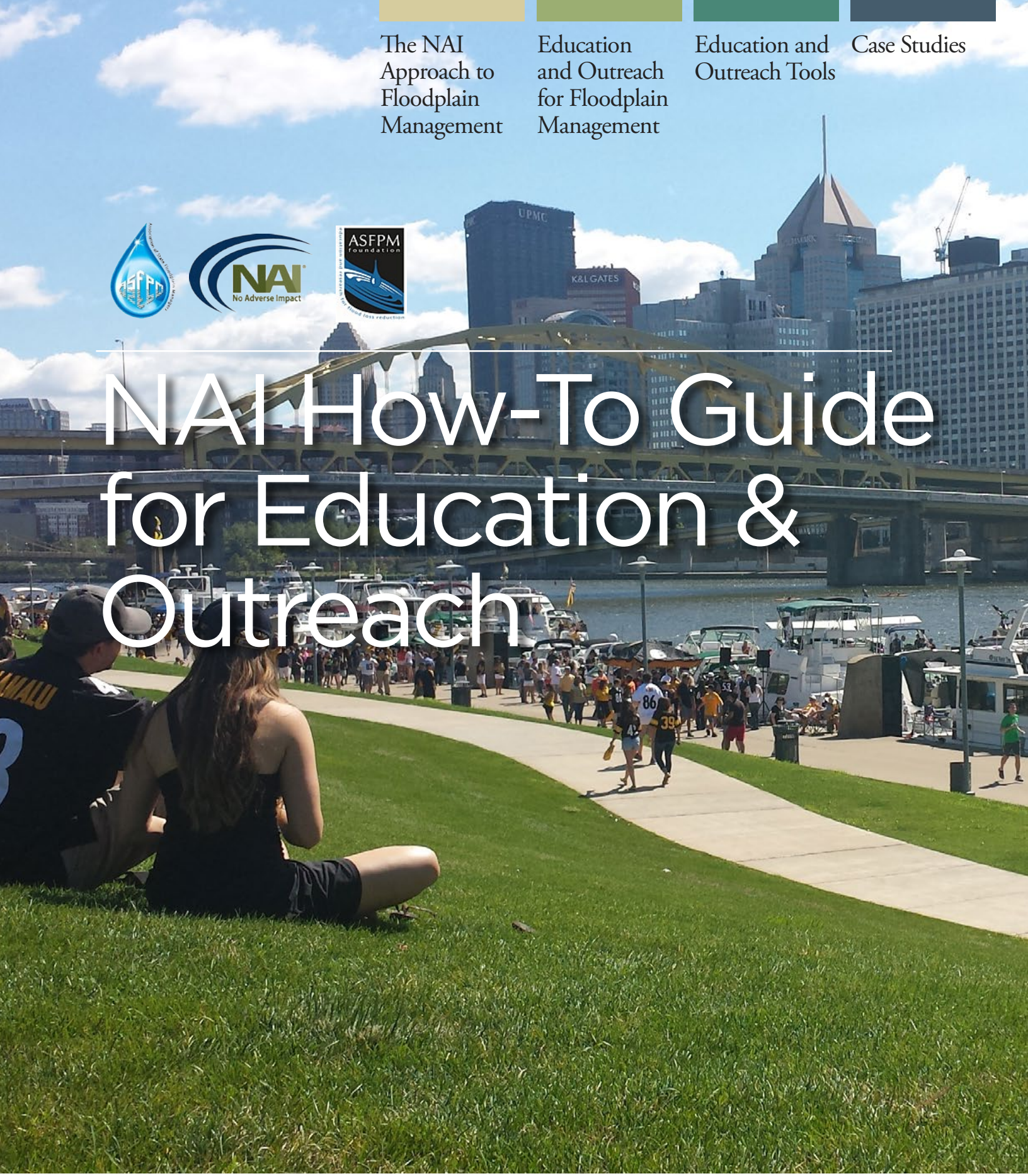
The NAI Approach to Floodplain Management

