and probably will not themselves be realized." This was the advice of Daniel Burnham, author of the 1909 "Plan of Chicago," the first comprehensive plan for a city in the US. While Burnham's plan would be called "aiming high," the results today are a lakefront with beautiful parks and few structures subject to flood damage.

Historically, most people viewed flood control as the answer to a flood problem – if the river floods your property, you "fix" the river. By the mid-1900s, people were realizing that flood control was expensive, environmentally disruptive, and did not always fix the problem. Problems were even worse when floods exceeded flood-control-project design levels and inundated buildings and infrastructure that had been built with no protection measures. Floodplain management rose as a profession to look at alternative approaches to flooding and flood problems.

Floodplain management and the NAI approach call for a review of all alternatives to prevent or reduce flood problems and protect natural floodplain functions. That is the essence of planning. The opposite of planning is making quick decisions without reviewing the facts, implications, and all possible options. Problems can be expected to arise

Types of Plans

when such quick decisions are made.

"Planning" is also a profession and, in many communities, a planning office has specific responsibilities related to development in a community. This Guide addresses the tools used by those offices as they are typically implemented by professional planners.

This Guide does not intend to tell planners how to do their jobs. Its objective is to advise planners how they can help their communities become more resilient and sustainable using NAI approaches, and to advise floodplain managers how the planning tools can help their work.

There are many types of plans that a community can prepare and implement. Some are required by state laws, but most are locally initiated. The main types of plans include:

Comprehensive plans: These are intended to set the tone for the future of a community. They cover many aspects of the community, such as housing and land use, but they may not address any one aspect in depth. They are typically prepared by the community's planning staff or planning consultants.

Some plans are often prepared after a comprehensive plan has been adopted, and are designed to follow through on the comprehensive plan's recommendations and to be integrated with each other. They can include:

Area plans: These are more detailed plans for specific areas, such as a neighborhood, the community's downtown, or a repeatedly flooded area. A plan for an area with a flood problem is more likely to have more flood-related aspects than a comprehensive plan. These are usually prepared by the planning office, but often with a lot of input from residents and businesses in the affected area and other departments.

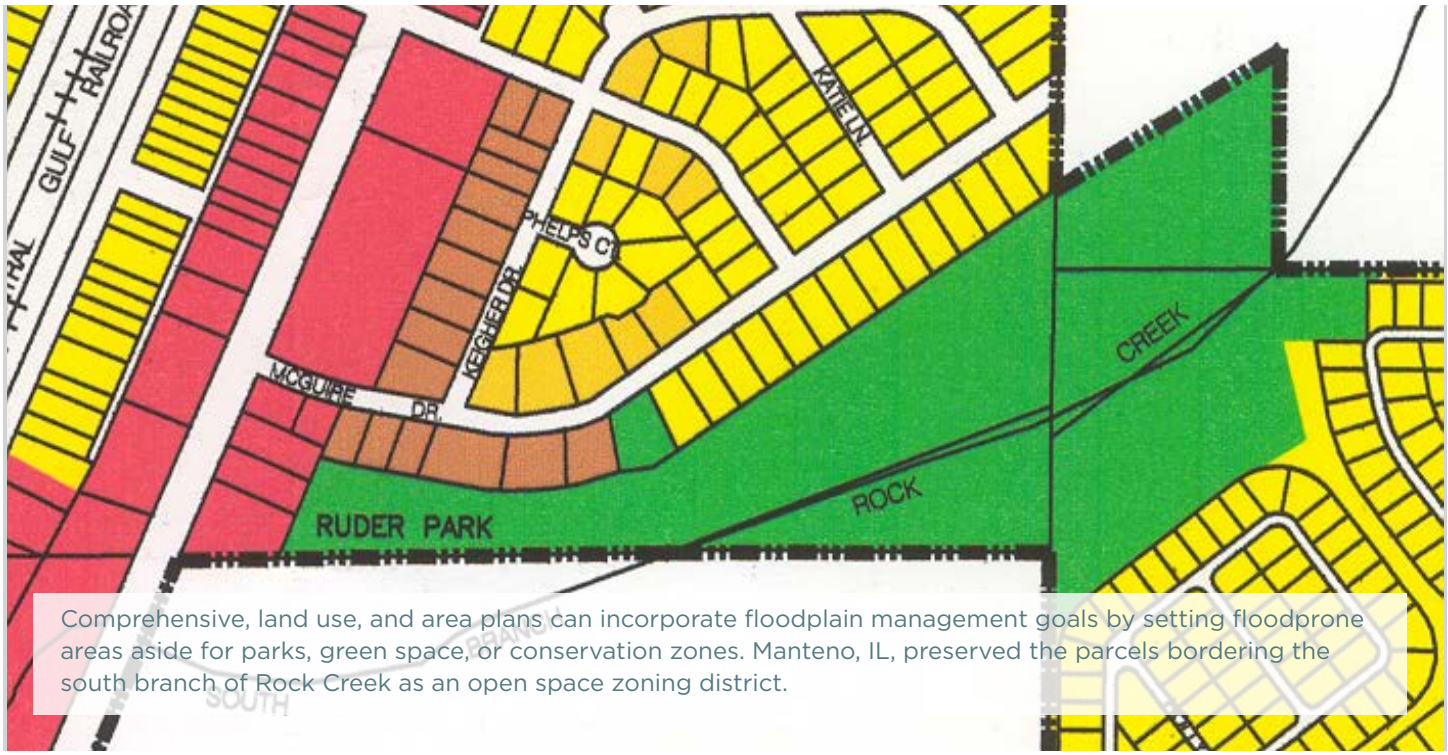
Functional plans: These plans address factors such as transportation, drainage, flood control, or capital improvements. Many of these may be prepared by departments other than planning, such as public works or engineering, or in cooperation with the planning office.

Operational plans: These include emergency operations and other plans that guide how community offices implement their assigned duties. More often than not, they are prepared by the offices responsible for the subject operations and not by the planning department.

Regional plans: Communities often participate in county-wide or multi-county plans that set regional patterns for development or regional policies for programs. Many local plans are implemented or revised to reflect these regional directions.

With the advent of FEMA and growing interest at the state and federal level in reducing disaster costs, two other types of plans have become important to floodplain managers:

Types of Plans, cont.



Comprehensive, land use, and area plans can incorporate floodplain management goals by setting floodprone areas aside for parks, green space, or conservation zones. Manteno, IL, preserved the parcels bordering the south branch of Rock Creek as an open space zoning district.

Hazard mitigation plans: These are intended to review the hazards facing a community and recommend long-term actions to reduce threats to safety, health, and property. For our purposes, there are two types of mitigation plans: multi-hazard mitigation plans and floodplain management plans. Many have not been prepared by the traditional planning department, but have addressed flooding in greater depth and are more likely to include emergency managers and floodplain managers in their development. They can and should be incorporated into later plans, as noted in the Kings County, example on p. 76.

Post-disaster plans: This type of plan guides a community through reconstruction and recovery after a disaster, a time when there could be many opportunities to reduce the affected areas' exposure to future damage. For the purposes of this *Guide*, there are two types of post-disaster plans: those prepared before the disaster and those prepared right after.

Regulations and development standards: There are other tools and activities to implement comprehensive and other types of plans. These are often administered by planning departments, so they are often considered part of the "big picture" of planning. They include zoning, subdivision regulations, setback rules, transfer of development rights, and building codes, to name a few. These tools are not included in this *Guide* because a separate NAI How-to Guide is being prepared for them.

Common Strands: While prepared for different purposes, all of the above types of plans have a common planning process:

continued on page 21

- Information and data related to the purpose of the plan are collected and analyzed;
- The problem or situation to be addressed is described;
- Goals and/or objectives are itemized to guide what should be done (see the Kings County, CA, example on p. 76);
- Alternatives are reviewed;
- Recommendations are made;
- The document and its recommendations are officially adopted;
- Implementation is monitored; and
- Revisions are made as warranted and as conditions change.

Anything prepared according to this process can be considered a "plan," and the results will be better than reacting quickly without such a rigorous decision-making process. However, some plans are better than others. Some devote more time and resources to these steps, while others take advantage of some NAI factors that span all types of plans. These factors are discussed in Section Two.

This *Guide* addresses three types of plans:

1. The **comprehensive plan** and its traditional implementation tools, such as area plans. As noted previously, these traditionally involve professional planners. The focus of this *Guide* is how planners can better incorporate floodplain management and NAI goals.
2. **Hazard mitigation plans**, which are traditionally managed by emergency and floodplain managers (and some planners). This *Guide* reviews how they can better incorporate good planning practices and NAI goals.
3. **Post-disaster plans** are relatively new on the scene and involve planners and emergency and floodplain professionals. This *Guide* reviews lessons learned from recent initiatives and how the NAI approach can help these plans.

> "Planners are the professionals who help ensure that decisions are rational and that all the alternatives and repercussions are considered. They provide the decision makers with the background facts, a problem description, alternative solutions, and recommendations."
> – from "Flooding and Planners," in Environment & Development, American Planning Association, July/August 1996.

While these are listed as separate plans, one added common strand is that they are all related and should be coordinated. A comprehensive plan may recommend that a more detailed hazard mitigation plan should be prepared or updated. The hazard mitigation plan may recommend changes to the comprehensive plan. As seen in the case studies, effective community planning efforts do not stop with just one plan document, as the Kings County, CA, and Tulsa, OK examples show on pp. 76-77.

Eight Factors for Effective Planning

The following factors are designed to make the traditional planning processes more effective and more likely to:

- Address the true, current, and long-term flood hazards facing a community;
- Include No Adverse Impact recommendations; and
- Produce a plan that will have its recommendations implemented.

As noted, the case studies later in the *Guide* show how local officials succeeded by taking advantage of these factors.

1. **Use the best available science:** This is described in more detail in the section on Tool 4. Risk Assessment, p. 44.

   Good examples of the use of best available science are found in the Charlotte/Mecklenburg, and Conway case studies on pp. 79 and 69, respectively.

2. **Future oriented:** Too often, a plan is designed to address the most recent flood. Many plans are designed to cover the next 5–10 years, although comprehensive plans may address the next 20–30 years. However, buildings are expected to last decades. The plan needs to describe how flooding is affected by changes over time in the floodplain and watershed, and what the community wants for its future. An NAI plan considers what is going to happen well into the future.

   Charlotte/Mecklenburg, (p. 79) based its floodplain management efforts on expected future development, while Hillsborough County, and Lewes, (pp. 64 and 60) developed plans to prepare their communities for future flooding conditions.

3. **Involve the public:** People who are involved in a plan's preparation are likely to push for implementation of the plan's recommendations. There is also an educational benefit as participants will better understand the NAI concepts. They realize they may be part of the problem, but that they also can be part of the solution.

   Most of the case studies were successful in part because of the level of public involvement. The Charlotte/Mecklenburg, Contra Costa County, and Davenport cases (pp. 79, 74, and 55) show how the public was vital in determining the direction of their plans.

4. **Coordinate and collaborate with others:** This has several benefits. Other organizations, communities, and agencies can help the planning effort

Eight Factors for Effective Planning, cont.

with data and knowledge of alternatives. They will support aspects that are aligned with their own needs and goals. And, they can implement or help to implement the recommendations.

As with public involvement, coordination paid off in most of the case studies, but was very important in Contra Costa County, Kings County, and Tulsa (pp. 74, 76, and 77).

5. **Review all alternatives:** While this looks like a basic tenet of planning, there is still a tendency for those involved to favor the alternatives they are most familiar with. Another unfortunate tendency is to dwell on measures that are funded by a grant. NAI planning takes discipline to fully and fairly review more than one option in order to determine the best option(s) for the community.

   The Contra Costa County and Davenport studies (pp. 74 and 55) show a conscientious review of a variety of alternatives with the resulting plans' recommendations varying from what was originally expected.

6. **Develop feasible recommendations:** The recommendations need to be affordable and within the capabilities of community staff to administer. They also need to be politically acceptable, or at least worded in politically-acceptable terms. If the resources are not there to implement what needs to be done, the plan should identify where the resources would come from, such as a grant, a new stormwater utility fee, or a cooperative effort with other communities.

   Arnold and Conway (pp. 78 and 69) are two good examples of recommendations that were keyed to local interests and available resources, and that resulted in converting developed floodprone areas into open space.

7. **Aim high:** This factor may look like it runs counter to the previous one. But a true NAI approach is to think beyond the usual solutions or the traditional 1 percent chance flood. "Move the town out of the floodplain" may sound infeasible, but it can be the best solution and it has been done.

   Charlotte/Mecklenburg and Kings County (pp. 79 and 76) set a very high standard of prohibiting floodplain development and succeeded.

8. **Evaluate implementation:** No plan is worth much if it sits on the shelf. The reason a plan is prepared is to change things and

Link: FEMA's National Disaster Recovery Framework: www.fema.gov/media-library/assets/documents/24647

Eight Factors for Effective Planning, cont.

that requires implementation. Just as important is monitoring implementation and revising the plan as warranted and as conditions change. This can be especially effective when those responsible for implementation are on the planning committee (they supported the initial recommendations) and the planning committee is responsible for monitoring implementation.

Davenport (p. 55) periodically prepared updated plans for its riverfront to make sure its policies and projects reflected local needs and desires that can change over time. Hillsborough County (p. 64) has advisory committees who monitor the projects and meet periodically to keep its Post-Disaster Redevelopment Plan current and realistic.

SECTION THREE

Planning Tools

There are many tools in the NAI Toolkit, and this *Guide* does not pretend to cover them all. Instead, five tools are described that illustrate a broad range of possible tools communities can utilize. They show how the factors for effective planning can help communities prevent and reduce flood problems and protect natural floodplain functions.

The table on the next page shows which case studies and community examples illustrate the tools described in this section. It also identifies which "Factors for Effective Planning" are illustrated in each example.

Paragraphs with the CRS logo describe how using these tools can receive credit under the CRS.

continued on page 26

Planning Tools, cont.

Community Examples of the Planning Tools and Eight Planning Factors	Arnold, MO	Charlotte - Mecklenburg County, NC	Contra Costa County, CA	Conway, SC	Davenport, IA	Hillsborough County, FL	Kings County, CA	Lewes, DE	Tulsa, OK
Page number	78	79	74	69	55	64	76	60	77
Planning Tools									
1. Comprehensive planning					X		X	X	
2. Hazard mitigation planning	X						X	X	X
3. Post-disaster planning	X			X		X			
4. Risk Assessment		X		X				X	
5. Public involvement		X	X	X	X	X		X	
Factors for Effective Planning									
1. Use the best available science		X		X				X	
2. Be future oriented		X				X		X	
3. Involve the public		X	X	X	X	X		X	
4. Coordinate with others		X	X			X	X		X
5. Review all the alternatives			X	X	X				
6. Develop feasible recommendations	X			X		X		X	
7. Aim high	X	X		X			X		
8. Evaluate implementation					X	X		X	

Tool 1: Comprehensive Planning

In most communities, planning activities revolve around the comprehensive plan for legal and practical purposes. That document is generally broad in scope, but it sets the stage for other plans, regulations, policies, and programs that implement the comprehensive plan's goals. As noted previously, other plans, such as area and functional plans, are often prepared as part of the comprehensive planning process. They are designed to follow through on the comprehensive plan's recommendations and often recommend actions that need to be incorporated into the next comprehensive plan update.

This section does not discuss how to prepare a comprehensive, area, or functional plan. There are many guides and college courses on how to do that. This section does identify how planners and floodplain managers can use the comprehensive planning process to further NAI objectives.

HOW-TO: INTEGRATE NAI IN THE COMPREHENSIVE PLANNING PROCESS

STEP 1. INVENTORY THE PLANS.

The place to start is with the current comprehensive plan. It usually has different sections for different aspects of the community, such as land use, transportation, economic development, and public facilities. It is likely some of these sections already have NAI aspects. Check them out. You might find:

continued on page 28

Tool 1: Comprehensive Planning, cont.

- The land use element identifies desired future uses for different areas of the community, such as high-density residential, industrial, or agriculture. An NAI plan would reserve the undeveloped parts of the floodplain for uses compatible with the flood hazard, like parks and open space;
- The housing element may call for improving housing conditions. This supports measures that protect houses from flood damage, such as removing them from harm's way;
- The conservation or natural resources element may call for protecting wetlands, critical areas, coastal zones, riparian areas, and other natural floodplain functions; or
- The recreation or parks element probably recommends preserving or expanding open space in or near waterfront areas.

A similar review should be conducted of other plans, such as a plan for a downtown area that is in the floodplain or the capital improvements plan that proposes extensions or improvements to roads into hazardous areas. Some plans will support NAI, and some will hinder it.

Your inventory should identify plans or sections of plans that:

- Recommend NAI-type actions, such as keeping the floodplain free from development, or expanding open space in the floodplain;
- Recommend the opposite of NAI-type actions, such as higher density development in the floodplain; or
- Make no mention of floodplain issues, but should or could incorporate NAI-type actions.

STEP 2. TALK TO EACH OTHER.

The number one concern voiced about the planning process is that so many plans neglect flooding and other hazards. After you become familiar with the various plans that could affect your NAI goals, ask for a meeting where those responsible for the various plans can sit down and talk with the floodplain and emergency managers.

- Discuss how the plans you reviewed do or do not recognize the community's flood hazards and what is happening to natural floodplain functions.
- Explain the NAI approach and how it can help their efforts.
- Show the overlaps between their work and yours.
- Point out any inconsistencies: For example, do some plans address flooding and floodplain development and others neglect the subject? Do some recommend something counter to sound floodplain management?

Tool 1: Comprehensive Planning, cont.

- Ask if they are using the best available science. Do you have better data for them?
- Find out when the plans are scheduled for updates and if any new plans are in the works.
- Ask to be involved in the updates and new plans the other offices may be working on.
- Show them where you can help.
- Agree to coordinate and keep each other posted.

STEP 3. ROUND UP ALLIES.

There will be others concerned about how the plans affect their programs and interests. They may want to see NAI-type recommendations or changes similar to what you would like to see. Following are some people and organizations that might support your concerns or might participate the next time a plan or update is tackled:

- Owners and renters of floodprone properties, businesses, or facilities;
- Homeowner or neighborhood organizations (especially those representing floodprone properties);
- "Friends of the _____ River," environmental groups, and similar organizations;
- Sports and sports-related organizations, like Ducks Unlimited;
- Conservation groups such as land trusts and people interested in farmland preservation (the Contra Costa County planning story on p. 74 is a good example);
- Public safety and emergency management staff who risk their lives during floods;
- Land developers, real estate agents, lenders, and others who could affect the future of the floodplain and watershed lands;
- Farmers and those concerned with preserving agricultural land (Kings County used these allies to prohibit development of floodplain farmland (p. 76); or
- Community offices with floodplain property, such as the building, public works, or parks departments.

This is not intended to be a confrontational or adversarial arrangement. Rounding up allies would bring in other players likely to share NAI concerns and would get their constituencies in support of plans that have NAI goals. See also the section on public involvement on p. 50 and the success story where allies worked together in Contra Costa County (p. 74).

STEP 4. GET INVOLVED.

Stay posted on the schedules for new plans and updates. Keep yourself and allies informed. Participate and help out when a relevant plan is being updated. With a supportive, constructive, approach that is coordinated with other interests, you can get the comprehensive and other plans to incorporate NAI objectives.

continued on page 30

Tool 1: Comprehensive Planning, cont.

STEP 5. TAKE ADVANTAGE OF OPPORTUNITIES.

By staying involved and keeping tabs on planning progress, you will know how to take advantage of opportunities that may arise. These could be new resources or new requirements to prepare or revise a plan. Here are some examples:

- A flood is always an opportunity to highlight where changes are needed;
- Preparing or updating the community's hazard mitigation plan should always be considered after a flood or other disaster;
- Know the requirements for updates, such as state laws or the five-year update required for FEMA approved hazard mitigation plans;
- Take advantage of grants that may be announced; and
- Use CRS as leverage to encourage preparing or updating a plan (Arnold, MO, did this, as explained on p. 78).

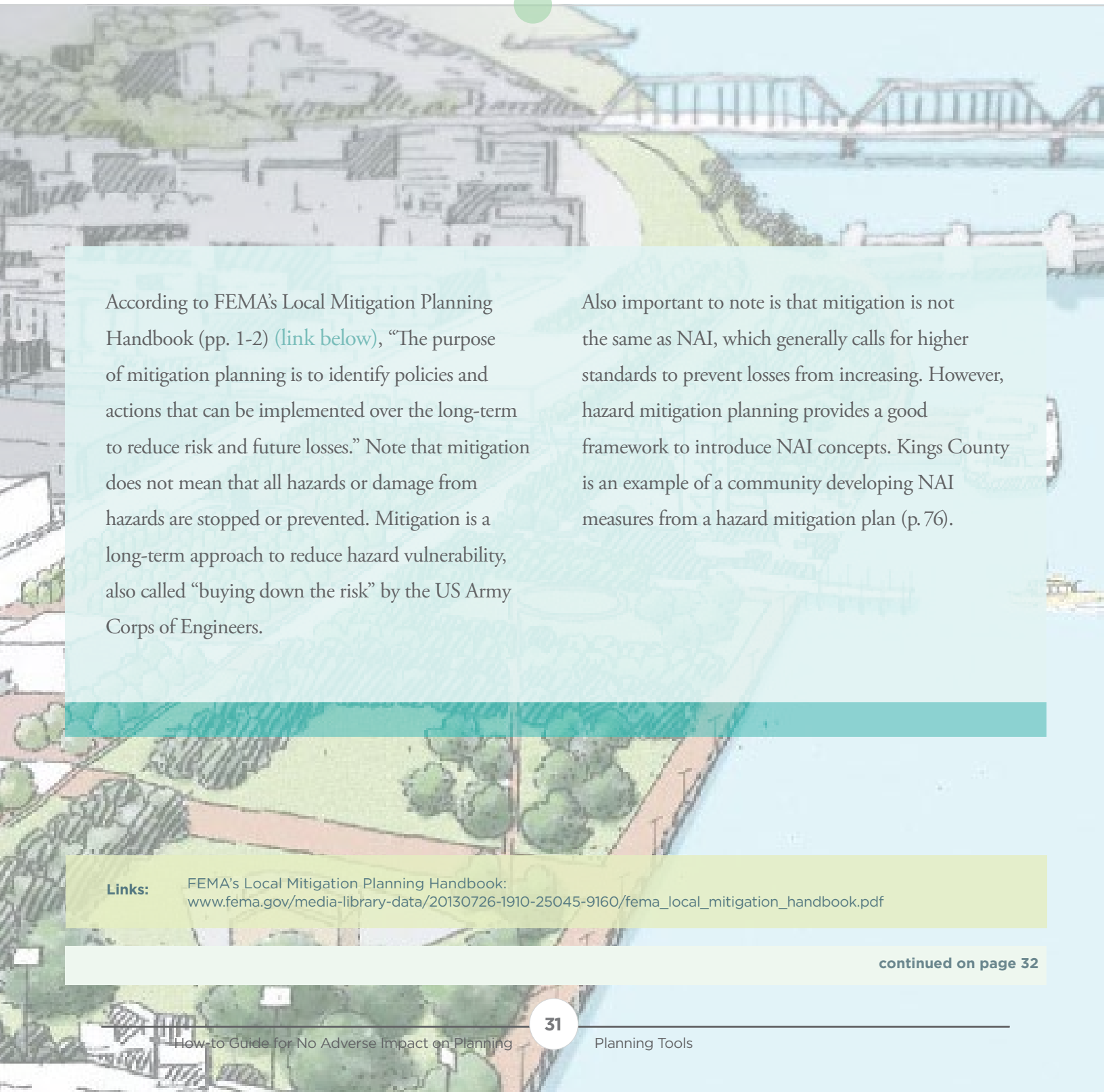
The end result of following these steps would eventually be a comprehensive plan and related plans that include your input, and hopefully, recommend NAI policies or projects. The key is to work with others. It may not be obvious at first, but there are many ways different groups can see NAI activities as forwarding their objectives, too.

NFIP/CRS

There is no separate CRS credit for a comprehensive plan, but there is for several types of plans that may come out of the comprehensive planning process, such as:

- A hazard mitigation plan (CRS Activity 510-Floodplain Management Planning);
- A land use plan that recommends open space or low-density development of floodprone areas (Activity 420-Open Space Preservation);
- A plan that addresses the floodplain's natural functions (Activity 510-Floodplain Management Planning);
- A plan that establishes post-disaster redevelopment and mitigation policies and procedures (Activity 510-Floodplain Management Planning); and
- An emergency operations plan that includes flood warning and response measures (Activities 610-Flood Warning and Response, and 620-Levees, and 630-Dams).

Tool 2: Hazard Mitigation Planning



According to FEMA's Local Mitigation Planning Handbook (pp. 1-2) (link below), "The purpose of mitigation planning is to identify policies and actions that can be implemented over the long-term to reduce risk and future losses." Note that mitigation does not mean that all hazards or damage from hazards are stopped or prevented. Mitigation is a long-term approach to reduce hazard vulnerability, also called "buying down the risk" by the US Army Corps of Engineers.

Also important to note is that mitigation is not the same as NAI, which generally calls for higher standards to prevent losses from increasing. However, hazard mitigation planning provides a good framework to introduce NAI concepts. Kings County is an example of a community developing NAI measures from a hazard mitigation plan (p. 76).

Links: FEMA's Local Mitigation Planning Handbook:
www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf

continued on page 32

Tool 2: Hazard Mitigation Planning, cont.

COMMON CONCERNS

Mitigation planning has traditionally been oriented around FEMA program criteria. Multi-hazard mitigation plans have been prepared to qualify for FEMA mitigation grants since the Disaster Mitigation Act was enacted in 2000. Floodplain management plans have been prepared in accordance with the CRS credit criteria that have been in effect since 1990. More and more CRS credited plans also qualify as multi-hazard plans and vice versa, but the criteria for the two programs are different.

There has been concern that mitigation plans are not as effective as they could be. FEMA and the American Planning Association have worked to improve mitigation plans. Both have produced some of the references listed at the end of this *Guide* on topics such as how to better integrate mitigation plans into comprehensive planning.

Here are the shortcomings that have drawn concern:

1. Mitigation plans prepared solely for FEMA programs have these issues:

- Many mitigation planning staff follow FEMA criteria closely and worry more about state and FEMA acceptance than whether the plan has the best fit with local conditions;
- The driving force is to qualify for FEMA acceptance or CRS credits rather than a concern to protect the community;
- Many of the multi-hazard plans' recommendations focus on projects that would be funded by a FEMA mitigation grant, which is sometimes needed to get approval of the plan. Alternative projects and activities, such as land use policies, public information programs, or ordinance revisions, are not often mentioned.

2. Most multi-hazard mitigation plans are prepared under the direction of emergency managers. "When planners are not part of the process of preparing the local hazard mitigation plan, a serious disconnection occurs, reducing the likelihood of successful implementation," according to Hazard Mitigation: Integrating Best Practices into Planning (p. 134) (link below).

3. The public may not be involved to a degree needed to gain understanding of the problems and support for the plan's recommendations.

4. A large amount of attention is spent on defining the problem and the community's vulnerability to damage, compared to reviewing the alternative projects and activities that could reduce that vulnerability.

5. Flood hazard sections focus on the FEMA-mapped 1 percent chance floodplain, historical floods, and repetitive losses rather than future conditions, impacts of larger floods, or the benefits of mitigating smaller, more frequent floods.

continued on page 33

Link: Hazard Mitigation: Integrating Best Practices into Planning: www.fema.gov/media-library-data/20130726-1739-25045-4373/pas_560_final.pdf

Tool 2: Hazard Mitigation Planning, cont.

6. Mitigation plans are not coordinated with, or incorporated into, other plans, missing opportunities for others to implement hazard mitigation or NAI recommendations.

7. Many mitigation plans are multi-jurisdictional plans, prepared at the county level. As such, they may not devote a lot of attention to each city's concerns and programs or account for their resources and capabilities.

There are certainly exceptions to these issues, as seen in the case studies in this *Guide*. Further, these shortcomings do not prevent a plan from recommending NAI activities.

HOW-TO: INTEGRATE NAI INTO MITIGATION PLANNING

There are several step-by-step guides on how to prepare a mitigation plan listed in the reference section. The multi-hazard mitigation planning guidance has four phases, while the CRS guidance follows 10 steps. Multi-hazard mitigation planning has been described as a "pass/fail" system, while CRS plans "get a grade." Multi-hazard plans are either accepted or rejected by FEMA, while a CRS plan can receive from 20 to 382 points. In most cases, a plan accepted by one program will be accepted by the other, but both have enough of their own criteria that acceptance is not guaranteed.

This how-to section follows the 10 CRS steps specified in Activity 510 of the *CRS Coordinator's Manual*, which is a good guide for developing a mitigation plan. Special attention is given where the planning process can overcome the issues listed above by utilizing an NAI approach and produces a product more likely to recommend NAI measures.

STEP 1. ORGANIZE.

The plan should be prepared under the guidance of a committee of community offices with specific involvement of the planning office. They can each help with their perspective on flooding and alternative solutions, and they will likely be responsible for most of the plan's recommendations.

STEP 2. INVOLVE THE PUBLIC.

This step is so important that public involvement is one of the five tools featured in this *Guide*. The committee of community offices should be augmented by stakeholders and other members of the public. Public meetings and other involvement efforts that would be effective are covered in more detail in the *NAI How-to Guide* on education and outreach.

STEP 3. COORDINATE.

The planners need to review existing studies, reports, and technical information, as well as the community's needs, goals, and plans. They should also contact as many other agencies and organizations as possible to gather their input.

STEP 4. ASSESS THE HAZARD.

This is also the subject of one of the five tools in this *Guide* and more information is provided on p. 44. An NAI hazard assessment goes beyond the FEMA-mapped Special Flood Hazard Area, considers what could

continued on page 34

happen in the future, and addresses other flood-related hazards, such as dam failure, erosion, and mudslides.

STEP 5. ASSESS THE PROBLEM.

This should be a review of all impacts of the hazards described in Step 4 on people and property. Again, future conditions, such as new development and redevelopment, changes in climate, and factors such as sea level rise, need to be considered. Hazus can help with this, as shown on pp. 48-49.

STEP 6. SET GOALS.

The goals should address all flood-related problems identified in Step 5. While the plan should be realistic, NAI goals would "aim high" and consider truly effective targets, such as "prevent any new development from increasing flooding or adversely impacting natural floodplain functions."

STEP 7. REVIEW POSSIBLE ACTIVITIES.

Ensure a review of a wide range of alternatives. Flooding issues are not solved by a single action or measure. An NAI-based mitigation plan includes a robust consideration of actions under the following mitigation categories.

- Preventive measures
- Property protection (e.g., elevation, insurance)
- Natural resource protection
- Emergency services
- Structural flood control projects
- Public information

Most multi-hazard mitigation plans do not include Step 7. Under 2013 CRS Coordinator's Manual, this will cap their credit at 50 of the possible 382 points.

STEP 8. DRAFT AN ACTION PLAN.

Building on effective planning factors, the alternatives selected should be future oriented, include other agencies and organizations, be feasible, and appropriate for the goals set in Step 6. Appropriate measures are put into action item format (such as what will be done, by whom, and the deadlines), to facilitate implementation, monitoring, and evaluation of progress.

STEP 9. ADOPT THE PLAN.

The community's governing body must adopt the plan to ensure that staff support and resources will be provided to implement it.

STEP 10. IMPLEMENT, EVALUATE, AND REVISE.

Periodic evaluations of plan implementation progress is highly recommended (annual evaluation reports are required for CRS credit and all FEMA plans must be updated every five years).

Not all the action items produced by this process will be NAI measures. However, they are more likely to result in NAI measures because of public involvement (Step 2), a full review of the hazard(s) (Step 4), their impact on people, property, and natural floodplain functions (Step 5), and the review of many alternatives, especially preventive measures (Step 7). The measures are more likely

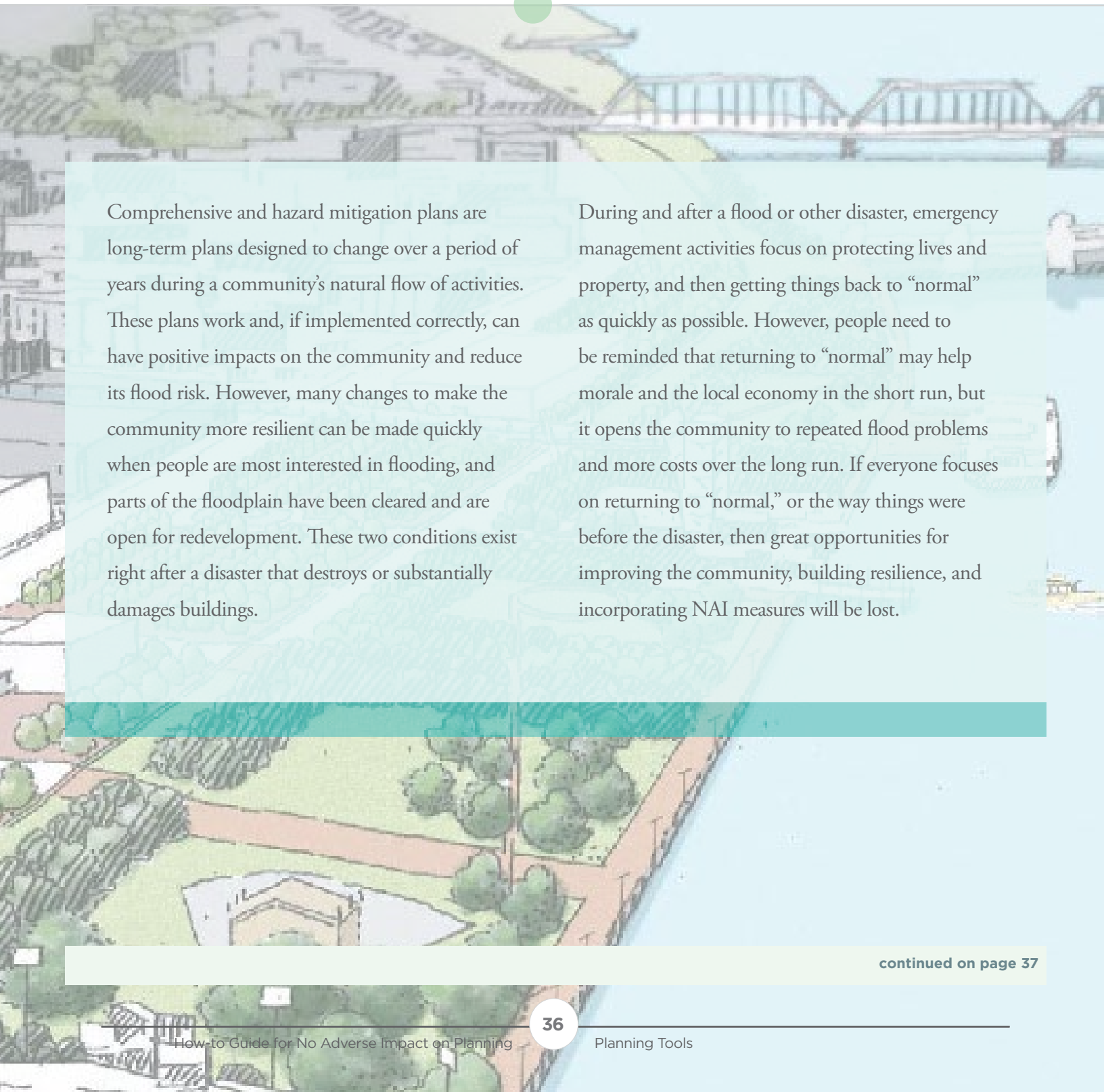
Tool 2: Hazard Mitigation Planning, cont.

to be implemented because of the involvement of planners (Step 1), the public (Step 2), other agencies and organizations (Step 3), and the requirement for the annual evaluation (Step 10).

The 10 steps listed are adopted from the CRS credit for floodplain management plans in Activity 510. Under the 2013 *CRS Coordinator's Manual*, there is a maximum possible 382 points. As noted previously, if a FEMA-approved mitigation plan misses one of the 10 steps, its credit is capped at 50 points.

Plans that cover all 10 of these steps and address other natural hazards will qualify for the CRS credit and as a Disaster Mitigation Act hazard mitigation plan.

Tool 3. Post-Disaster Planning



Comprehensive and hazard mitigation plans are long-term plans designed to change over a period of years during a community's natural flow of activities. These plans work and, if implemented correctly, can have positive impacts on the community and reduce its flood risk. However, many changes to make the community more resilient can be made quickly when people are most interested in flooding, and parts of the floodplain have been cleared and are open for redevelopment. These two conditions exist right after a disaster that destroys or substantially damages buildings.

During and after a flood or other disaster, emergency management activities focus on protecting lives and property, and then getting things back to "normal" as quickly as possible. However, people need to be reminded that returning to "normal" may help morale and the local economy in the short run, but it opens the community to repeated flood problems and more costs over the long run. If everyone focuses on returning to "normal," or the way things were before the disaster, then great opportunities for improving the community, building resilience, and incorporating NAI measures will be lost.

continued on page 37

Tool 3: Post-Disaster Planning, cont.

If the community takes months to decide what to do after a disaster, it is very likely people will have repaired their homes and businesses and "gone back to normal." Therefore, a plan should be prepared to address what happens *immediately* after the disaster to intervene in the traditional post-disaster process of rebuilding and restoring a community to "normal."

For the purposes of this *Guide*, there are two types of post-disaster plans, a comprehensive pre-disaster recovery plan and a post-disaster flood mitigation plan.

PRE-DISASTER RECOVERY PLANNING

A comprehensive disaster recovery plan is prepared before the disaster. It is the product of a deliberate and thorough planning process that may take months of effort by a wide range of participants. As seen in the graphic on the next page, pre-disaster recovery planning covers a full range of issues, such as housing, economic development, infrastructure, public health, education, and environmental sustainability. The process addresses many questions related to the community's future.