Education and Outreach for Floodplain Management

Education and Outreach Tools

Case Studies




# NAI How-To Guide for Education & Outreach



*Education & Outreach*

# Education and Outreach

SECTION ONE
The NAI Approach

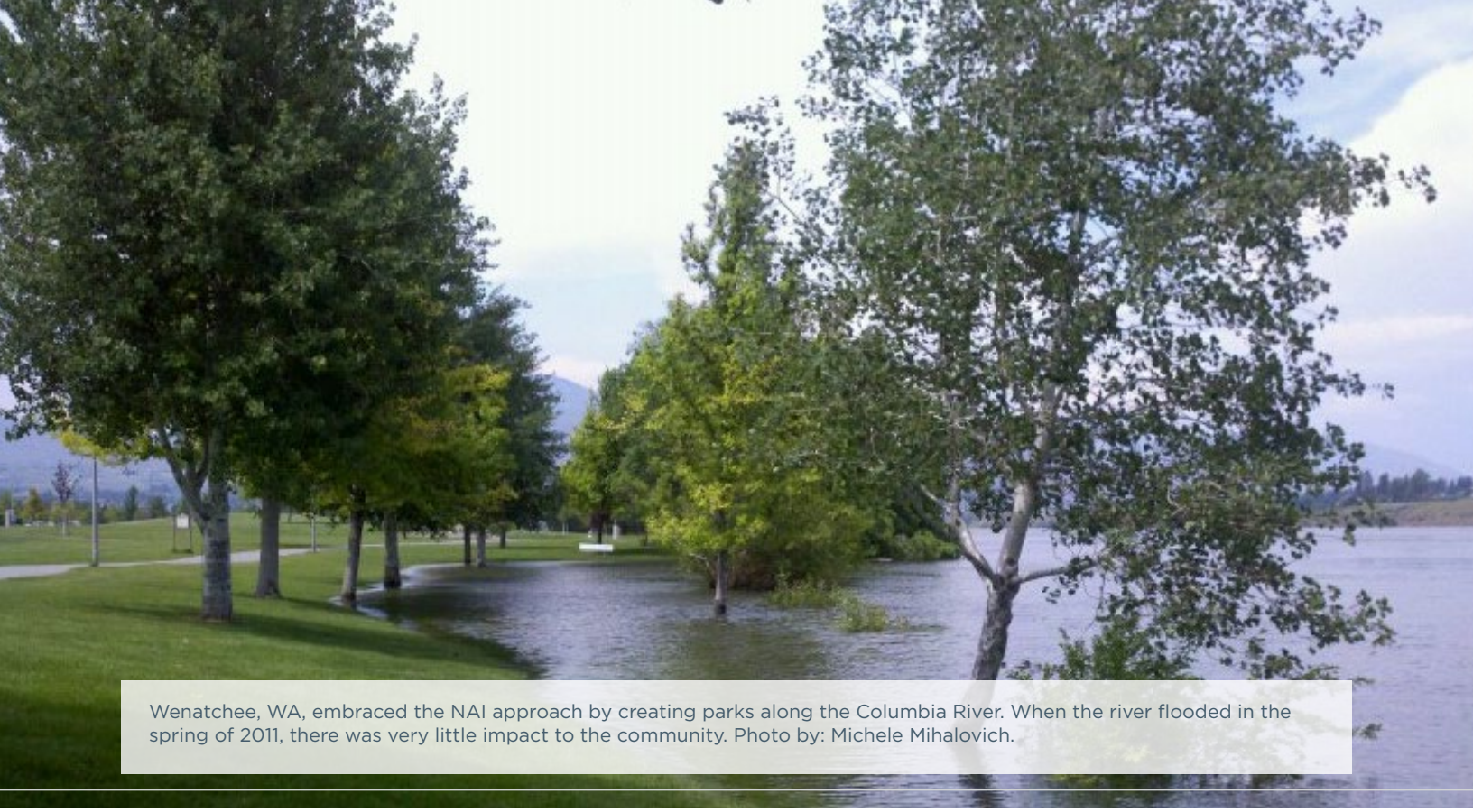
SECTION TWO
Education and Outreach

SECTION THREE
Education and Outreach Tools



## ON THE COVER:

Floodplains attract people for a variety of reasons. Flooding is usually not one of them. Communities can take advantage of people's interest in their riverfront and educate them about flooding, flood protection measures, and protecting natural floodplain functions with signs or other education and outreach tools. Photo of the North Shore Riverfront Park that runs along one of the rivers in Pittsburgh, PA. Photo by Michele Mihalovich.



Wenatchee, WA, embraced the NAI approach by creating parks along the Columbia River. When the river flooded in the spring of 2011, there was very little impact to the community. Photo by: Michele Mihalovich.

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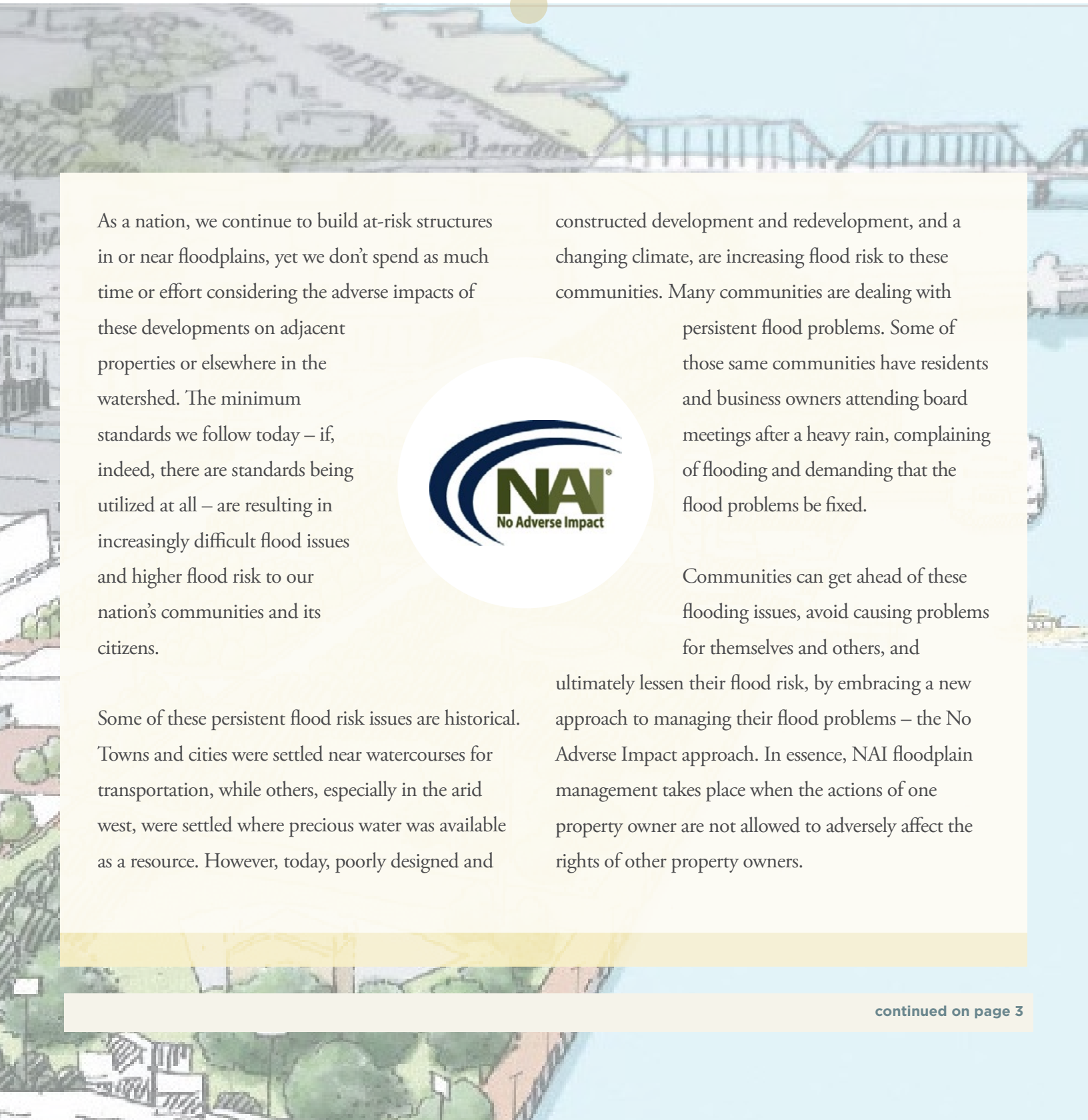
# Introduction



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.