Because a pre-disaster recovery plan is done before a disaster, it is not usually very hazard-specific. Rather than try to predict what will happen, it sets up a process to assure that the right steps are taken during the response and recovery phases. It identifies roles and responsibilities that are appropriate, and tasks that must be performed, regardless of what type of disaster occurs.

Even if a complete pre-disaster recovery plan is not prepared, the concept can be introduced in the comprehensive plan or a plan for an area affected by flooding. The result is that some citizens and key decision makers will be attuned to what is needed. That is the basic premise of Florida's Hillsborough County plan, described on p. 64.

> The disaster does not have to be a flood. In 1990, a tornado destroyed 20 buildings in the Plainfield, IL floodway. Federal disaster assistance and state flood protection funds were used to buy the properties and convert the damaged areas into open space.

continued on page 38

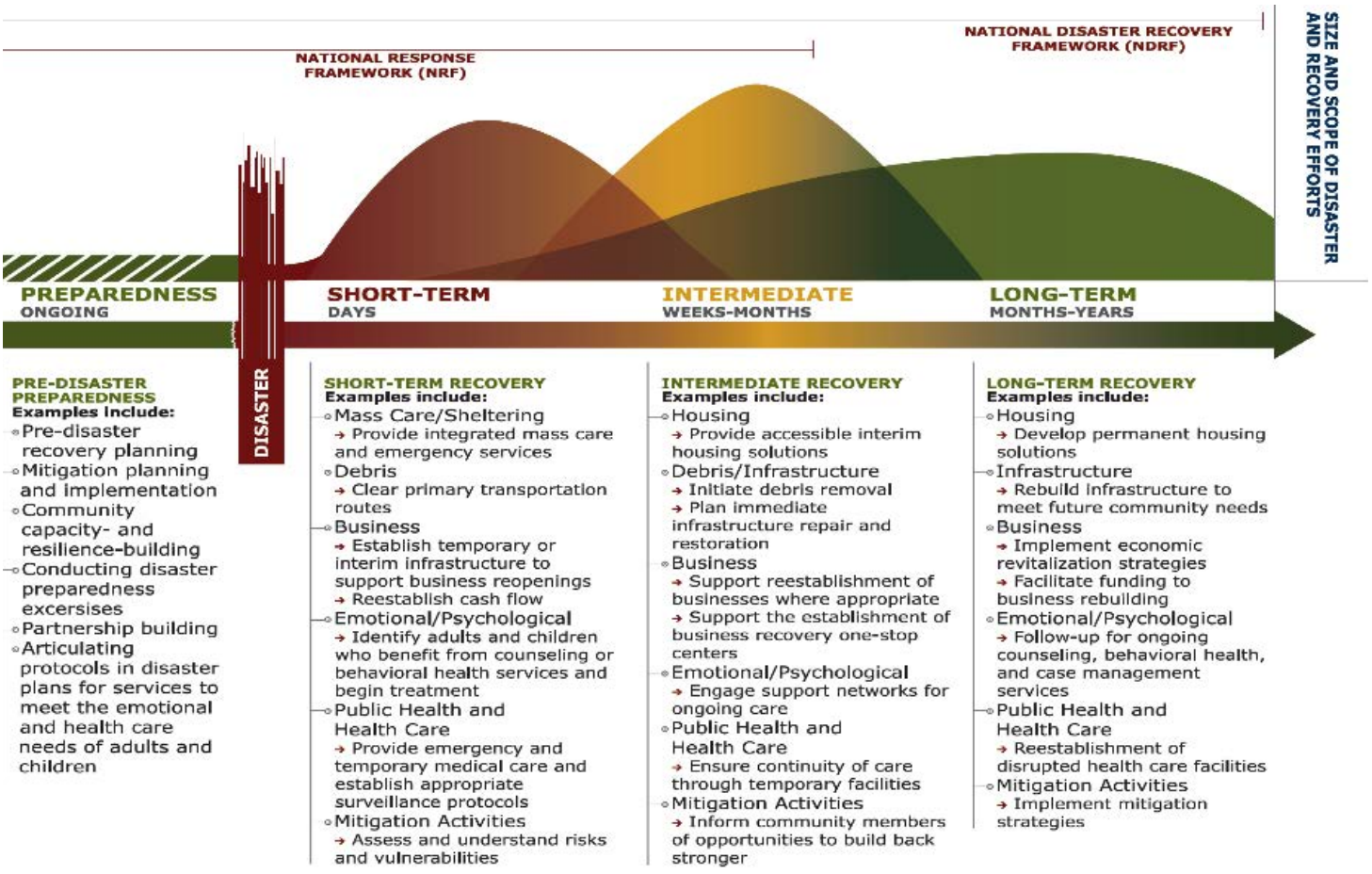
Tool 3: Post-Disaster Planning, cont.

The American Planning Association noted in its Planning for Post-Disaster Recovery and Reconstruction (p. 61, *link next page*), "There is far more political and institutional momentum in the post-disaster period behind a policy objective that is already in place and being actively pursued, than in one that is suddenly activated from scratch, no matter how well the community planned for its contingency." Any doubts on that point should be resolved by the case study of Arnold, MO (p. 78).

HOW-TO: INTEGRATE NAI INTO PRE-DISASTER RECOVERY PLANNING

No matter what format pre-disaster planning takes, be it a formal recovery plan or considerations of post-disaster conditions, the five steps described in the first tool of the *Guide* for integrating NAI in the comprehensive planning process are relevant (see pp. 27-30).

The most important way to integrate NAI into the recovery plan is to be involved in the process. Use every opportunity to identify potential adverse impacts of flooding, explain how those impacts can be mitigated, and how to redevelop into a resilient community or neighborhood.



Recovery continuum with a description of activities by phase from FEMA's National Disaster Recovery Framework (p. 8).

Tool 3: Post-Disaster Planning, cont.

Above all, educate decision makers, stakeholders, and others participating in the recovery planning on the importance of implementing the plan immediately after the disaster, so the damaged area does not quickly return to "normal."

POST-DISASTER FLOOD MITIGATION PLANNING

A post-disaster flood mitigation plan is prepared immediately after a disaster that damages properties in a floodplain. It is assembled quickly and focuses on short-term mitigation decisions. It is essentially a triage process that identifies:

- What areas should be cleared or not be restored to pre-disaster conditions;
- What areas should incorporate retrofitting as part of reconstruction;
- What areas could be allowed to repair without delays; and
- What changes should be made during rebuilding to make the community more resilient or sustainable?

> "Lee County, FL, used a disaster on the other side of the state as a motivator to improve the county's post-disaster preparations. The emergency manager said Hurricane Andrew, "put a scare into people about what could happen in Lee County." – Planning for Post-Disaster Recovery and Reconstruction (p. 88)."

A post-disaster flood mitigation plan is not a complete or long-term recovery plan that addresses the many aspects of community life. Instead, it is intended to ensure that the worst-hit or most exposed neighborhood(s) do not rebuild before NAI mitigation measures can be incorporated.

A post-disaster plan should be prepared following a standard planning process, such as the 10-step hazard mitigation planning process discussed in the previous section. Given the limited time available and the pressures to rebuild, it is more important to prepare a good framework quickly than to produce a large, polished document.

continued on page 40

Link: Planning for Post-Disaster Recovery and Reconstruction: www.fema.gov/media-library-data/20130726-1455-20490-4744/fema_apa_ch3_5.pdf

Tool 3: Post-Disaster Planning, cont.

HOW-TO INCORPORATE NAI INTO POST-DISASTER PLANNING

The conditions in a community just hit by a disaster require a fast and effective planning process. The following six steps are recommended when there have been no advance preparations or pre-disaster recovery planning to set the stage for an NAI-based recovery.

STEP 1. GET LEADERSHIP SUPPORT.

In every community facing disaster recovery, the question of "What now?" is asked in many different forums. It is critical to be present in these meetings and provide credible input for consideration. Drive home these points:

- The area will flood again, someday;
- It could be worse next time; and
- The community can do things to make it better next time.

ASFPM and other organizations have promoted messages like "Stop and think – you don't want to go through this again," and "Build back safer and smarter (*link below*)." These phrases can help leaders and the public understand the concept.

Community leaders must publicly support efforts to rebuild the community to be resilient and sustainable. The sooner the leaders decide to support the effort, the better. Waiting for a decision means lost planning time and more time for people to rebuild. The worst case scenario is starting after people have already built back.

STEP 2. BUY TIME.

It took two weeks to prepare the interim mitigation plan in Conway, SC, (p. 69, and that project began while the river was still rising. In most cases, it will take weeks, if not a month or two, to collect the needed data, review alternatives, and iron

In order to have enough time to prepare a post-disaster plan, a community can enact a temporary reconstruction moratorium. These can be enforced by "red tagging" a building, i.e., issuing an order that it cannot be occupied until certain criteria are met. Photo of red tag taken at Waikoloa Village, HI, by Patricia Brach.

Link: Build back safer and smarter : http://recovery.stormsmart.org/

Tool 3: Post-Disaster Planning, cont.

ASFPM has published post-disaster guidance following major flooding events that is relevant to local situations. Visit http://www.floods.org and search "post-disaster." See also the Natural Hazard Mitigation Association's "Build Back Safer and Smarter" at http://recovery.stormsmart.org.

out recommended approaches for different areas. Meanwhile, people will understandably want to repair and reoccupy their homes and businesses as soon as they can.

To buy time, a temporary reconstruction **moratorium** can freeze reconstruction in the affected area until decisions can be made about who can rebuild, who must mitigate, and who can make repairs and reoccupy right away. Also known as a "temporary permit suspension," the moratorium is usually in the form of a council resolution that includes the following provisions.

- An area is designated where there is reason to believe that most of the buildings are substantially damaged, so time will be needed to determine whether or how they can be repaired. If the disaster was a flood, this could be based on a threshold of having been flooded to a depth of two or three feet above the first floor.

- It should stress that the action is temporary and the resolution will be revised when the mitigation plan is completed. For example, the boundaries of the no-reconstruction area could be changed once all the data have been collected on building conditions.

- It should clarify that the moratorium restricts rebuilding. Cleaning up, collecting valuables, removing debris, eliminating health and safety hazards such as draining water from pools to prevent mosquitos from breeding, and similar work, should still be allowed.

- It could set parameters for the post-disaster flood mitigation planning, such as:
  1. Create the planning committee and appointing its members;
  2. Set a deadline for completion or for status reports; and
  3. Provide instructions on how to keep the public informed of its meetings and progress toward completion.

Moratorium **enforcement** is very important. If there are only one or two streets into the affected area, the community may want to set up check points staffed by police or emergency management volunteers to ensure

continued on page 42

Tool 3: Post-Disaster Planning, cont.

everyone is informed of the rules and procedures when they return. This will also reassure residents that looters and others are not roaming their neighborhood. If the buildings are not fit for occupancy, the police should enforce a curfew for the area and ensure that no one stays overnight.

Another enforcement tool is to make sure utility companies do not turn on water or power without a certificate of reoccupancy or other permission issued by the community.

STEP 3. INVOLVE THOSE AFFECTED.

The post-disaster planning process needs to consider the frame of mind of people who have just been hit by a devastating event. For example:

- Most residents, businesses, and community leaders will want to keep the old buildings, businesses, and infrastructure. They will not want a plan that changes things;
- Sometimes a post-disaster plan will conclude that properties in high-hazard areas should be permanently relocated. In other words, people will be asked to move from where they have lived or worked for years. That will be controversial; and
- The subject matter is central to the lives of the population in the affected area. The plan will determine where they live and work in the future. If done after the disaster, they will be held in limbo by local officials until the plan is completed. As a result, the plan will trigger highly emotional responses from those affected.

Because of these factors, public information and involvement need to be a central part of the post-disaster planning process. Public involvement measures covered under Tool 5 in this *Guide* are useful here. There should be a continuous flow of information on the status of the planning and what people can do in the interim.

Mitigation planners need to be sensitive to the condition and needs of residents who have just been through a very traumatic situation. They need to account for residents' and businesses' financial abilities and their desires to stay in a community of friends and neighbors. The best way to do this is to actively involve them in the planning process, preferably by serving on the planning committee. Dealing with the public needs to be conducted in a "listen and gather information" mode, rather than a "plan presentation" mode.

STEP 4. BUILD ON EARLIER EFFORTS.

The post-disaster mitigation planning process will be much easier if it shows how it supports earlier plans or programs. The best situation is to work within the framework of a pre-disaster recovery or mitigation plan that's already attuned residents, businesses, and community leaders to the idea of redeveloping the floodplain differently.

There may be other plans, like the comprehensive plan or a parks and recreation plan, which call for expanding open space. There may be a housing agency that wants to improve housing conditions. Redeveloping may improve economic conditions by replacing floodprone homes with waterfront or tourist facilities, something local business interests may have been promoting.

Tool 3: Post-Disaster Planning, cont.

Building on these earlier plans and established policies and programs will strengthen the mitigation plan's recommendations and draw allies who want to see them adopted and implemented.

STEP 5. GET HELP.

The more resources devoted to the effort, the sooner the plan will be ready. A disaster draws help and expertise from other communities and state and federal agencies. Here are some examples:

- If there has been a disaster declaration, check with mitigation and recovery support staff in the Joint Field Office to see what types of planning assistance and mitigation programs are available;
- State water agencies can help identify the frequency and historical context of a flood event. Some offices can assist with high water marking, which can be especially important in areas without flood elevation data;
- One of the biggest jobs is assessing buildings to determine if they are substantially damaged. There may be additional resources available from FEMA, ASFPM state chapters, and other communities via mutual aid arrangements. Conway's staff was greatly helped by the Building Official Association of South Carolina, which provided resources to thoroughly inspect each house in a short period of time;
- State floodplain management and hazard mitigation staff can provide assistance in mitigation planning, post-disaster activities, and regulating reconstruction (including setting higher standards for reconstruction); and
- In the past, FEMA has extended its temporary housing program to cover time needed for a post-disaster planning and mitigation effort, reducing the pressure to quickly get people back into their damaged homes.

STEP 6. THINK LONG-RANGE.

There is a very strong tendency to focus on the flood that just occurred. But higher floods, flood-related hazards, and future conditions must be included in an NAI hazard assessment.

Remember the planning factor of aiming high and "make no little plans." If nature has cleared the floodplain, think about starting with a clean slate. Now is the chance to move the area affected in a different direction. Soldiers Grove, WI, and Valmeyer, IL, not only relocated large areas out of the floodplain, they incorporated energy efficiency measures in the new buildings.

Tool 4. Risk Assessment

Climate Central's sea level rise map (http://sealevel.climatecentral.org/) can show the potential future hazard at sites along the coast. In addition to showing areas that will flood, the site can also help assess the impact of such flooding in terms of property value affected and social vulnerability.

As noted previously, one of the first steps in an effective planning process is to collect and analyze information and data related to the purpose of the plan. In the standard flood-related planning processes used for hazard mitigation and post-disaster planning, early steps include "assess the hazard" and "assess the problem."

"Assessing the hazard," where a flood could go, is only half the job. An NAI plan also needs to "assess the problem," that is, the consequences of what flooding could do to people and property. This is important because while it may be difficult to manage the flood, we can do things to protect people and property that reduces the risk of flood losses.

continued on page 45

Tool 4: Risk Assessment, cont.

"Risk" is defined as the likelihood of harm occurring. Risk is a combination of the probability of the hazard occurring, multiplied by the consequences when it does. A risk assessment addresses where and how often a flood will occur, and what will happen when it does. The recommended planning processes do these risk assessment tasks one at a time. It is important to remember to not stop at the hazard description. The full assessment is needed.

While an NAI risk assessment is normally done for a mitigation plan, there are cases where it can stand alone. For example, scenario computer models, discussed later, can be effective tools for identifying and communicating risk.

Flood Insurance Rate Maps are based on certain mapping criteria. One criteria is that a channel is assumed to be clear during a flood. Hazard mitigation planners reviewed historical records and found the Kankakee River at Wilmington, IL, had exceeded the FIRMs base flood elevation nine times since 1950. All but one of those floods was caused by ice jams, an obstruction not accounted for in the mapping criteria. See also the Conway, SC, case study for an example (p. 69) of using historical data instead of the lower FIRM flood levels.

HOW-TO: DO AN NAI RISK ASSESSMENT

STEP 1. COLLECT HAZARD DATA.

This is similar to the mitigation planning step of "assess the hazard." Collect the following to ensure the data is based on the best available science:

- Start with the data from the Flood Insurance Study and Flood Insurance Rate Map, but do not stop there.
  - o Have things changed since your flood study was conducted, such as development in the watershed?
  - o Do you have a better topographic base map that might show different floodplain boundaries?
- Where have floods gone in the past?
- Are there known flood problems not shown on the FIRM, such as stormwater problems that do not meet FEMA's mapping standards?
- Are there other studies of flood or flood-related problems?
- Where have flood insurance claims been paid? Have there been payments in areas not mapped as floodprone?
- What are the flood velocities? Are there areas of wave action greater than 1.5 feet? How much flood warning time is there? Does

continued on page 46

Tool 4: Risk Assessment, cont.

flooding bring debris, sediment, or pollutants? These factors can help identify the more hazardous areas of your floodplain.

- Are there plans to construct flood-control projects or build major developments in the floodplain or watershed?
- Are there unmapped flood-related hazards, such as coastal erosion, mudslides, and subsidence?

While this review may conclude that your FIRM does not adequately describe your flood hazard, do not discard it. FIRMs are used for important decisions, such as the flood insurance purchase requirement, insurance premium rates, and possibly, building permit requirements.

STEP 2. INVENTORY WHAT FLOODS.

Do we care if a flood covers a forest or a wetland? What and where are the problems? To start the "assess the problem" planning step, inventory:

- Use of the area(s), such as farming, industry, housing;
- Business and employment centers;
- The number and types of affected buildings, and whether they have basements or other features that affect their potential for flood damage;
- Critical facilities, bridges, and infrastructure;
- Properties and facilities that have been flooded in the past; and
- Coastal dunes, wetlands, and other areas serving natural floodplain functions.

STEP 3. ASSESS FLOODING IMPACTS.

A flood that inundates pole barns does not have the same impact as one that affects homes or hospitals. The impacts should take into account.

- Threats to life and safety. Deaths from past floods and the data on depths, velocities, and warning times can describe the relative severity of flooding in different areas.
- Threats to health and mental health from polluted waters, mold, and stress.
- Direct damage costs of different levels of flooding. These can be estimated based on past flood experiences, extrapolations from insurance claim data, or depth/damage curves used by USACE, and for benefit/cost analyses. Running a Hazus computer model is another option (p. 48).
- Costs of flood response, rescue, and recovery activities.
- Impact on critical facilities. Think about what happens when it floods? Even if a hospital or fire station is on high ground, is it accessible? USACE and FEMA have prepared hurricane evacuation studies that include a lot of this information.
- Impact on the local economy. How long will businesses be closed? Will workers be able to get to work? Do they have the resources to rebuild? Will they simply move to another community, or did the disaster wipe them out?