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# Who Should Use this Guide?

After a flood, damage assessments are conducted to identify where changes can be made during repairs and reconstruction. 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 education and outreach, 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 education and outreach 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:** Education & Outreach for Floodplain Management
**SECTION THREE:** Education & Outreach Tools
**SECTION FOUR:** Case Studies
**SECTION FIVE:** Resources & Fact Sheet

After reading this *Guide*, it is recommended that a community conduct an assessment of its education and outreach 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



**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.

after reviewing the other *Guides* in this series.

**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.

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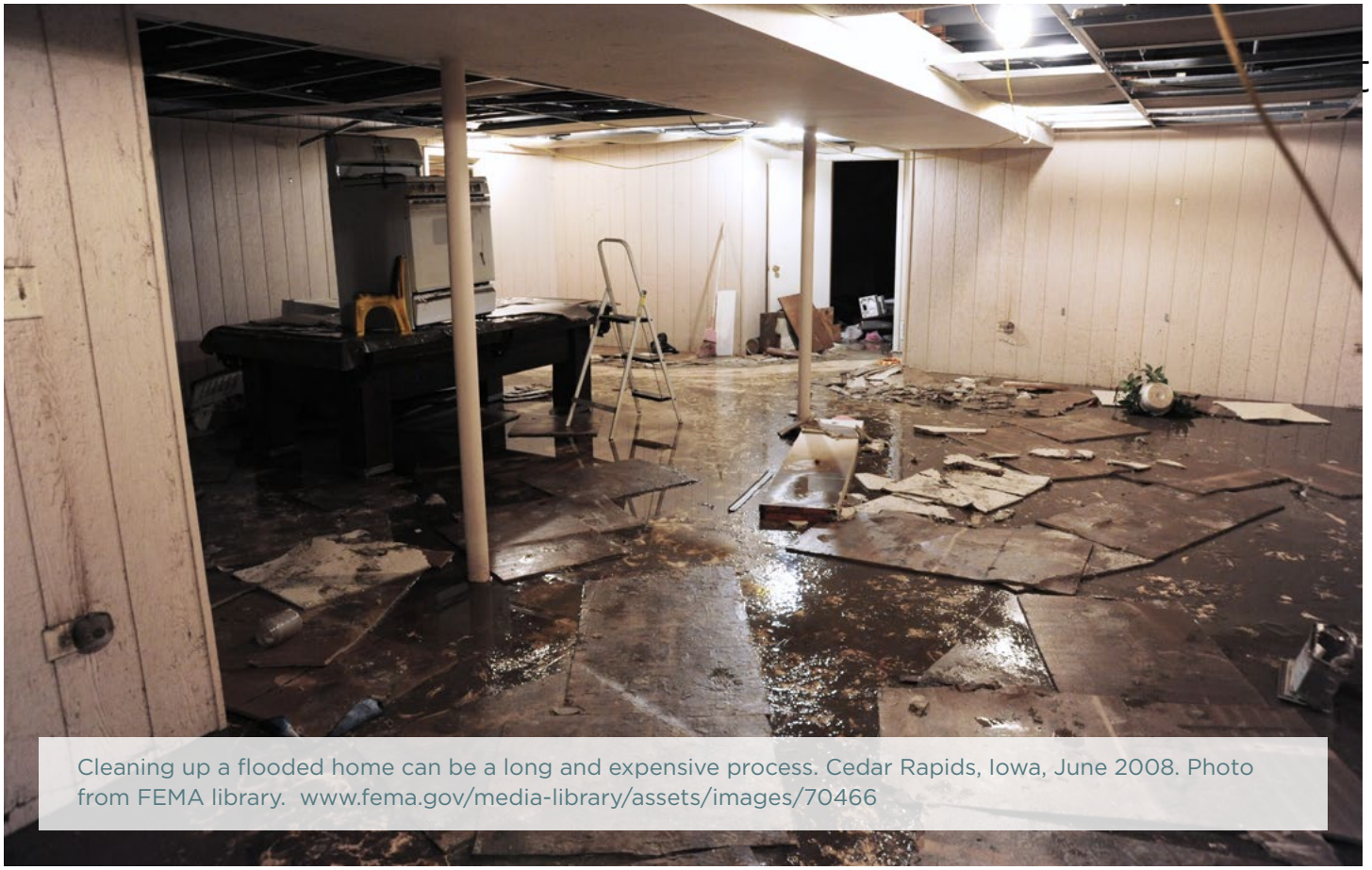
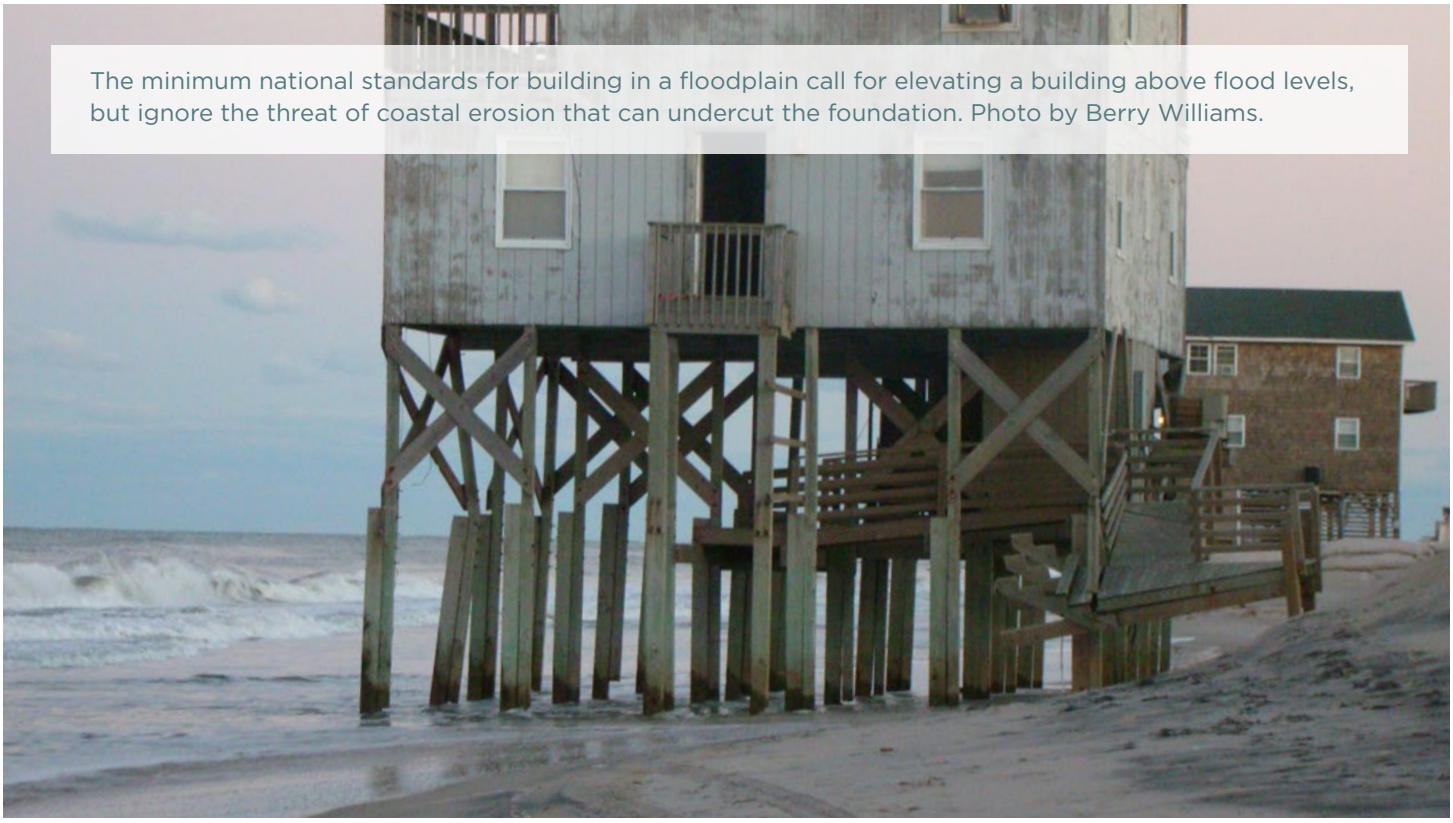