An NAI risk assessment uses scenario modeling to map and display alternative severe, but plausible, flood events. This brings the risk assessment to life and helps communicate the impact of flooding to elected officials and the public.

Tool 4: Risk Assessment, cont.

STEP 4. CONSIDER THE FUTURE.

The hazard and the area(s) exposed to the hazard can change over time. **You do not want to plan for yesterday's flood.** What's likely to happen over the next 20, 50, or 100 years? How much of your watershed will be urbanized? Repeat Steps 1–3 considering larger floods that may occur due to:

- The impact of a proposed development that may cause adverse impacts on others;
- Continued development in the floodplain that constrains flows and raises flood heights;
- More development in the watershed that increases runoff;
- Sea level rise, eroded shorelines, or climate change; or
- Failure or overtopping of a levee or an upstream dam.

Assessing future flood problems does not have to be expensive. There are some free online models that demonstrate areas affected by sea level rise, like the Sea Level Rise and Coastal Flooding Impacts Viewer and Surging Seas: Sea level rise analysis by CLIMATE CENTRAL.

www.sealevel.climatecentral.org/ssrf

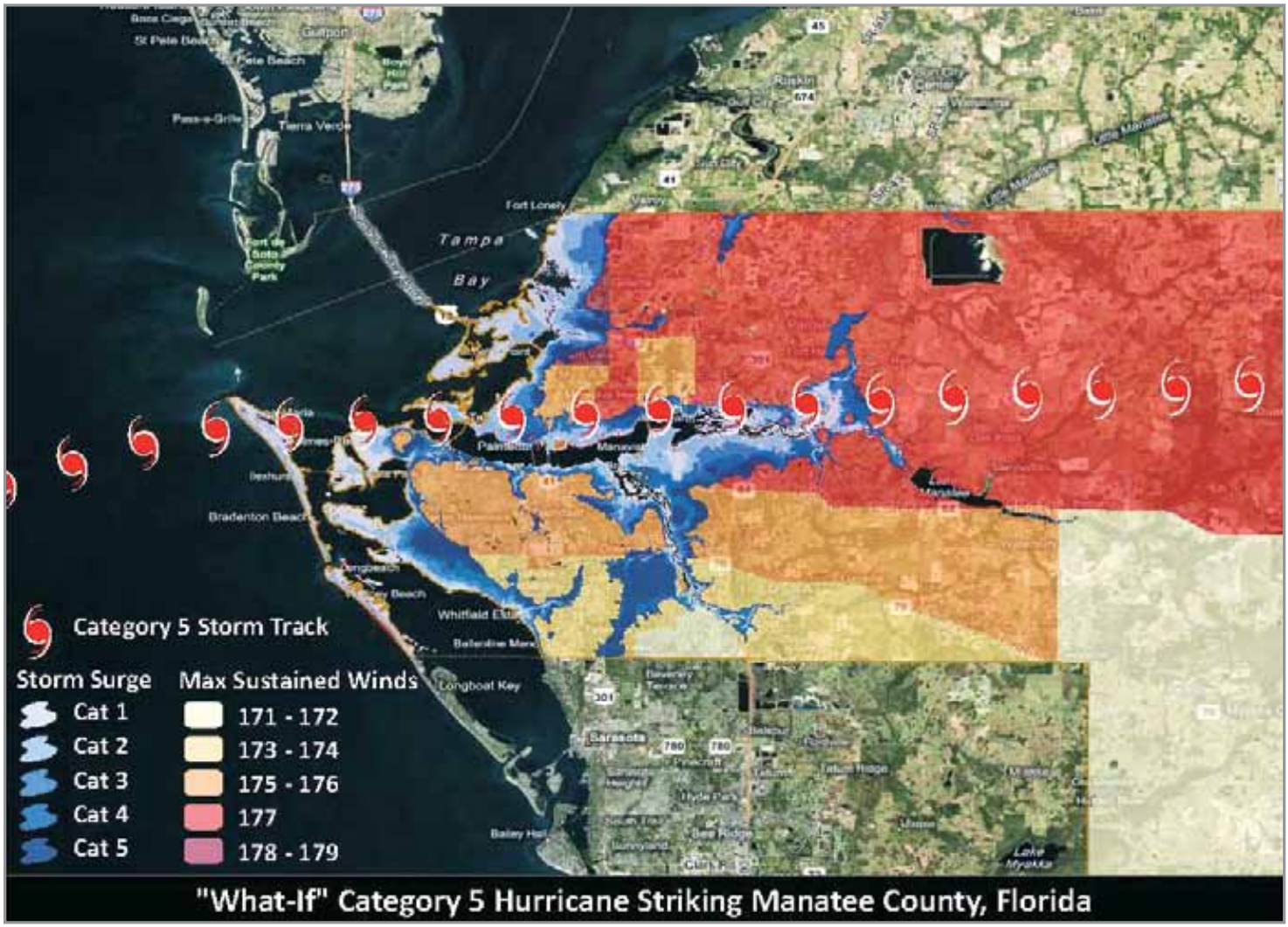
STEP 5. COMMUNICATE YOUR FINDINGS.

There is a tendency in many plans to lay out all the data from the previous four steps in large tables and lists with lots of numbers. Remember, the technician who prepared the plan is not the decision maker who determines what will be implemented. Explain the findings in lay terms, such as with a narrative summary, graphs, or a map with colors noting areas most severely affected. Other ideas are discussed in the following section on public involvement.

Hazus-MH is a FEMA software program that contains computer models for estimating potential losses from floods, earthquakes, and high winds. It uses Geographic Information System software to map and display data. It can be used to quickly estimate damage after a disaster, or to run different "what if" scenarios for planning purposes to calculate:

- Physical damage to buildings, schools, essential facilities, and infrastructure;
- Economic loss, including lost jobs, business interruptions, and reconstruction costs; and
- Social impacts, including estimates of displaced households, and population exposed to different scenario floods and hurricanes.

Tool 4: Risk Assessment, cont.



Results from Category 5 HAZUS-MH Scenario						
Category	Capital Stock Losess			Business Interruption Losses		
	Total Building Damage	Total Contents Damage	Inventory Loss	Income	Relocation	Rental
Residential	$15,440,764,000	$7,630,860,000	NA	$25,288,000	$1,675,503,000	$696,833,000
Commercial	$2,674,046,000	$2,919,204,000	$66,459,000	$556,509,000	$365,232,000	$252,874,000
Industrial	$741,953,000	$1,015,644,000	$184,409,000	$14,342,000	$32,082,000	$8,396,000
Other	$652,958,000	$670,840,000	$14,812,000	$12,048,000	$96,959,000	$13,122,000
TOTAL	**$19,509,721,000**	**$12,236,548,000**	**$265,680,000**	**$608,187,000**	**$2,169,766,000**	**$971,225,000**

"What-If" Category 5 Hurricane Striking Manatee County, FL.
Source: page 29 of Post-Disaster Redevelopment Planning: A Guide for Florida Communities, Florida Department of Community Affairs, 2010.
www.floridadisaster.org/Recovery/documents/Post%20Disaster%20Redevelopment%20Planning%20Guidebook%20Lo.pdf

Tool 4: Risk Assessment, cont.

Hazus does not provide data on the impact of flooding on health, mental health, or natural floodplain functions. On the other hand, NOAA's Digital Coast (*link below*) program may have data on economics, vulnerable populations, and demographics.

Any community with GIS capability can download Hazus free (*link below*). There are guides online, a FEMA help desk, and user groups around the country for assistance. There are three levels of Hazus analyses. Level 1 uses rough figures from national databases, while the other two provide more accurate results based on additional local data added by the user. More local data will produce a better product. The example on p. 48 shows how Hazus can process data for an entire county.

Links:

Digital Coast: www.csc.noaa.gov/digitalcoast/
Hazus: www.fema.gov/hazus

Tool 5. Public Involvement

> "It is not easy involving the public. Just critical."
> Crorey Lawton, CFM, USACE

As noted in the previous section, planners are not the people who adopt and implement their plans. Elected officials will do the adopting and most plans rely on other organizations, the private sector, and individual property owners to implement some of the recommendations.

While a plan can be written by planners, involving the public has many advantages for an NAI plan, including:

- More sources of knowledge of historic flooding and its impacts;
- Helping prevent misunderstandings;

- Sharing the workload, especially in explaining the risk and the plan to others;
- Recommendations better fitting local needs;
- Recommendations that depend on others will more likely be implemented; and
- The public will more likely support adoption, implementation, and funding of the plan.

On the flip side, not involving the public has its disadvantages. The primary one is that the plan will not get adopted or implemented because of a constituency that opposes something in it.

HOW-TO: INVOLVE THE PUBLIC IN NAI PLANNING

STEP 1. IDENTIFY THE RIGHT PEOPLE.

FEMA's Example Plans (*link below*) notes, "The planning process will succeed only if the right people are involved." Three groups make for a successful program:

> Do not confuse "public information" with "public involvement." Public information is often a one-way communication effort to tell people something. Public involvement is a two-way communication effort to elicit input and support for the planning effort and recommendations.

- Staff from offices responsible for implementing the plan;
- Residents and owners of businesses from the affected areas; and
- Community stakeholders.

The last two groups are generally considered "the public," but technical staff can benefit from public involvement measures discussed here. "Residents and owners" include owners and renters of floodprone properties, operators of critical facilities, and neighborhood organizations. "Stakeholders" are not limited to floodplain occupancy or interest in disasters. They should include people and organizations that do things that affect the community as a whole, such as business leaders, civic groups, schools, major employers, and land developers. Elected officials are a particularly good source of names. They know who makes a difference in their communities and who is an appropriate representative of a neighborhood. They also know the leaders and spokespeople for different constituencies and involving them is a chance for education and gaining support.

continued on page 52

Link: FEMA's Example Plans: http://recovery.stormsmart.org/example-plans/

Tool 5: Public Involvement, cont.

Many planning processes include exercises where everyone participates, drawing input from even the silent committee members.

Photo of the Flood Mitigation Planning Committee for Gretna, LA, taken by French & Associates.

STEP 2. DETERMINE THE BEST WAY TO INVOLVE THEM.

One of the most important factors for effective planning is to offer people a chance to have a say in the plan. Here are some tools that can help do this:

- The most effective public involvement approach puts public representatives and stakeholder organizations on a committee that plays a meaningful role in the planning process.
- Publicize the planning schedule so people can go to meetings on issues they care about most.
- Hold one or more meetings of the planning committee in the affected areas to facilitate resident input.
- Distribute a questionnaire to gather their input.
- Speak at civic and neighborhood organizations' meetings, answer questions, and record comments and suggestions.
- Host a workshop, open house, or a demonstration project to attract public attention and raise their level of awareness and interest.
- Such workshops or public meetings could include a "charrette," an exercise where everyone participates in seeing what could happen during a flood and in helping design what should be done afterward.
- Keep everyone posted through a newsletter, website, or social media.
- Circulate the draft plan for review.
- Host a public meeting to receive comments on the draft plan.

Remember that people's input needs to be meaningful. For example, make sure the draft plan is made available several weeks before the public meeting so people have a chance to read it, discuss it with others, and ask questions.

STEP 3. COMMUNICATE IN THEIR LANGUAGE.

No matter how the public is involved:

- Use lay terms.
- Relate key points to local experiences or landmarks.
- Relate the NAI issues to their priorities (see the Kings County and Contra Costa County examples on pp. 76 and 74 respectively).
- Explain and ask for comments on big issues rather than technical details.
- Listen and take notes. This is a communication effort, not a speaking engagement.

STEP 4. USE THEIR INPUT.

For the plan to be credible, it must reflect what the public tells you. Request information and ideas before drafting, and then circulate draft sections for comment. It does not hurt to announce now and then how a section was revised based on comments.

STEP 5. KEEP THEM INVOLVED.

Planning does not end when the plan is adopted. Public support will still be needed to get the plan implemented. The most common way to keep the involvement going is to keep the planning committee going as a monitoring and evaluation mechanism. This not only keeps the plan useful and pertinent, but implementation is encouraged when the planners have to report progress to a public body.

NFIP/CRS

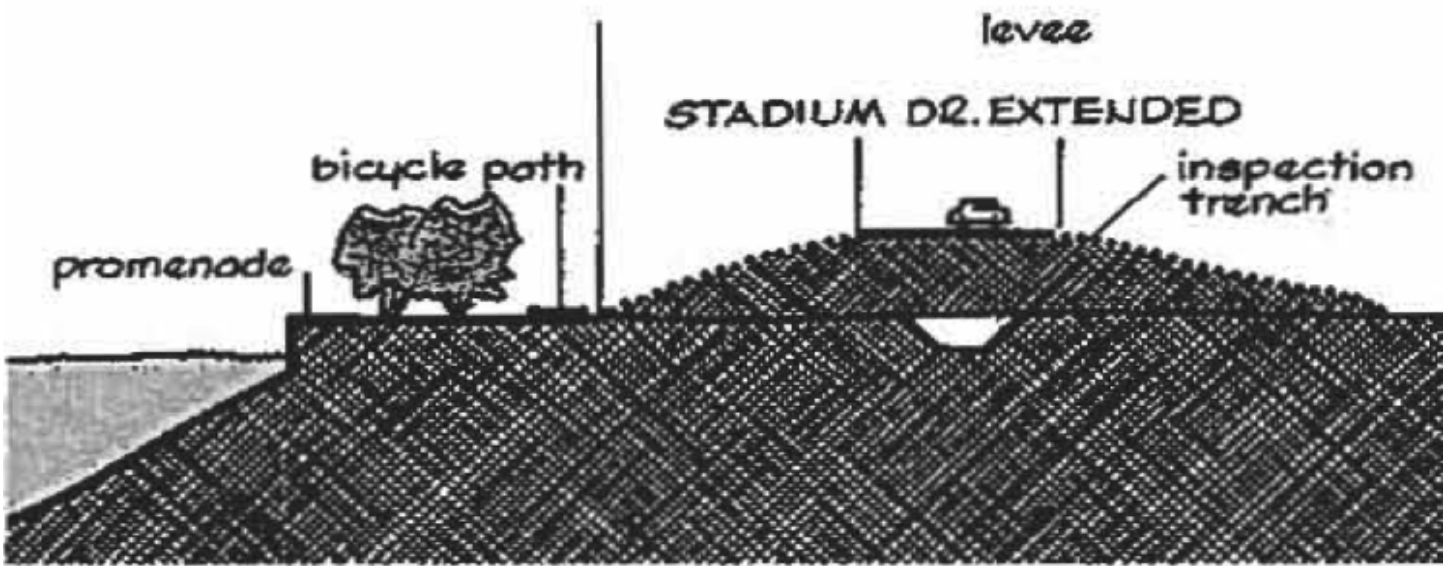
Public involvement, Step 2 of the 10-step process is recognized as being so important, it receives more points than any other element in the CRS' floodplain management planning credit, up to 30 percent of the maximum credit for Activity 510. A variety of communication tools, such as newsletters and neighborhood meetings, can be credited under Activity 330 (Outreach Projects) if done annually.

Avoid jargon when explaining sea level rise impacts. Graphics are a great way to help the public understand complicated materials. The photo above indicates the Category 2 hurricane wave height predicted for the year 2100 with the red line. – Somerset County, Maryland, Rising Sea Level Guidance (p. 17).

SECTION FOUR

Case Studies

Plans for the Riverfront: Davenport, IA



The 1974 River Edge plan recommended a levee close to the Mississippi River bank (p. 32).

This case study shows how plans can be coordinated and integrated with the comprehensive plan and each other, and how public involvement can change a community's directions toward NAI approaches to flood protection.

Davenport, IA, was established on the Mississippi River, and with the benefits of riverine transportation came the flooding hazard. The comprehensive plan devotes three pages to the city's history since 1950. Each page has a paragraph on one of the three floods of record.

1965: The "Great Flood" of 1965, the highest flood of record at the time.

1970: Congress approved a flood control project by the USACE. During the Corps project planning process, it became apparent citizens were concerned a levee would block their access to the river.

1974: To sort out the concerns, the Davenport Levee Improvement Commission published *The Mississippi River Edge at Davenport: A Plan for Improvement.* This plan (p. 1) was, "Dedicated to retrieving the use of the river for the community." It assumed a series of levees would be built, so it recommended measures to take advantage of the project, such as trails and drives along the tops of the levees. Other than public meetings hosted by the Corps, the only mention of public input in the 58-page document was in reference (p. 17) to "interviews and discussions with local businessmen, civic leaders, and public officials."

1977-1984: The Corps plan received quite a bit of debate. There were concerns that it was too expensive, had adverse environmental impacts, and would interfere with the earlier voiced desires to preserve access to the river. The City Council withdrew its support. The only piece that survived was a floodwall around the water treatment plant.

1986: The Davenport Riverfront Task Force commissioned the 1986 *Davenport Riverfront Conceptual Development Plan*. In the introduction (p. i), it references the 1974 and Corps plans. "Both studies prepared several recommendations of merit; however, both based their planning efforts on the premise that structural flood control was both **desired** by the Davenport community, and **needed** as a prerequisite to improved waterfront use and enjoyment."

This plan's planning process included two public workshops and additional public input. "People from all segments of the Davenport and Quad Cities area were invited and encouraged to participate in the development and programming of the Riverfront Plan." Here is the key finding:

> "The plan responds to the input received from the Davenport Community in the public workshops, and illustrates how a comprehensive plan prepared to optimize the use, form, and structure of the Davenport riverfront can also maximize its social and economic potential…
>
> "The Riverfront Conceptual Plan presumes that *all riverfront areas presently in the flood plain will remain there and will therefore be susceptible to occasional flooding. All development should be designed, used and maintained with this probability in mind.* As a general guide, all buildings should be held back from the immediate river edge to allow for the river trail, unless the building operation is river dependent" from 1986 Davenport Riverfront Conceptual Development Plan (p. 20).

The *Riverfront Conceptual Development Plan* included more specific site plan recommendations for five sub-areas. All would be connected by a pedestrian and bicycle trail. There were also general recommendations for regulatory actions, management actions, and physical improvements. The regulatory changes included rezoning sections from manufacturing to commercial and recreation districts; establishing a resource conservation district for a marsh; creating a public open space district; and adopting more flexible regulatory tools to allow creative uses along the waterfront; and adapting building plans to allow for floodwaters.

The plan did not have the legal authority to regulate land use, so its recommendations needed to be

continued on page 57

Plans for the Riverfront, cont.

The effectiveness of the NAI approach can be seen by comparing Davenport's waterfront (on the left in the pictures above) with that of Rock Island, IL, a community that opted to build up to its floodwall (on the right side of the river). Both illustrate how Davenport has open space along the river while Rock Island is built right up to the river.

adopted in the comprehensive plan and zoning ordinance. Most of these regulatory changes were incorporated in one form or another in later plans and ordinances.

1993: Davenport was hit by a flood that was higher than the 1965 flood.

1994: Davenport began its Flood Acquisition Program funded through a Local Option Sales Tax. The program has obtained federal grants and removed more than 115 homes from the floodplain. The city also received an Economic Development Administration grant to provide technical assistance to flood-damaged businesses. As a result, 52 businesses have incorporated emergency or permanent mitigation measures.