Cleaning up a flooded home can be a long and expensive process. Cedar Rapids, Iowa, June 2008. Photo from FEMA library. www.fema.gov/media-library/assets/images/70466

## 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.

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**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:

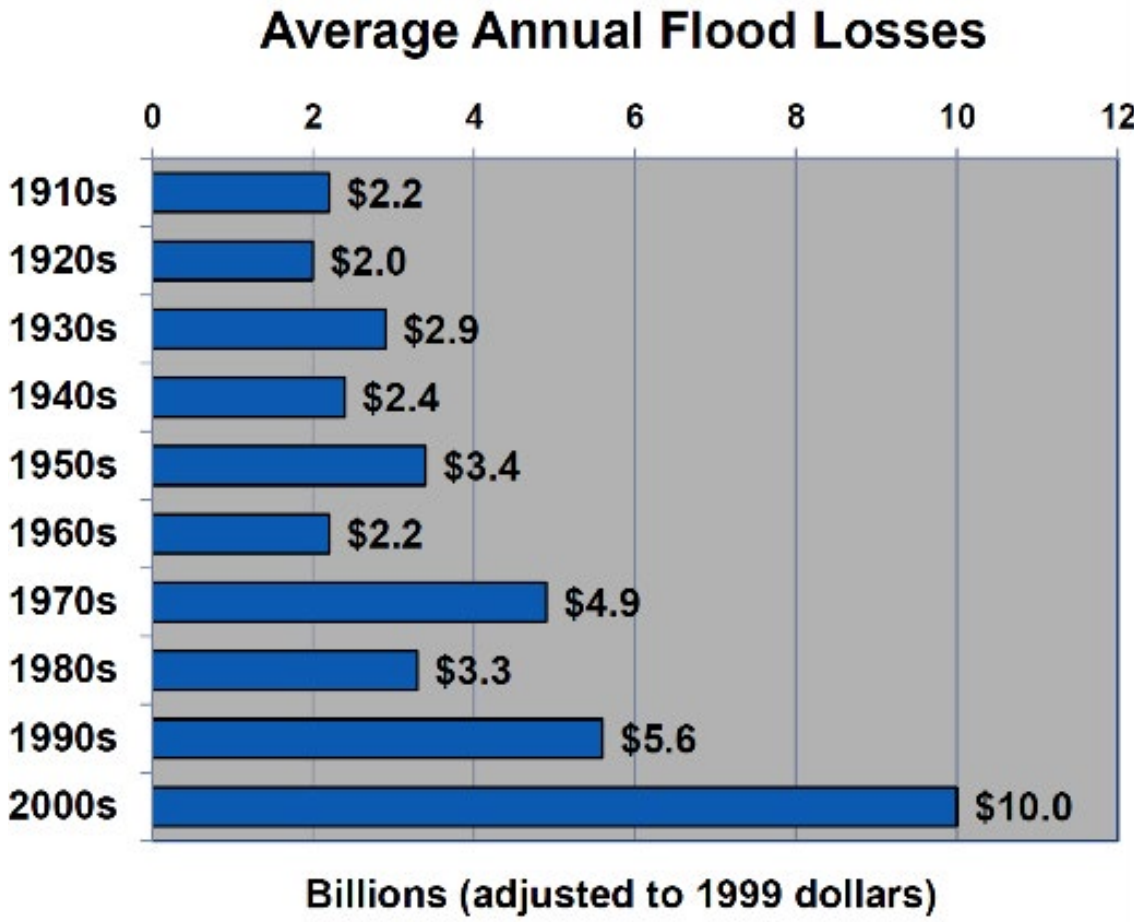

Comic created by Rob Pudim, and appeared in Natural Hazards Observer, May 2014.