2001: Davenport was hit by its third worst flood on record, cresting 2 inches below the 1965 crest and only 4 inches below the 1993 flood. There was talk of needing a levee.

2004: The city worked with its Rock Island, IL, neighbor across the river to prepare another plan, called RiverVision (*link below*). This planning process had extensive public involvement activities, which gave people an opportunity to talk about a levee or other flood control measures. The section on comments at public meetings states:

"The comments indicate that it is critical to the public to protect river views in Davenport and to create river views in Rock Island. There is a strong desire to allow people to connect physically with the river. Flooding is viewed as a major concern in Davenport, but also as a unique characteristic of the city that should be leveraged. Overall, the comments expressed that the two cities' proximity to the river is a great strength," (p. 57).

"The prevailing local attitude suggests that the Davenport riverfront should be kept free of development, as commercial properties have consistently given way to the riverfront of today, free of private parcels. The allure of a contiguous, improved public riverfront landscape, unrestricted by commercial development, provides an attractive alternative ideal for Davenport residents," (p. 25).

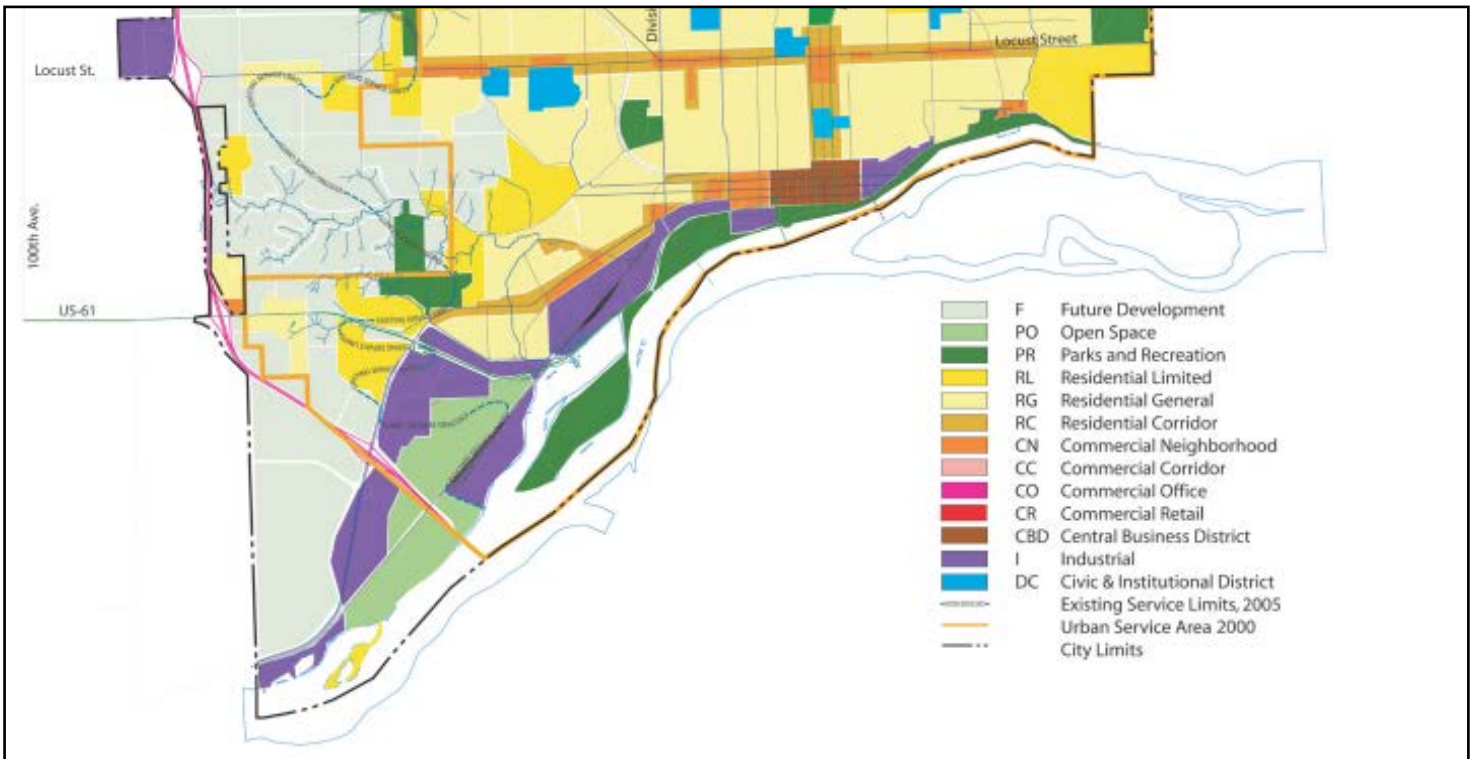
Links: RiverVision: www.cityofdavenportiowa.com/egov/documents/1180045217_757019.pdf

Plans for the Riverfront, cont.

2005: Davenport 2025: Comprehensive Plan for the City (*link below*) was adopted. It recommended implementing the RiverVision provisions. The proposed land use map (below) keeps the waterfront green with open space and parks and recreation uses. There is only one paragraph on flooding in the 160-page plan (quoted right). It is simply assumed that the floodplain will be kept open and no additional time needs to be spent on the subject.

"Flooding has been a historical concern of Davenport residents. The community works to manage flood events, rather than control them by engineering means (e.g., flood walls and levies). Flood protection occurs through guided construction in flood plains, and requiring floodways…to maintain or increase their carrying capacity. The City has a flood response plan in place, listing procedures to minimize flood damage as the water rises." (Comprehensive Plan, p. 123).

2008: The city was hit by the fifth highest flood on record. The city's Flood Plan, the document that guides the emergency manager's flood warning and response activities, was updated. Since there are unprotected areas that still flood, this is a key part of the city's program to use nonstructural measures to prevent or reduce flood damage.



The Comprehensive Plan's Proposed Land Use Map and the Planning Area 2 Action Plan (next page) both show the riverfront being preserved as green space.

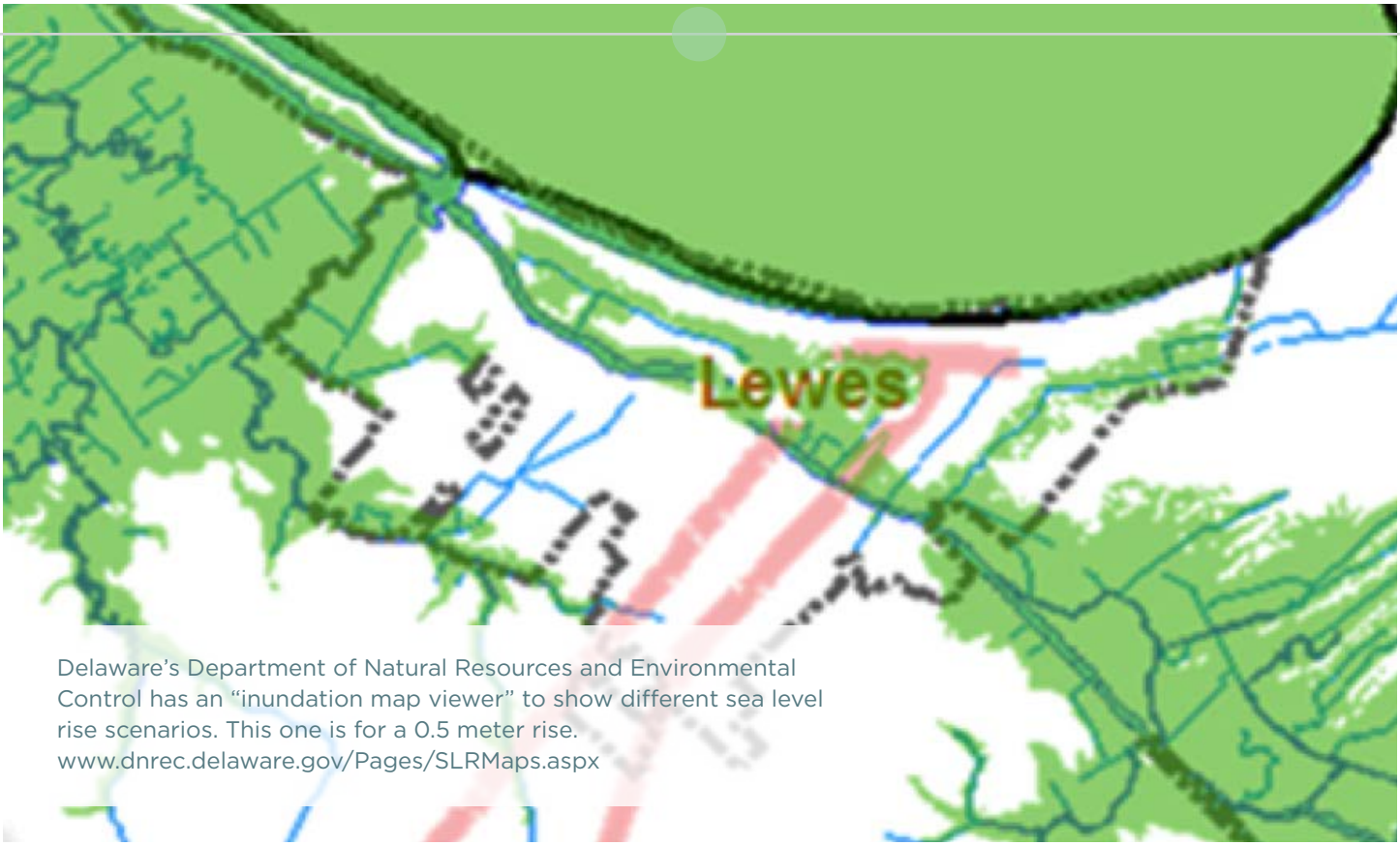
Plans for the Riverfront, cont.

2011: The Davenport 2025 comprehensive plan recommended more detailed area plans for the city's 13 designated neighborhoods. These would have a large amount of public involvement to develop policy recommendations for neighborhood improvement. Planning Area 2 Action Plan was published in 2011. Area 2 covers the downtown and waterfront.

Only three years after the last big flood, the only water concerns raised in the plan related to stormwater and water quality. One of the nine vision statements (p. 5) was, "Embrace the wonderful amenities of downtown Davenport and the Mississippi River."

Links: Comprehensive Plan for the City: http://www.cityofdavenportiowa.com/egov/documents/13181153457656.pdf

Plans for Future Flood Risk: Lewes, DE



Delaware's Department of Natural Resources and Environmental Control has an "inundation map viewer" to show different sea level rise scenarios. This one is for a 0.5 meter rise. www.dnrec.delaware.gov/Pages/SLRMaps.aspx

Lewes, DE, a coastal town of 2,700 people on Delaware Bay, adopted a Flood Hazard Mitigation Plan in 1999. The mitigation plan was replaced by a 2004 Hazard Mitigation Strategy, which was updated in 2009. The town participated in the development of the multi-jurisdictional Sussex County multi-hazard mitigation plan, which was adopted in 2010. The city adopted a comprehensive plan in 1992 and most recently in 2005.

In short, Lewes was getting a good handle on its hazards and mitigation opportunities. However, community leaders realized they were not planning for future hazards. With help from the Delaware Sea Grant, University of Delaware, and International Council for Local Environmental Initiatives, the city prepared a separate *Hazard Mitigation and Climate Adaptation Action Plan* in 2011.

Plans for Future Flood Risk, cont.

THIS CASE STUDY ILLUSTRATES FOUR IMPORTANT ASPECTS OF NAI PLANNING:

1. Using data based on best available science planners and lay people can understand,
2. Involvement of the public and stakeholders on the planning committee, at workshops, and other venues,
3. Tying the findings to specific changes in plans and land use regulatory tools, and
4. A continual process of updating general and specific plans, and incorporating the latest findings in them as they are revised.

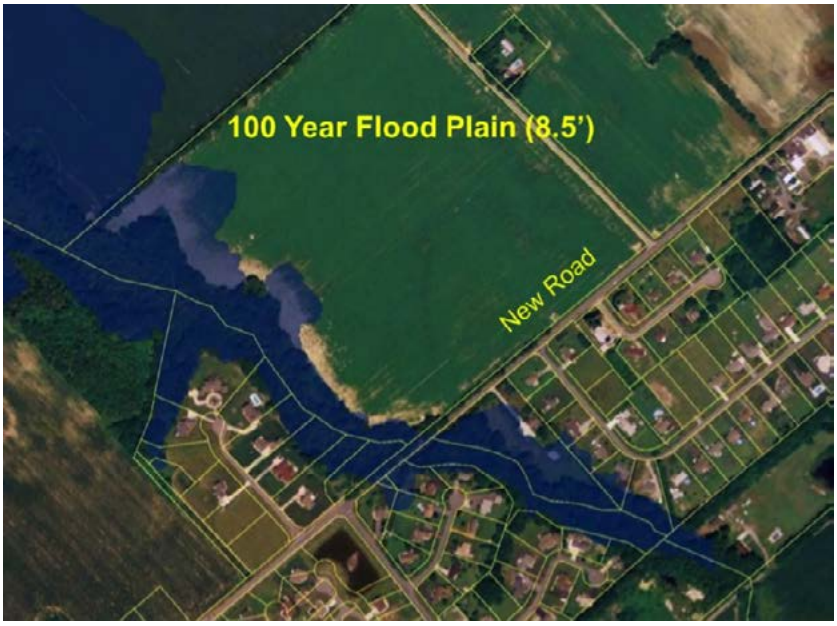
The planning process had the following features:

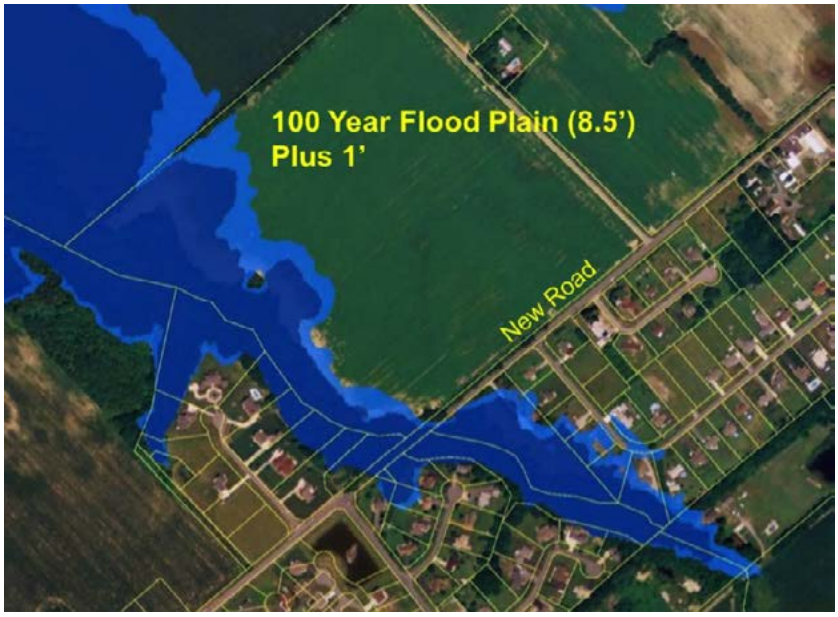
- A Mitigation Planning Team that had been active for almost 10 years was the focal point of the effort.
- The state NFIP coordinator gave presentations with technical data on hazards, future sea levels, and climate change.
- A state "inundation map viewer" (next page) provides graphic displays of different sea level rise scenarios. It allows users to enter an address and see what will happen on their own properties when the sea rises by 0.5, 1.0, and 1.5 meters.
- Workshops with stakeholders used a self-assessment process to identify the impacts of the hazards on various aspects of the community.

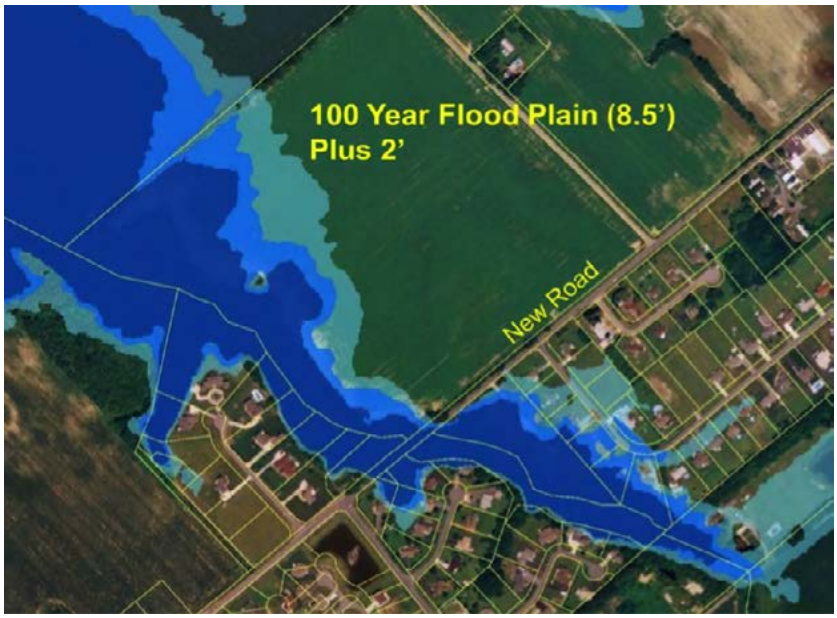
This process selected several areas of greatest vulnerability:

- Flood impacts to homes, property, and land use;
- Flood impacts to city infrastructure; and
- Impacts to water resources due to precipitation pattern changes, flooding, and salt water intrusion.

continued on page 62







Example of the maps used by the Mitigation Planning Team in Lewes, DE, to visualize the impact of adding one and two feet to the current base flood elevation (Adaptation Action Plan (link on next page), pp. 97–99).

Plans for Future Flood Risk, cont.

A variety of adaptation strategies were reviewed. Six "Primary Hazard Mitigation and Climate Change Adaptation Actions" (p. 49) were selected and are listed below:

1. Incorporate climate change concerns into the comprehensive plan and into future reviews of the building and zoning codes.
2. Improve outreach and education, particularly focused on successful behavior changes related to home building and retrofits.*
3. Ensure that aquifer information is integrated into all planning efforts.
4. Use elevation data to determine road levels and evacuation risk.*
5. Evaluate the city and the Board of Public Works infrastructure's flood vulnerability from direct flood impacts, as well as from indirect flood impacts to access routes.*
6. Improve the city's level of participation in the CRS.*

* These actions had also been identified in earlier mitigation plans. The Plan has 2–3 pages of detailed implementation guidance for each of the six actions.

Implementation has been challenging due to funding and staffing limitations facing the small community. There have been some new education and outreach activities, and the city hired a consultant to pursue actions one and six. The report was not finished at press time for this *Guide*. The draft includes comments on all the city's current CRS activities (and additional activities that appear feasible) and 15 recommendations on the building code, floodplain management regulations, code administration, and mitigation planning. The timing also fits well for the update to the comprehensive plan, which is starting in 2014.

Link: Adaptation Action Plans:
www.ci.lewes.de.us/pdfs/Lewes_Hazard_Mitigation_and_CLimate_Adaptation_Action_Plan_FinalDraft_8-2011.pdf

Pre-Disaster Plan for Post-Disaster Redevelopment: Hillsborough County, FL

This example shows how planners use a process that keeps people involved over the years to prepare for redevelopment after a disaster. It has a lot of public involvement and, as a result, it is supported by elected officials and stakeholders. One reviewer of the plan said, "The county recognizes the importance of the land use element and the need for balance between building a safer future and keeping residents and businesses from moving away." (Pre-Disaster Planning for Post-Disaster Recovery: Case Studies, p. 24).

Planning staff at Hillsborough County have long been interested in planning for what should be done after the next big one. Storms in the early 1990s, especially Hurricane Andrew, increased awareness of the need for this statewide. In 1993, the Board of County Commissioners adopted a post-disaster recovery ordinance, which established a Redevelopment Task Force, but did not include any plans for recovery or redevelopment.

By the late 1990s, the county had a hazard mitigation plan in the form of the Local Mitigation Strategy that Florida counties must adopt as a condition for mitigation assistance. This also met the county's comprehensive plan recommendation for having an all hazard risk analysis. It was concluded that having the LMS as a separate document gave it more visibility.

With more storms and hurricanes in the mid-2000s, the state promoted post-disaster redevelopment planning. In 2007 it offered to help five counties prepare pilot plans. Hillsborough County volunteered to be one of them. In 2008, county staff started what became a two-year process that devoted a lot of attention to public involvement – something vitally needed because of the public impact of a plan that might "red line" certain areas.

More than 250 people participated on eight technical advisory committees, and an umbrella stakeholder group. By 2010, the Post-Disaster Redevelopment Plan (*link below*) was drafted. It has

Link: Post-Disaster Redevelopment Plan: www.hillsboroughcounty.org/index.aspx?NID=1793

Pre-Disaster Plan for Post-Disaster Redevelopment

one section for each of the eight stakeholder subject areas:

1. Introduction
2. Implementation
3. Public/Private Infrastructure and Facilities
4. Health and Social Services
5. Housing Recovery
6. Economic Redevelopment
7. Land Use
8. Environmental Restoration
9. Public Outreach
10. Financial Administration

The resulting plan is considered a collaboration by the Land-Use Technical Advisory Committee between drawing lines on a map, that would likely lead to curtailed investment and eventual abandonment of otherwise vibrant areas, and doing nothing to prepare for the next disaster. Thanks to stakeholder involvement, the plan is politically feasible and was adopted in 2010.

Stakeholder technical advisory committees. Hillsborough County PDRP, page 2-6.

KEY FACTORS

Katrina lessons: After Hurricane Katrina in 2005, Hillsborough County assisted Hancock County, MS, by sending staff to help during recovery. The two jurisdictions worked together to develop lessons learned, which was funded by Hillsborough County. Staff learned many lessons on what would be expected after a storm of such force.

Objectives: The objectives of the Hillsborough County Post-Disaster Redevelopment Plan (pp. 1-2, 1-3) are:

- Long-term restoration of public infrastructure, social services, and environmental assets damaged in the disaster.
- Re-establishment of an adequate supply of housing to replace what was destroyed and provide

continued on page 66

Pre-Disaster Plan for Post-Disaster Redevelopment

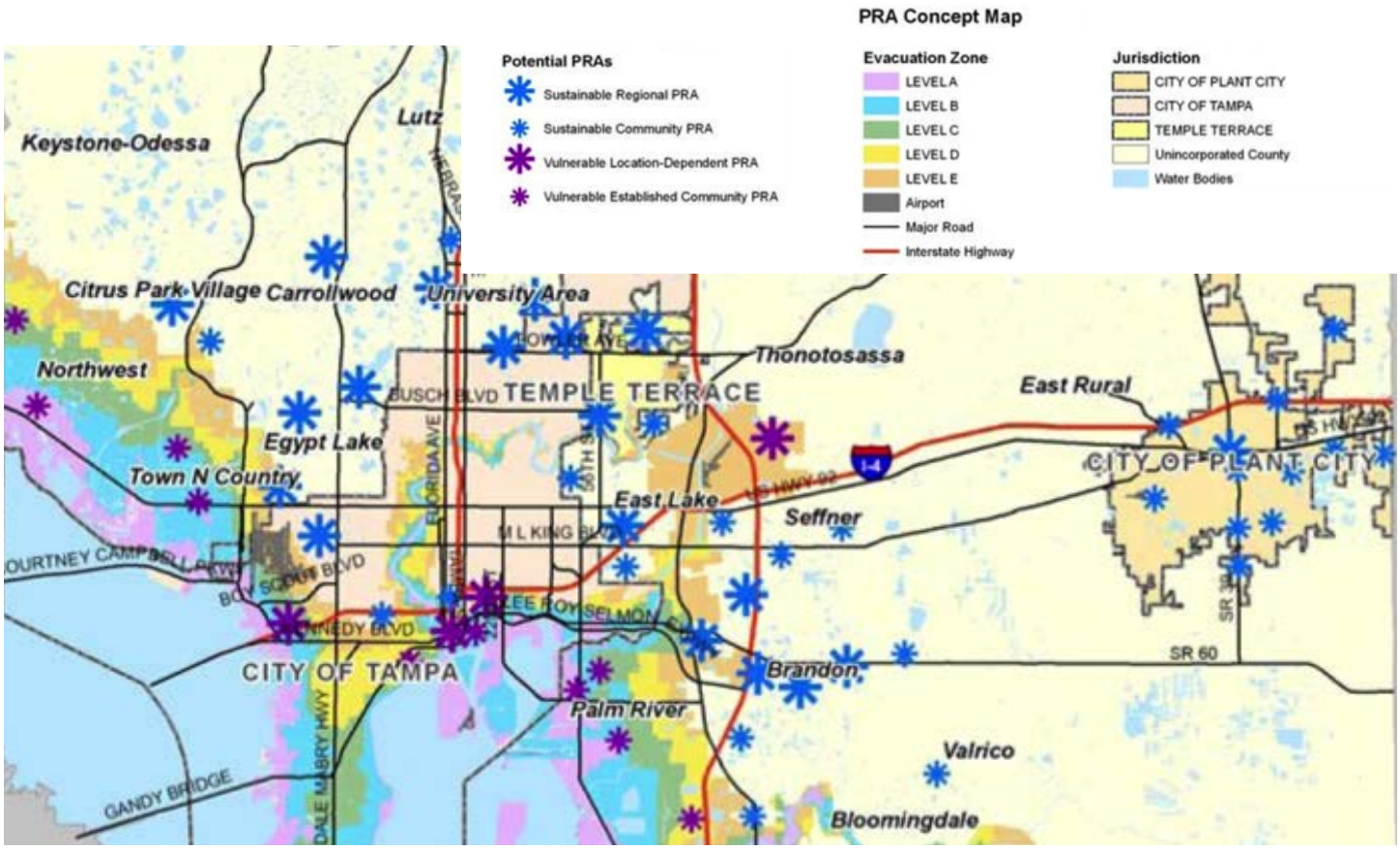
safe transitional housing opportunities.

- Restoration of the economic base of the disaster area(s) and jobs that were lost.
- Sustainable and healthy redevelopment occurring in disaster-resilient land use patterns.
- Public involvement and efficient use of public funds.

It is significant to note that the objectives do not say replacement housing or economic base would be in the same location. They do say there will be "disaster resilient land use patterns."

Priority Redevelopment Areas: Rather than identify areas where redevelopment would not be allowed after being substantially damaged, the Hillsborough County Post-Disaster Redevelopment Plan (pp. 7-16) identified areas that would be encouraged to accept new housing and businesses after the storm. The PRAs are described in the plan as:

> A PRA is a regional or community center or a critical installation essential for disaster recovery and consistent with future land use



A portion of the Priority Redevelopment Area Concept Map Hillsborough County PDRP (p. 7-19).

Pre-Disaster Plan for Post-Disaster Redevelopment

plans. PRAs will receive focused and prioritized attention during the short-term recovery and long-term redevelopment periods and will serve one or more of the following redevelopment functions:

1. Rapidly restore centers of economic activity and critical facilities,
2. Provide a staging area for restoring nearby impacted communities,
3. Locate recovery services in efficient and convenient hubs, and
4. Facilitate growth into disaster resilient centers.

Designating PRAs was not very controversial because (1) they were the areas people would likely move *to*, not move *from*, and (2) they were already designated as development centers in the comprehensive plan. However, a development center would not be a PRA if it was heavily damaged or located in an area vulnerable to a natural hazard. Further, their "generalized locations" were plotted on a "PRA Concept Map" in the plan.

Continual work: The PDRP is a "dynamic plan." It calls for keeping technical advisory committees to follow through on recommendations. They have assignments and projects to prepare over the years. Such continuing work will maintain a cadre of stakeholders familiar with the redevelopment concepts, so when the big one hits, people will not be starting from scratch.

"This Plan will integrate long-term redevelopment and reconstruction opportunities into the community planning process. Through implementation of the Plan via the technical advisory committee structure, limited resources will be managed to provide the most efficient redevelopment process …

Implementation Conceptual Framework

1. Nurture an ongoing Post-Disaster Redevelopment Stakeholder Structure that interfaces with the Local Mitigation Strategy (LMS) Working Group during pre-disaster implementation and with the Redevelopment Task Force established in Ordinance 93-20 during post-disaster implementation.
2. Provide criteria for considering long-term impacts of disaster response and short-term recovery decisions …
4. Develop inclusive lists of organizations and resources that may be available to assist in pre- and post-disaster plan implementation.
5. Integrate long-range policy initiatives from local plans.
6. Capitalize on disaster mitigation and public assistance funds to improve disaster resiliency through pre-disaster research, training, and project planning.
7. Incrementally prepare the community for a more rapid and higher quality disaster recovery through implementation of priority pre-disaster actions each year …" from the PDRP (pp. 1-3).

Pre-Disaster Plan for Post-Disaster Redevelopment

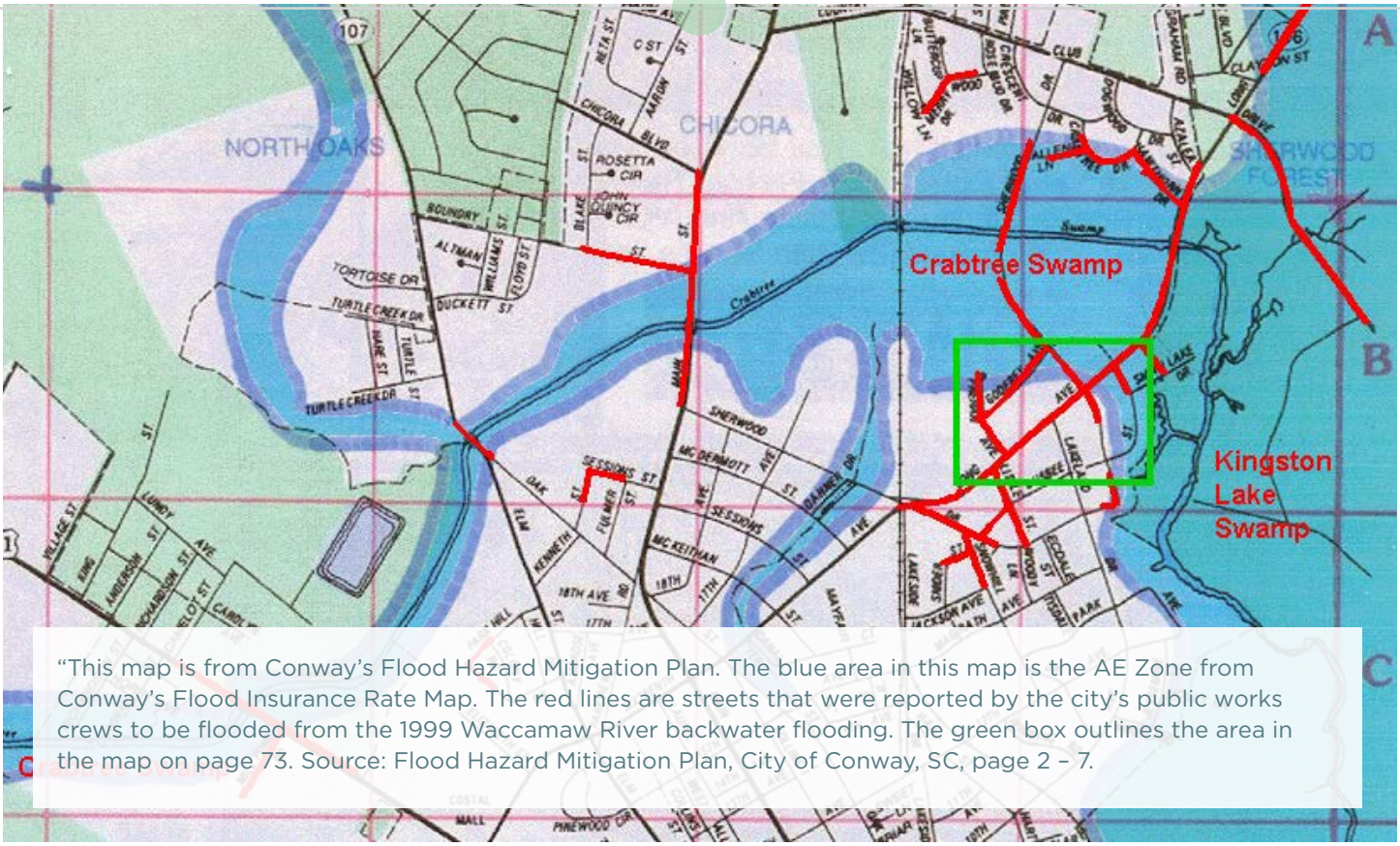
Land use criteria: The land use section of a comprehensive plan is usually where the most effective NAI provisions are found. The land use section of the PDRP (p. 7-1) identified three priority issues to be addressed:

1. Prioritize areas to focus rebuilding, reconstruction, and redevelopment;
2. Build-back standards; and
3. Develop policies for redeveloping land areas that have sustained repeated damages from storm events.

Work was started on these and pilots were tried on priority issues one and three. Staff found all three very controversial and held many meetings with developers and builders. It was concluded that the pilots needed to consider more alternatives and vetting with the stakeholders. Meanwhile, staff cuts further delayed progress on the land use criteria.

The Hillsborough County PDRP does provide variations to code requirements to allow a more rapid recovery. For example, it would allow emergency housing in different zoning districts. But it does not prohibit redevelopment anywhere. That is one of the reasons it was adopted.

Post-Disaster Hazard Mitigation Plan: Conway, SC



"This map is from Conway's Flood Hazard Mitigation Plan. The blue area in this map is the AE Zone from Conway's Flood Insurance Rate Map. The red lines are streets that were reported by the city's public works crews to be flooded from the 1999 Waccamaw River backwater flooding. The green box outlines the area in the map on page 73. Source: Flood Hazard Mitigation Plan, City of Conway, SC, page 2 – 7.

In September 1999, Conway, SC, was being flooded by the Waccamaw River due to heavy rains from Hurricane Floyd. The river had taken two weeks to crest, so there was time for community leaders to act before people rushed to rebuild.

With help from the state's Department of Natural Resources and a FEMA Flood Mitigation Assistance grant, the city formed a Mitigation Planning Committee, hired a consultant, and passed a reconstruction moratorium Sept. 27, the day the Waccamaw crested.

The planning effort was done in two phases. Phase one was to prepare an interim mitigation plan that drew lines on a map to show which properties would be cleared, which needed to be elevated, and which could rebuild with no further requirements. The Interim Report was distributed at a public meeting Oct. 16, a little over two weeks after the moratorium had been enacted.

Phase two was preparation of the complete flood hazard mitigation plan that reviewed all other options for the city to pursue to reduce flood

Post-Disaster Hazard Mitigation Plan, cont.

This case study shows how the step-by-step approach, using best available data and public involvement, resulted in a plan that took advantage of the post-flood window of opportunity. As a result, a hazardous area was cleared of damage-prone homes.

losses. It was presented at a public meeting in December and adopted in February 2000.

The interim and final plans followed the 10-step mitigation planning process. This case study shows how the factors for effective planning helped.

STEP 1. ORGANIZE:

The Mitigation Planning Committee had 12 members, including representatives from five city departments and seven floodplain residents. Two city staff were also floodplain residents and two of the floodplain residents were City Council members. In short, it was an excellent mix of staff and stakeholders, all of them motivated to complete the interim plan as quickly as possible, in part because the floodplain residents had not yet been allowed to start repairs.

STEP 2. INVOLVE THE PUBLIC:

In addition to public members serving on the committee, which advertised its open meetings, a running series of public information efforts was conducted in early October to inform residents of progress and their options. These included:

- A public meeting that explained the regulatory requirements and the planning process, with plenty of time for one-on-one questions and answers after the meeting.
- Handouts covering the rules, procedures, and mitigation options.
- A questionnaire on resident interests, and
- A public meeting when the Interim Report was drafted.

This effort was vital to gain support of the plan. It was especially important for residents to trust that the process would be finished relatively quickly and that it would not have arbitrary recommendations. By the same token, the planning committee was helped by questionnaire results, which were returned by two-thirds of floodplain residents, and showed a high level of interest in relocating out of the floodplain.

STEP 3. COORDINATE:

During the process, planners stayed in touch with county, state, and federal agencies, particularly to stay on top of financial assistance sources.

STEP 4. ASSESS THE HAZARD:

The Interim Report had a section on the flood hazard, explaining that the Hurricane Floyd flood had about the same discharge as the 1-percent chance flood in the Flood Insurance

continued on page 71

Post-Disaster Hazard Mitigation Plan, cont.