- 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

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# 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.

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# The No Adverse Impact Approach, cont.

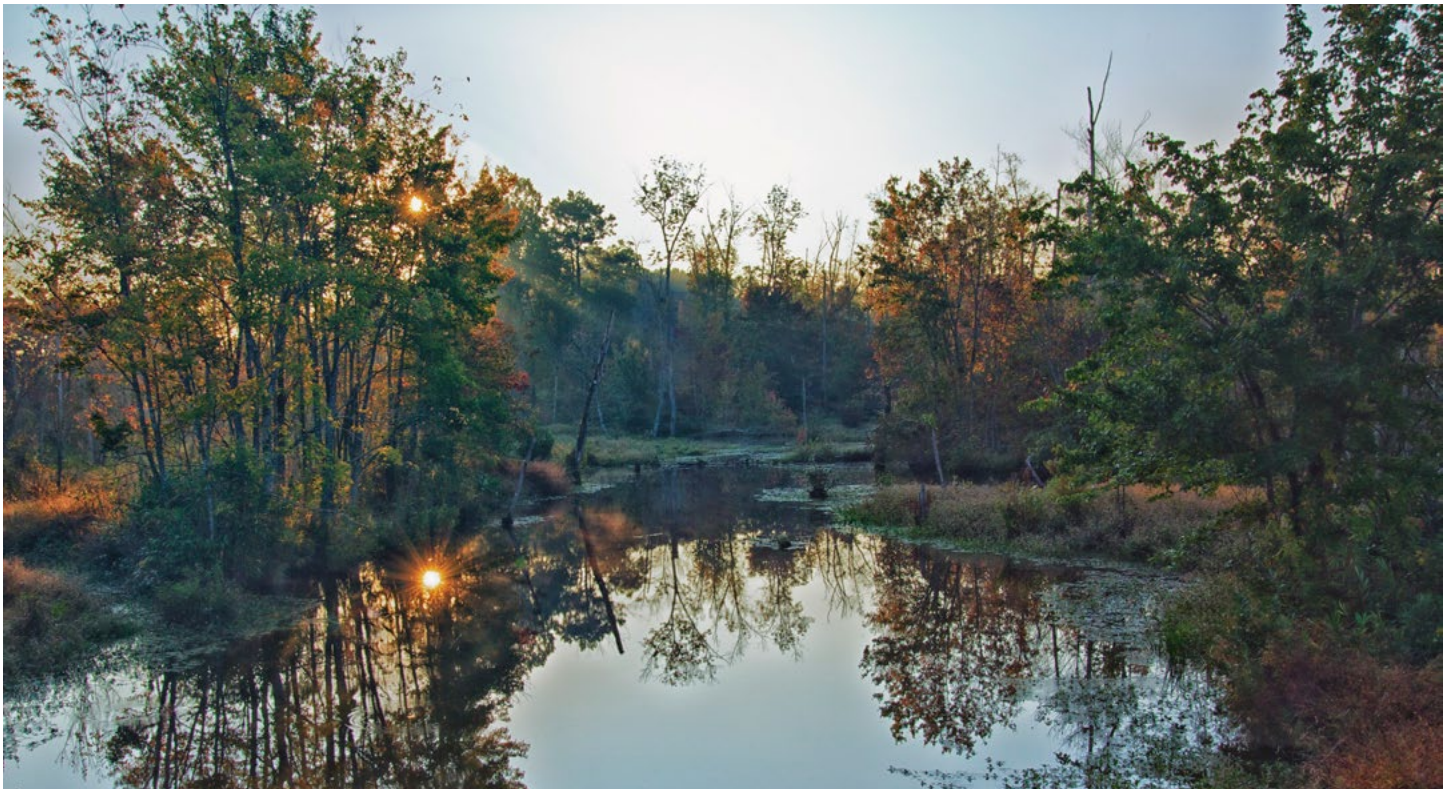

Source: Natural Hazards Informer, July 1999, Natural Hazards Center, University of Colorado.

**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.



Wetlands in Franklin County, North Carolina. Photo by Jim Liestman via Flickr.