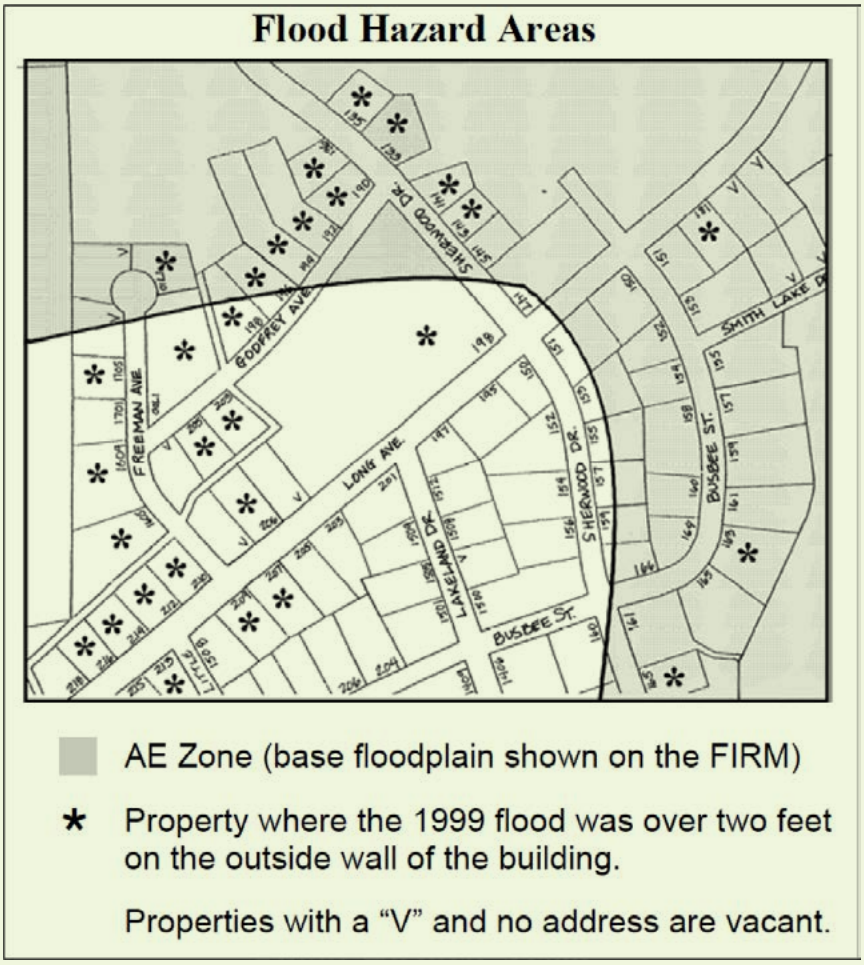
Study. However, it crested 1.5 feet higher than the base flood elevation on the FIRM. Furthermore, a flood in 1928 had been slightly higher than the 1999 crest.

A second concern is illustrated in the map to the right. It noted that the flood did not follow the floodplain boundaries on the FIRM.

As a result of these two findings, the Interim Report recommended, and the City Council approved:

1. The city should use the elevation of the 1999 flood as the basis for protecting new construction and redevelopment from flood damage.
2. The city should not rely on the FIRM to determine the flood hazard or as the basis for floodplain regulations. All properties affected by the 1999 flood should be considered in the regulatory floodplain (p. 5).

This meant the higher historic flood governed the post-disaster reconstruction rules. It also meant the rules affected everyone who got wet, whether they were in FIRM's AE Zone or not.



Source: City of Conway, Flood Hazard Mitigation Plan, Feb. 16, 2000.

STEP 5. ASSESS THE PROBLEM:

While the affected area was relatively small, there were more buildings than the one-person building department could evaluate. Under a newly completed mutual aid agreement with the Building Officials Association of South Carolina, a dozen cities and counties sent staff. After a half-day training session by FEMA on the Residential Substantial Damage Estimator, these officials fanned out as two-person teams and covered all the buildings in a week. They gave the building department detailed reports of their findings, which were given to the residents at the second public meeting.

Post-Disaster Hazard Mitigation Plan, cont.

The results were vital to determining which areas could be repaired and reoccupied, and which needed more time to mitigate. That assessment was matched with information on flood insurance coverage because some grants would only be available for insured properties. The findings were that 19 buildings were substantially damaged. Interestingly, eight of them were in the mapped X Zone.

STEP 6. SET GOALS:

The Mitigation Planning Committee set three overall goals: recover and protect existing development; prevent new development and redevelopment from causing problems (an NAI goal); and integrate mitigation activities with other programs (primarily to secure needed funding).

STEP 7. REVIEW POSSIBLE ACTIVITIES:

A range of activities in six mitigation categories were evaluated in the final mitigation plan. For the Interim Report, the review focused on acquisition, elevation, and wet floodproofing. The last two measures were most feasible because a majority of Conway buildings were on crawlspaces and not substantially damaged. There were many opportunities to replace damaged furnaces and ductwork in crawlspaces with new ones on higher floors or in the attic, which could prevent a lot of damage from shallow, repetitive flooding.

STEP 8. DRAFT AN ACTION PLAN:

The Interim Report had three recommendations:

1. Voluntary floodproofing for non-substantially damaged properties.
2. Acquisition of substantially damaged buildings. Planners had located enough funding sources for the acquisition projects.
3. Mitigation for flooded city facilities (primarily pump stations). These would be funded by FEMA's Section 406 Public Assistance mitigation provision.

During the Interim Report preparations, the committee recommended, and the City Council adopted, a requirement that all new construction be elevated 2 feet above the 1999 flood level.

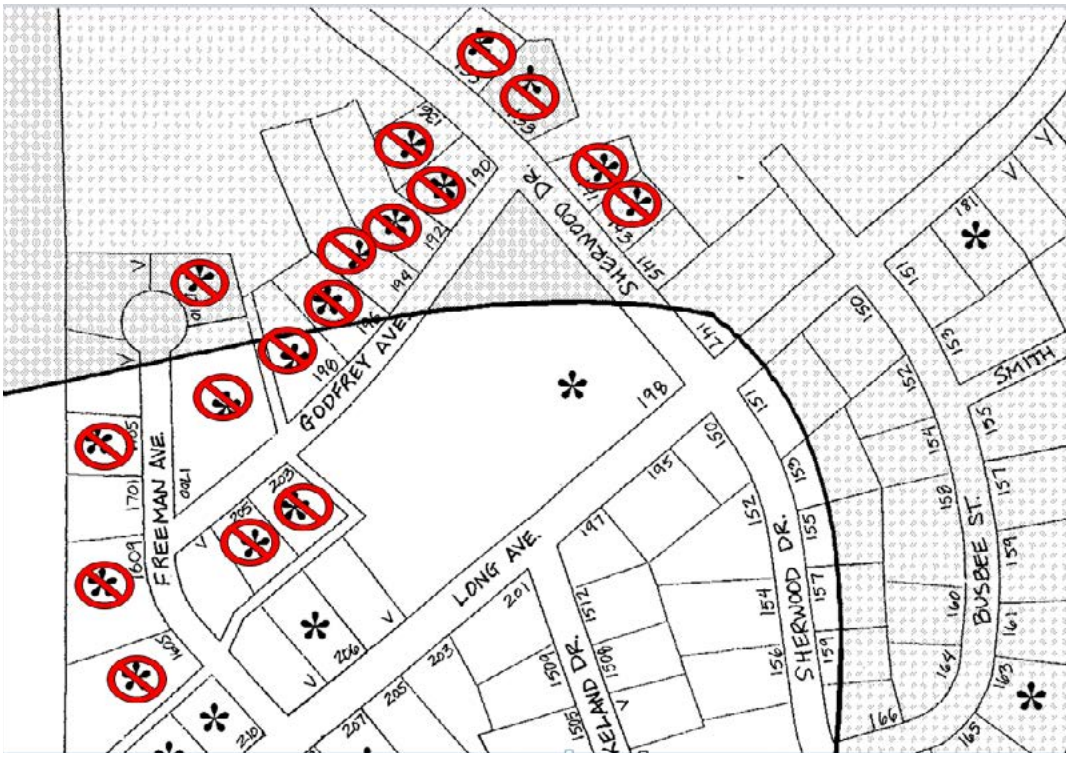
The Final Mitigation Plan had 21 action items, including preparing an open space/greenway concept plan for vacant and acquired areas along streams.

STEP 9. ADOPT THE PLAN:

There were no statements of opposition to the Interim Report at the Oct. 16 public meeting, and was adopted three days later by the City Council.

STEP 10. IMPLEMENT, EVALUATE, AND REVISE:

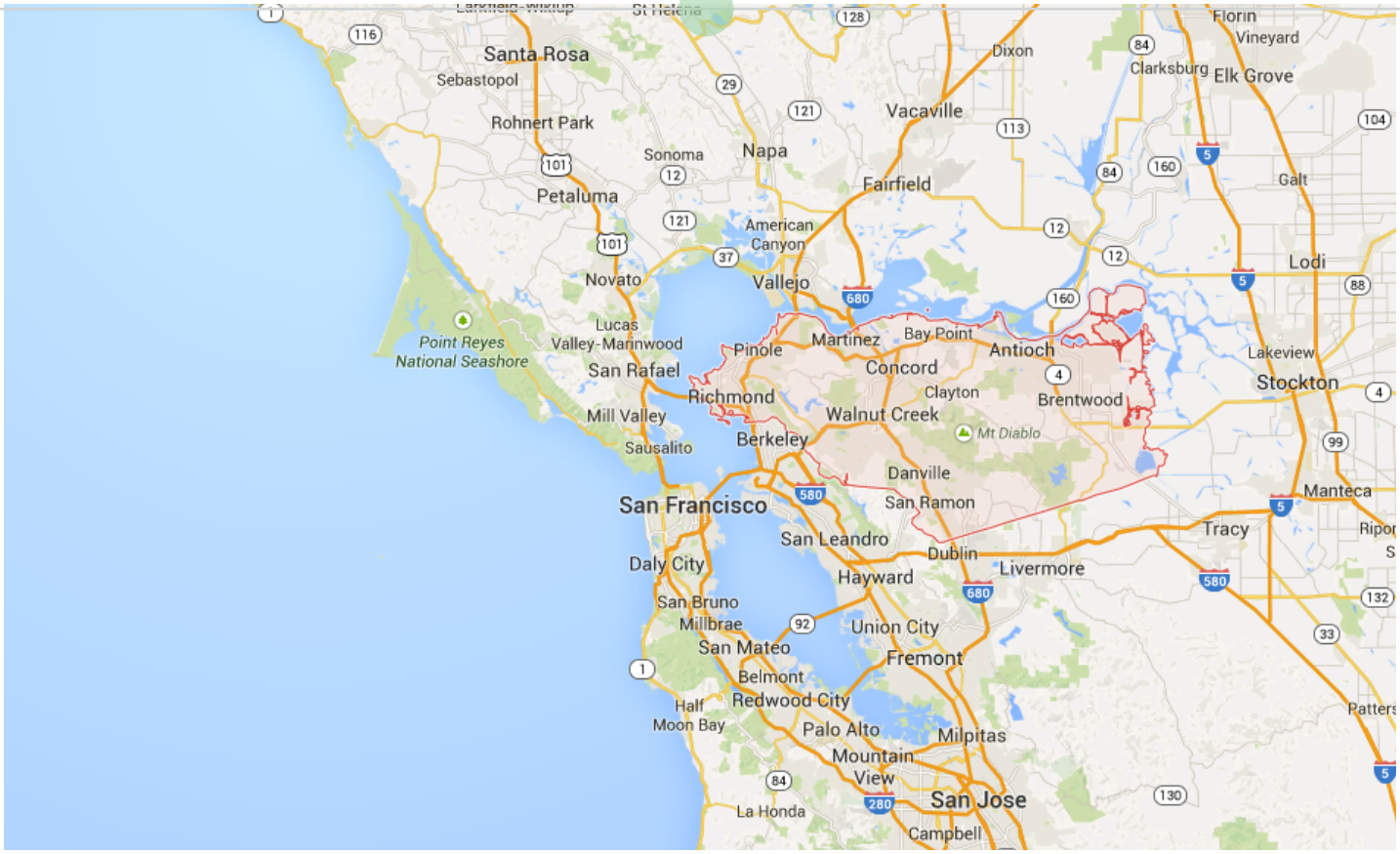
Implementation was facilitated by state support in obtaining grants needed to fund the acquisition.



Map of the properties slated for acquisition in the 1999 Conway, SC Interim Report

A 2012 Google Earth® photo showing most of the slated parcels as vacant in Conway, SC

Working with Allies in Contra Costa County, CA



"Involve the public" and "coordinate with others" are two factors for effective planning illustrated in this success story from ASFPM's guide "Using Multi-Objective Management to Reduce Flood Losses in Your Watershed," p. 41.

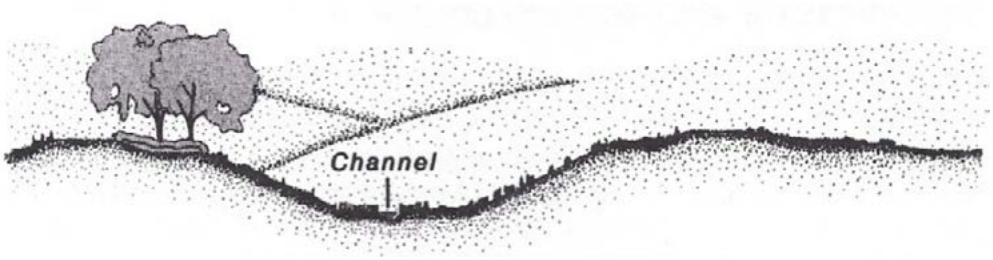
The Wildcat and San Pablo Creeks flow through Contra Costa County, northeast of San Francisco. Proposed flood control plans to modify the creeks' channels were turned down by residents and others because they were too expensive, would destroy riparian habitat, and had no recreational or other community benefits.

A coalition was formed to prepare alternative plans. The coalition included a neighborhoods coordinating council, environmental groups, and a parks committee. A consensus plan was developed with support from the county government and staff support from state and federal conservation and recreation agencies.

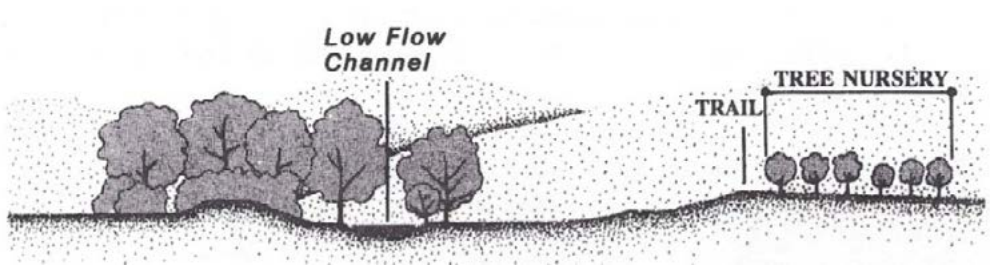
continued on page 75

Working with Allies, cont.

"If you have only one objective – 'stop the flooding'–you may spend a lot of time and money on your one problem and you may create more problems for other people. You will be competing with other communities that want funds for expensive structural projects. You will even be competing with others in your own community who have different goals in mind. The [multi-objective management] approach helps you take charge of your future by looking at all the things your community needs and seeing how they can be combined with possible ways to reduce flood losses." – Using Multi-Objective Management to Reduce Flood Losses in Your Watershed (p. 3).



ORIGINALLY PROPOSED PLAN



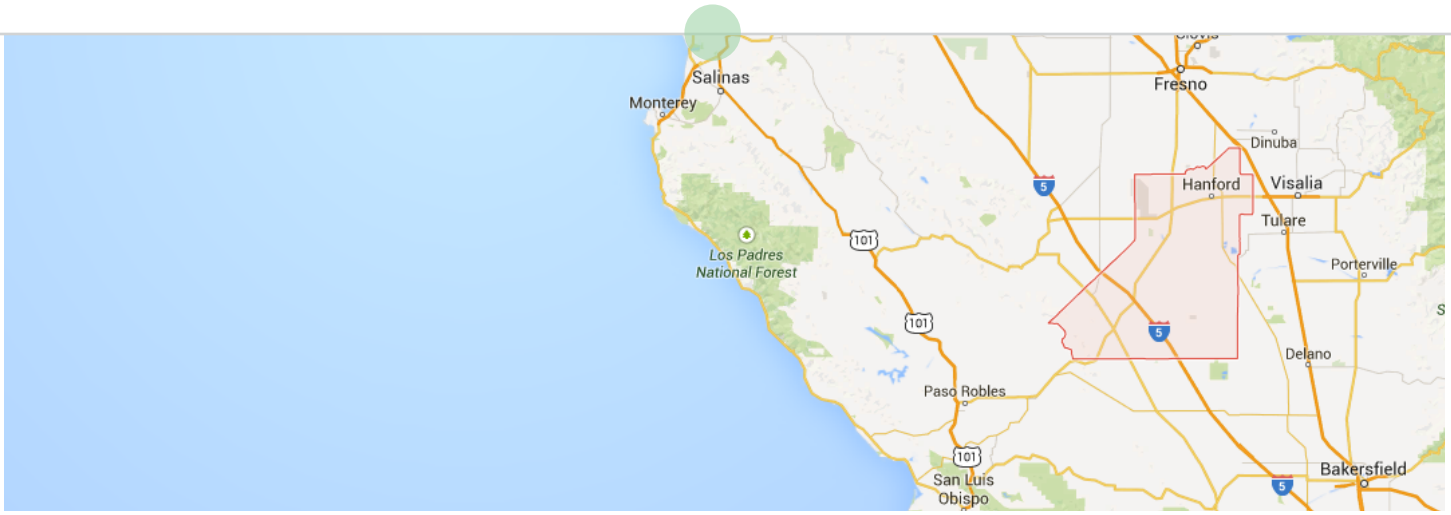
FINAL COALITION PLAN

Image adapted from Using Multi-Objective Management (p. 41). www.floods.org/PDF/Using_MOM_in_Watershed.pdf

The consensus plan incorporated natural channel geometry in the same area that had been reserved for channel modifications, protection of wetlands from sediment loads, and restoration of riparian vegetation. A low flow channel is maintained using natural features and minimal human intervention. The channel and its floodplain provide recreational and educational opportunities with trails and recreation areas. A nature study area was established at an elementary school that is located on Wildcat Creek.

The plan was promoted as serving multiple objectives of flood control, marsh restoration, educational opportunities, and environmental enhancement. While the earlier single-purpose channel project could not be funded (top), the Final Coalition Plan (bottom) was implemented with $2.5 million from the local park district, USACE, and three state agencies.

Examples of Coordinated Plans



KINGS COUNTY, CA

Kings County adopted its hazard mitigation plan in 2007, and finished its comprehensive plan soon after. The 2035 Kings County General Plan (*link below*) incorporated the mitigation plan by reference. The General Plan has an entire section dedicated to reducing and eliminating long-term vulnerability to hazards, which is coordinated with one of the General Plan's major concerns: to protect the county's economic base – farming – from urban development.

Some excerpts from the Health and Safety Element of the General Plan are listed below (p. HS-44):

- HS GOAL A4 Prevent unnecessary exposure of people and property to flood damage.
- HS OBJECTIVE A4.1: Direct new growth away from designated flood hazard risk areas, and regulate new development to reduce the risk of flood damage to an acceptable level….
- HS Policy A4.1.2: Reserve FEMA designated flood hazard areas for agricultural and natural resource conservation uses along the floodway channels and Tulare Lake Basin.
- HS Policy A4.1.4: Direct new urban growth to existing cities and community districts, or away from New Community Discouragement Areas to avoid flood hazard areas and increased risk to people and property.
- HS Policy A4.1.5: Regulate development, water diversion, vegetation removal, and grading to minimize any increase in flood damage to people and property.

Links: 2035 Kings County General Plan:
www.countyofkings.com/departments/community-development-agency/information/2035-general-plan

Examples of Coordinated Plans, cont.

TULSA, OK

When it was updated in 2009, the city of Tulsa Multi-Hazard Mitigation Plan (*link below*) took all related existing plans into account. In turn, the mitigation plan has been integrated into the following:

- City of Tulsa Community Rating System Plan
- City-County Heat Emergency Action Plan
- Drainage Master Plans
- Non-Structural Mitigation Plan
- Pearl District Plan
- Repetitive Loss Plan
- Tulsa County Multi-Hazard Mitigation Plan
- Tulsa Emergency Operations Plan
- City of Tulsa Technical Hazards Mitigation Plan
- Tulsa Historic Preservation & Cultural Resources Annex to the Multi-Hazard Mitigation Plan
- Tulsa Metropolitan Area Major Street and Highway Plan
- Tulsa Public Schools Multi-Hazard Mitigation Plan

Link: Multi-Hazard Mitigation Plan: www.cityoftulsa.org/media/275990/2009hmplan-woapph.pdf

Arnold's Comprehensive Plan (p. IX-3), shows the large Meramec Greenway in the floodplain.
Link: http://bit.ly/1KOIG6J

PLANNING FOR OPPORTUNITIES: ARNOLD, MO

"In 1991, the city of Arnold prepared a floodplain management plan, in part to meet requirements of the Community Rating System. The plan identified a need to purchase some damage-prone properties in the Meramec River floodway and develop a greenway along the riverfront.

"The planners recognized that funding would be needed for such a large undertaking, noting, 'While there are no funds presently available to relocate these homeowners, such funds often become available after a flood.' At that time, the building commissioner and community development director were tasked to stop reconstruction of these buildings after a flood (or other disaster) until funding sources were checked and an acquisition project was reviewed with the owners.

"In fact, such activities were implemented less than two years later, following the Great Mississippi Flood of 1993. Arnold received the needed funding and now has a greenway. After that flood, the city was recognized by FEMA as one of the best-prepared communities for mitigation funding," from Natural Hazards Informer, July 1999 (p. 12).

Examples of Coordinated Plans, cont.

BEST AVAILABLE SCIENCE AND PUBLIC INVOLVEMENT: THE KEYS TO NAI MEASURES IN CHARLOTTE AND MECKLENBURG COUNTIES, NC

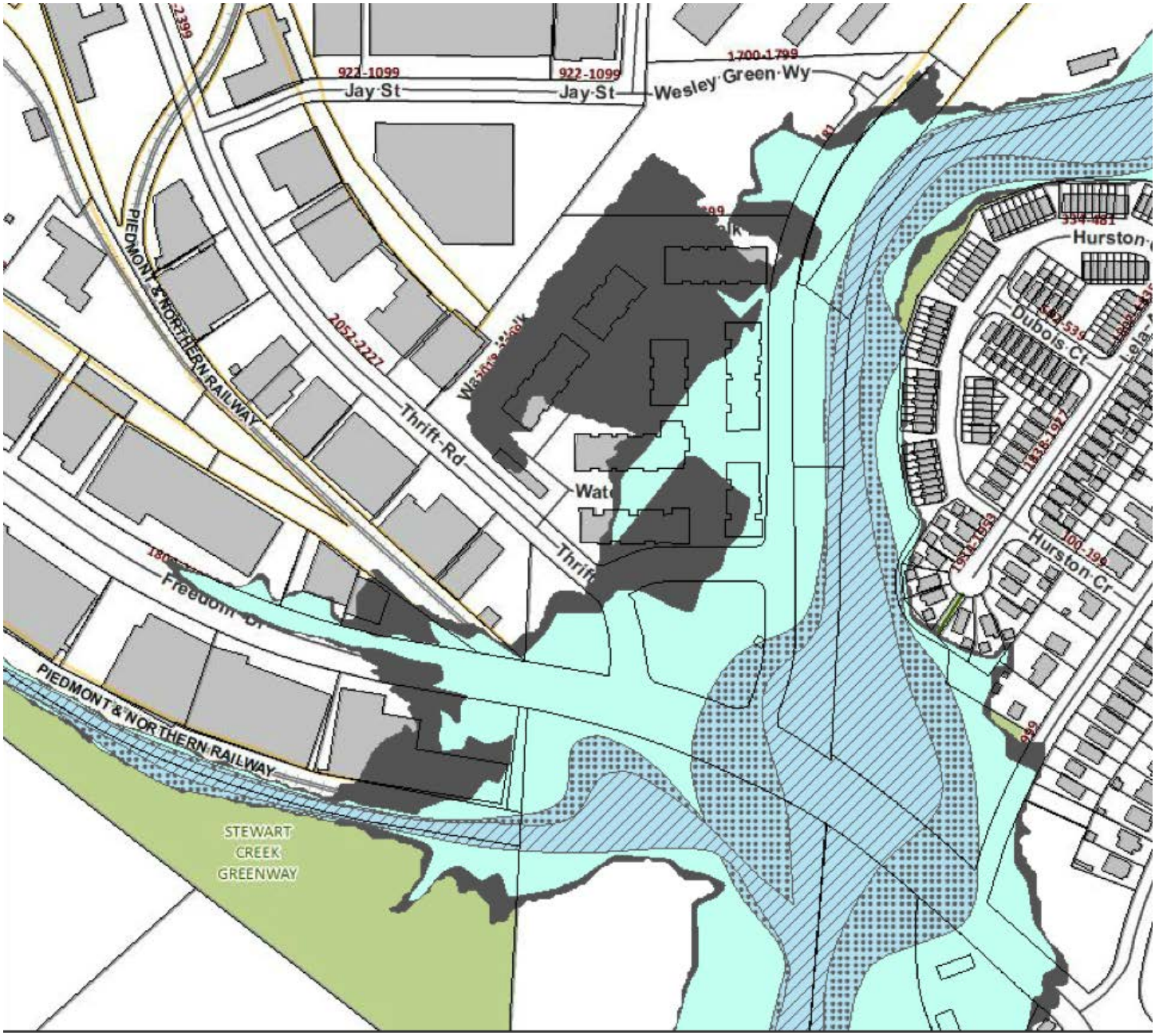
After several floods in the 1990s, Charlotte-Mecklenburg Storm Water Services staff realized the 1975 Flood Insurance Study did not reflect the actual risk. Staff knew that if the maps were updated using current conditions, they would become outdated again and new development would be exposed to continued flooding.

Rather than prepare a new study based on the current level of watershed development, the office used "build-out land-use" conditions to model runoff. The difference on some streams was enough to lead staff to recommend a higher standard regulatory floodplain based on future conditions (shown in grey on the map on the next page), in addition to the Flood Insurance Rate Map's Special Flood Hazard Area (shown in blue).

Staff knew extending floodplain regulations to a larger area would not be well-received by affected property owners or developers. If enough people opposed the idea, it would not pass the respective councils. Accordingly, a stakeholder involvement process was initiated. After meetings with different groups and organizations, staff showed and explained the model's findings. Several engineers representing the stakeholders reviewed the models and convinced their clients they were accurate.

Eventually several key organizations, including the real estate board and chamber of commerce, agreed that the maps were based on "good science." The explanations included calculations of losses from the build-out scenario, showing the increased costs of flood damage if the maps were not adopted. The office also set up an online flood zone interactive map, where anyone could see the results for their own properties. As a result of this effort, the maps were adopted without much protest. They have also been used in subsequent area plans prepared by the planning department.

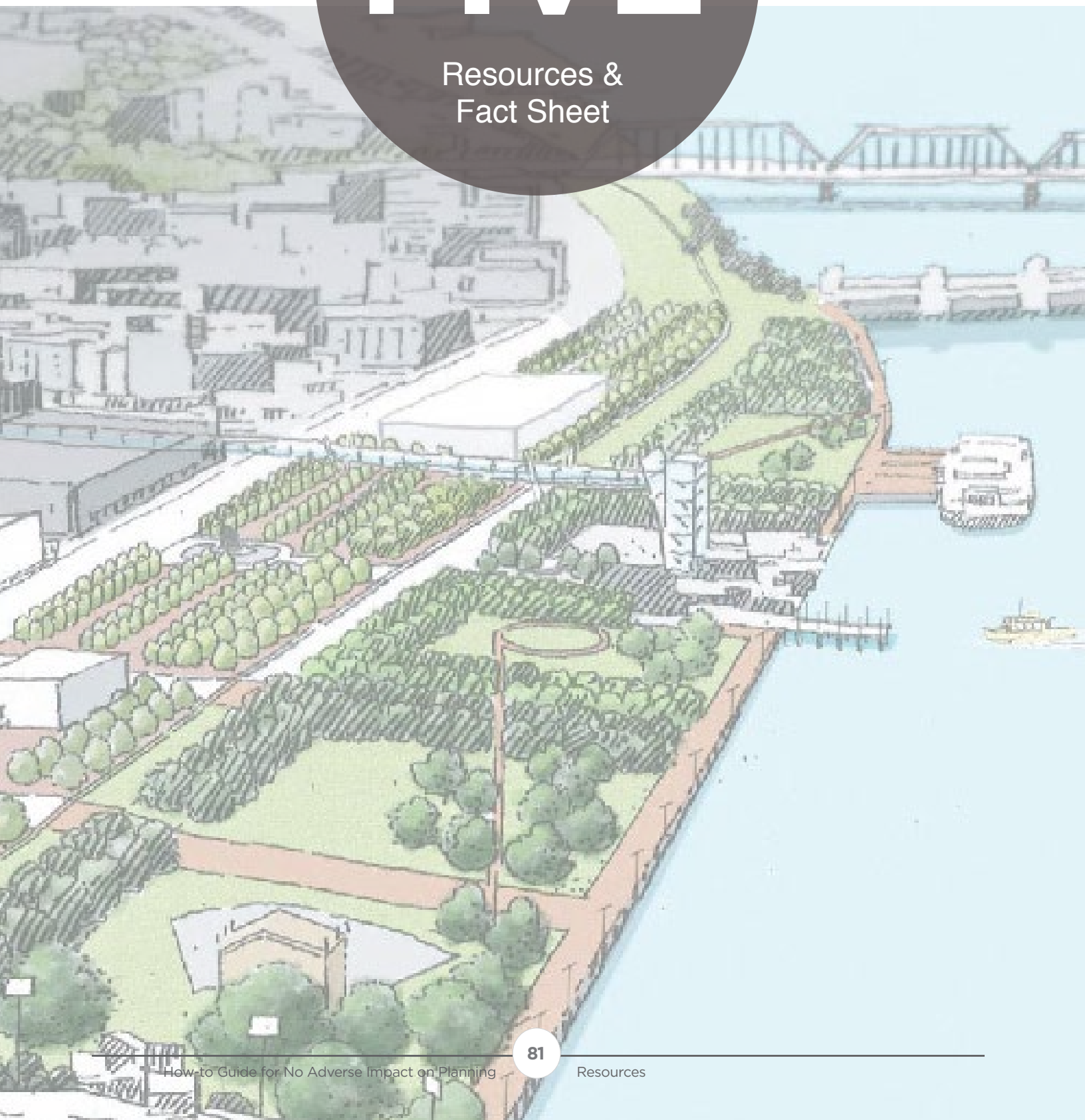
Concurrently, Storm Water Services worked with environmental groups, citizens, and developers to improve water quality. The result was a stream buffer plan that set buffer widths according to the size of the contributing drainage areas. Designed to reduce polluted runoff, the buffer areas effectively prevent development, even where their boundaries extend beyond the mapped floodplain.



Excerpt from Storm Water Services' regulatory floodplain map, courtesy of Charlotte-Mecklenburg Storm Water Services. In the map above, blue indicates the FIRM 1-percent chance floodplain, while the dark grey indicates the "Build-out" floodplain.

SECTION FIVE

Resources & Fact Sheet



Resources, cont.

COMPREHENSIVE PLANNING

- "Flooding and Planners," in *Environment & Development*, American Planning Association, July/August 1996.
- *Integrating Hazard Mitigation into Local Planning – Case Studies and Tools for Community Officials*, FEMA, 2013. http://1.usa.gov/1EIuZlY
- Planning Primer, US Army Corps of Engineers Institute for Water Resources, 1997. www.au.af.mil/au/awc/awcgate/army/97r15.pdf
- Using Multi-Objective Management to Reduce Flood Losses in Your Watershed, Association of State Floodplain Managers, 1996. www.floods.org/PDF/Using_MOM_in_Watershed.pdf

MITIGATION PLANNING

- "Beyond the Basics – Best Practices in Local Mitigation Planning" a mitigation planning resource website by the University of North Carolina's Institute for the Environment: www.mitigationguide.org.
- *CRS Coordinator's Manual*, FEMA, 2013, www.crsresources.org.
- "Great Lakes Coastal Resilience Planning Guide," a mitigation planning resource website developed by NOAA, ASFPM, and other organizations: www.greatlakesresilience.org.
- Example Plans, FEMA, 2007 (Guide to CRS credit for Activity 510 – Floodplain Management Planning). http://1.usa.gov/1Fh52xE
- "Flood Mitigation Planning – the CRS Approach," Natural Hazards Informer, July 1999, http://bit.ly/1H5SyFZ.
- *Hazard Mitigation: Integrating Best Practices into Planning*, APA, Planning Advisory Service Report Number 560, 2010. http://bit.ly/1bSZiyn
- *Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan – A Guidebook for Local Governments*, FEMA Region X, 2013. www.fema.gov/media-library/assets/documents/89725
- *Local Mitigation Planning Handbook*, FEMA, 2013. www.fema.gov/media-library/assets/documents/31598
- Mitigation Planning "How-To" Guides, FEMA. There are nine guides on different aspects of mitigation planning. www.fema.gov/hazard-mitigation-planning-resources#1

POST-DISASTER PLANNING

- "Building Back Better: Creating a Sustainable Community After Disaster," *Natural Hazards Informer*, January 2002, http://bit.ly/1H5SyFZ.
- *Build Back Safer and Smarter*, Natural Hazard Mitigation Association, 2013, http://recovery.stormsmart.org.
- *Building Resilience: Social Capital in Post-Disaster Recovery*, Daniel R. Alfrich, 2012. University of Chicago Press. http://bit.ly/1IBkyXQ
- *Long-Term Community Recovery Planning Process*: A Self-Help Guide, FEMA, 2005 www.fema.gov/pdf/rebuild/ltrc/selfhelp.pdf.
- *National Disaster Recovery Framework*, FEMA 2011 www.fema.gov/pdf/recoveryframework/ndrf.pdf.
- *National Flood Insurance Program Floodplain Management Requirements Desk Reference*, FEMA 480, Unit 10. Disaster Operations. http://bit.ly/1Hgn0jb
- Planning and Building Livable, Safe & Sustainable Communities: The Patchwork Quilt Approach, Natural Hazard Mitigation Association, October 2014, http://nhma.info/publications/the-patchwork-quilt/
- *Planning for Post-Disaster Recovery and Reconstruction*, American Planning Association, Planning Advisory Service (PAS) Report 483/484, 1998. http://1.usa.gov/1JinmYP
- *Post-Disaster Recovery Planning Forum: How-To Guide*, Partnership for Disaster Resilience, University of Oregon, 2007. http://1.usa.gov/1IBkvv0
- *Post-Disaster Redevelopment Planning: A Guide for Florida Communities*, Florida Department of Community Affairs, 2010. http://bit.ly/1RL3bGC
- *Pre-Disaster Planning for Post-Disaster Recovery: Case Studies*, University of Oregon, Community Planning Workshop, for FEMA, 2010. http://bit.ly/1Fh4vMe

RISK ASSESSMENT

- www.fema.gov/hazus

PUBLIC INVOLVEMENT

- *Building Public Support for Floodplain Management*, ASFPM, 2008. http://bit.ly/1EIu0Ce
- NAI how-to guide for education and outreach.

Fact sheet: How-to Guide for No Adverse Impact

"If we continue to encourage at-risk development and ignore the impact to others, can we accept the consequences and, are you willing to pay for it?"

-Larry Larson, ASFPM

"No adverse impact (NAI) is an approach that ensures the action of any community or property owner, public or private, does not adversely impact the property and rights of others."

-NAI Toolkit, 2003

For case studies and specific examples of NAI success, visit http://bit.ly/1H5SeXL.

To speak to a No Adverse Impact expert, contact ASFPM at ASFPM@Floods.org or (608) 828-3000.

THE CONCEPT

Communities that effectively reduce flood losses and promote and protect public safety look at alternative approaches to flooding and flood problems to make sure the actions of one person do not adversely affect others. That is the essence of No Adverse Impact floodplain management.

Planning is a profession that assures community development decisions are rational and that all the alternatives, impacts, and repercussions are considered in the decisionmaking process. Floodplain management is most successful when floodplain managers and planners work closely together to ensure their respective goals and activities are coordinated and reflect the NAI approach.

The *NAI Planning How-to Guide* shows how the two professions can do this. It helps build on eight factors for effective planning:

1. Use the best available science
2. Be future oriented
3. Involve the public
4. Coordinate with others
5. Review all the alternatives
6. Develop feasible recommendations
7. Aim high
8. Evaluate implementation

There are many opportunities for floodplain managers and planners to work together to forward NAI objectives. The Guide identifies five tools that can be particularly useful in this process:

- Comprehensive Planning
- Hazard Mitigation Planning
- Post-Disaster Planning
- Risk Assessment
- Public Involvement

COMPREHENSIVE PLANNING

Most planning activities focus on the comprehensive plan. The comprehensive plan sets the stage for other plans, regulations, policies, and programs that implement the comprehensive plan's goals. By being active in the comprehensive planning process, floodplain managers can affect many other planning tools that can reduce flood losses. The Guide shows five steps that can be followed to integrate NAI into the comprehensive planning process.

HAZARD MITIGATION PLANNING

Mitigation planning focuses on actions that can reduce flood losses. Almost every community has a mitigation plan and floodplain managers should be closely involved in mitigation planning. Therefore, it makes an excellent tool for building better connections with planners and forwarding the NAI message. The Guide follows a 10-step mitigation planning process and identifies where NAI can be integrated into mitigation planning.

POST-DISASTER PLANNING

Many opportunities for NAI actions arise after a flood or other disaster. A post-disaster plan for recovery or mitigation can be very effective by curbing the return to pre-disaster conditions and reducing a community's exposure to flood losses. The Guide shows how to incorporate NAI into long-term recovery planning and immediate post-disaster mitigation planning.

RISK ASSESSMENT

Planning and floodplain management efforts are built on a description of the hazard and its impact on development (and the impact of development on natural floodplain functions). An NAI risk assessment goes well beyond the traditional approach of depending on the community's Flood Insurance Rate Map or reacting to the most recent flood. The Guide shows how it should incorporate unmapped flood problems, flood-related hazards (such as coastal and riverine erosion), and future flooding conditions.

PUBLIC INVOLVEMENT

Plans are not adopted and implemented by floodplain managers and planners. Elected officials do the adopting and most plans rely on other organizations, the private sector, and individual property owners to implement some of their recommendations. Therefore, it is vital to involve these community's stakeholders in the planning processes. The Guide has five steps for involving the public in all types of planning.

IN SUMMARY

Comprehensive and other types of plans can be very helpful in implementing an NAI program. The key is for the floodplain manager to be involved in the planning processes to ensure that NAI approaches are considered. The How-To Guide reviews five tools that do this and shows how nine communities have used these tools to forward the NAI message to make their citizens safer and reduce their flood risk and associated costs from flooding.

RESOURCES

For more information refer to ASFPM's NAI Resource Center: http://bit.ly/1Ei2r19