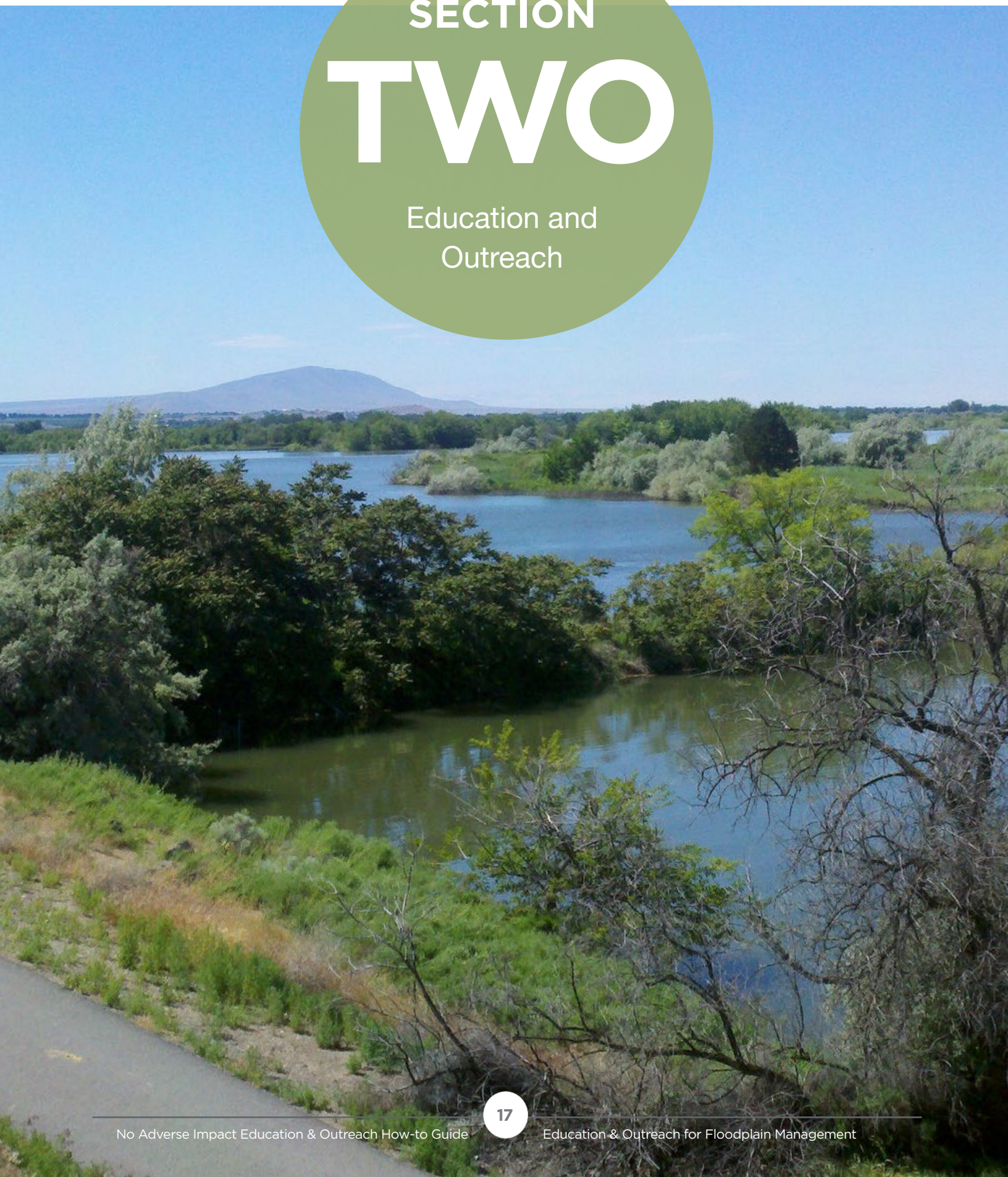
habitat, and similar benefits that come with maintaining an environmentally sustainable ecosystem.

**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

## Education and Outreach



# Education and Outreach for Floodplain Management

Education and outreach tools can strengthen floodplain management efforts. If everyone knew their flood risk, how to avoid problem areas, build wisely, and protect themselves and their properties, flood losses would be greatly reduced. Reaching out and educating people has an impact. Research has shown that well-informed citizens make smarter decisions and support sound, floodplain management practices.

Unfortunately, many communities do not pursue education and outreach activities as a way to prevent and reduce flood losses. They may rely on structural, flood control projects, or the minimum regulatory criteria of the National Flood Insurance Program to solve all of their flood problems.

They may not realize the advantages of building constituencies not only interested in their own protection, but who want better approaches to managing future development, and better protection of natural floodplain functions.

**Benefits:** An effective education and outreach program could provide the following benefits:

- When a flood warning is issued, people move things out of harm's way, evacuate in time, or otherwise protect life and property;
- Homeowners and businesses relocate, retrofit, and take other permanent flood protection steps;
- Developers stay away from high-hazard areas, and areas needed to sustain natural floodplain functions, or incorporate those benefits into their development as an amenity;

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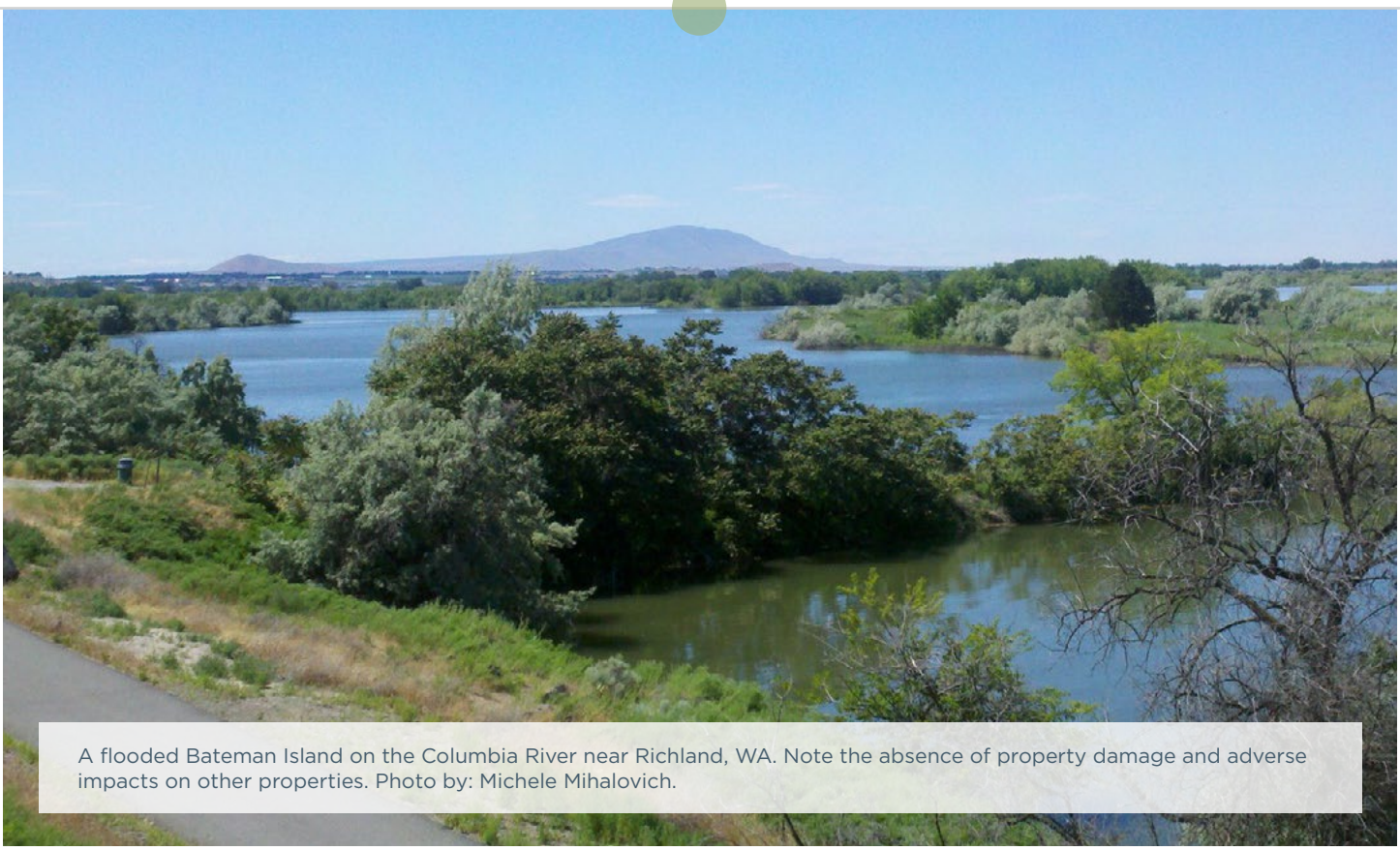
# Education and Outreach for Floodplain Management, cont.

- Prospective home buyers are aware of flood risks and make informed decisions before purchasing a property, discouraging developers from building in flood hazard areas;
- Property owners protect their buildings to higher levels than required by codes;
- Owners and tenants have flood insurance policies to protect their assets and provide financial assistance after future floods; and
- Citizens demand local, floodplain management programs that prevent problems from increasing or adversely affecting others.

Note that all of these benefits are actions: concrete steps that reduce flood losses. The first point stressed in the NAI approach is that it is not enough for people to know more – they need to *do something*. Many people know their community has a flooding problem. Many may even be aware they live in a mapped flood hazard area, and that flood insurance is available. However, unless people take actions, an education or outreach effort may have minimal impact on flood losses or protecting natural functions.

The objective of NAI education and outreach tools is to change behavior. This Guide identifies tools and methods that help local officials change the behavior of the people who live and work in their communities.

# Research Findings



A flooded Bateman Island on the Columbia River near Richland, WA. Note the absence of property damage and adverse impacts on other properties. Photo by: Michele Mihalovich.

The impact of education or outreach projects on people exposed to a hazard has been researched for years. There have been some success stories, notably campaigns to stop smoking, wear seatbelts, or encourage women to get breast cancer examinations.

There have also been research projects on risk communication and family preparedness that focused on flooding or natural hazards. All found similar keys to what makes people change their behavior, and start protecting themselves and others from flood hazards, and/or protecting natural functions from the adverse impacts of floodplain development.

**1980s research:** In 1978, Dr. Thomas Saarinen surveyed people who had and had not received a brochure from the Urban Drainage and Flood Control District in the Denver metropolitan area. The brochure advised the recipients that they were in a floodprone area, and provided advice on how they could protect themselves. He found:

> "If care is taken in designing the campaigns, and an experimental approach adopted, future efforts in public education could contribute substantially to a reduction in deaths and damages from future natural hazards events," – from Perspectives on Increasing Hazard Awareness (Saarinen, 1982, pp. 26–28).

"A higher percentage of those respondents who had received the brochure had taken some form of mitigation action such as purchasing flood insurance, floodproofing their residence, or developing an emergency plan, than in the population that had not received the brochure. In addition, the brochure recipients had, on average, taken significantly more protective actions per person than in the population without brochures." (Saarinen, ed., 1982, p. 9).

**1990s research:** Based on findings like Saarinen's, the Community Rating System encouraged, and many communities implemented, public information programs that relied heavily on annual mailings, which were found to be successful. A study of 250 residents in CRS communities that did annual mailings, and 250 residents in non-CRS communities, concluded that:

"… residents are aware of flood hazards and are taking action to protect their property from flood damage. Furthermore, results show that the people in the CRS communities are more aware of these hazards and are therefore taking proactive steps … 76 percent of the CRS residents who knew they were in a floodplain learned it through community efforts (local or community official, neighbors, or outreach effort); only 24 percent of the non-CRS residents learned through community efforts," from FEMA's 1998 Evaluation (1998, p. 22).

**2000s research:** Following a review of the literature and a national survey in 2008, Drs. Michele Wood and Dennis Mileti, and others, published findings in a series of articles and presentations (see Resources, p. 69). In particular, they examined more than just mailings. They looked at the bigger context of what everyone could do together, which is explained in the next section.

**Summary:** For the last 35 years, government agencies and private organizations have been implementing education and outreach activities and academics have studied them. The research found that if done correctly, these activities can be very effective in informing the public and changing behavior.

# Factors for Effective Education and Outreach

The following factors are taken from various research reports, revised CRS guidance, and the ASFPM publication, *Building Public Support for Floodplain Management* (*link below*). The case studies later in this *Guide* demonstrate how local officials succeeded by taking advantage of the following 10 factors.

1. **Communicate to your audience:** Keep the messages simple and clear. Most audiences are not scientists, so technical terminology, acronyms, and bureaucratic phrases should be avoided. A business owner may be more interested in the dollar costs and benefits of retrofitting a building, while a homeowner's primary concern may be the appearance of the house after the project. Developers probably won't listen if all they hear is, "Don't build in the floodplain."

   One good example of communicating with target audiences includes providing materials in Spanish, like the city of Pasadena, TX, did (see case studies on p. 53). Another good example is how Denver Urban Drainage District got developers' attention by showing them how they could make money following NAI approaches to developing floodprone lands (see case studies on p. 63).

2. **Use tools that will reach your audience:** For example, use social media for tech savvy audiences or in emergency situations, and printed documents for more traditional audiences. Reach families through their children – school activities have proven effective in getting parents' attention. Reach homebuyers by recording flood risk information with the property's deed.

   Models can be very effective tools to show concepts to young and old, and non-English speakers (see the case studies on pp. 67-68). Pasadena used a game to teach children about keeping pollutants out of storm drains and streams (see case studies on p. 58).

3. **Be positive:** Pictures of devastation do not motivate people; however, stories of how people successfully protected themselves do. "Fear doesn't sell preparedness," said Dr. Dennis Mileti during a presentation at ASFPM's 2010 national conference. Mileti is a nationally known sociologist and former director of the University of Colorado's Natural Hazards Center.



**Links:** Building Public Support for Floodplain Management: http://bit.ly/1EIu0Ce

The Denver Urban Drainage District's approach is to focus on the benefits to developers if they follow the NAI approach (see case studies on p. 63).

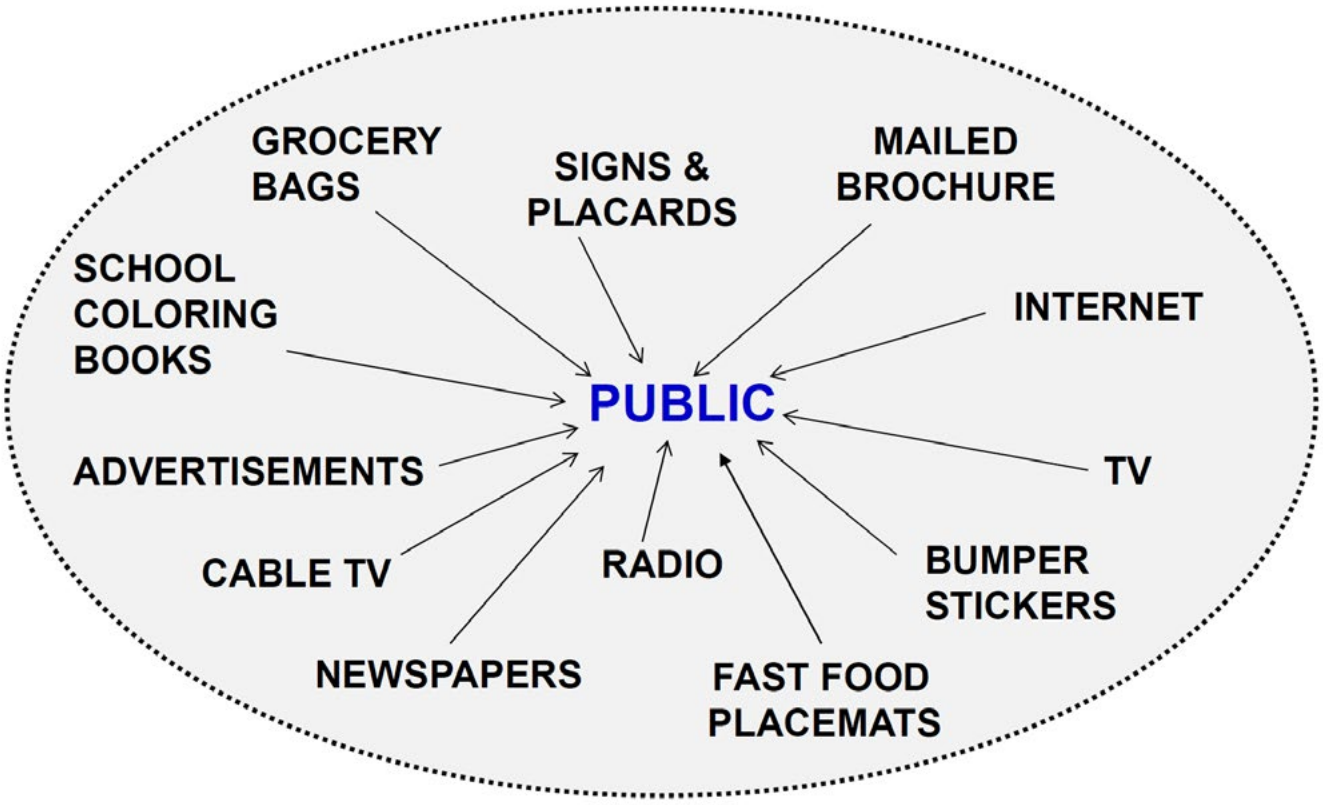
4. **Tell people what they should do:** This gets back to the basic objective of education and outreach programs – changing behavior. Instead of describing the odds of getting flooded or what their government is doing with their taxes, tell people how they can protect themselves.

   Floodplain models show that good floodplain management practices prevent increased flows and flood heights (see case studies p. 67). Floodproofing open houses can have mitigation tables where participants are given specific advice on what they can do to protect their property (see case studies p. 61).

5. **Show people the results:** If you can show people actual examples of how others took steps to reduce damage or lower insurance premiums, it reinforces the message. This is especially effective if a neighbor bought flood insurance or retrofitted. Mileti calls these "visible action-taking clues."

   The Denver Urban Drainage District's "Good Examples" brochure and CD show how developers can save time and make money (see case studies p. 63).

6. **Repeat the message:** "People do more after receiving the same message many times … it's best if communication is sustained over extended periods of time and even better if it's ongoing and doesn't end," Mileti said.




A graphic from Dr. Mileti's presentation at the 2010 ASFPM national conference.

# Factors for Effective Education and Outreach, cont.

"One time is not enough" is the mantra of Pasadena's staff, as seen in the case study (p. 53). The Denver Urban Drainage District uses a brochure, plan review meetings, regional organization meetings, and a video to repeat its message (see case studies p. 63).

7. **Repeat the message from different sources:** This means using different media (see graph on page 23). It also means using different organizations. "People do more when they get the same information different ways," said Mileti. One of the best sources are peers. Hearing good advice from a neighbor can be more effective than hearing it from a city official.

   At open houses, organizers use handouts, presentations, and contractors to convey messages on how to protect homes from flood damage (see Tool 2, page 33, and the South Suburban open houses case study, page 61).

8. **Coordinate with others:** There are three reasons for this: 1) it spreads the workload, 2) it ensures a consistent message, and 3) it is more effective when the message is repeated from different sources.

   All four case studies, which are presented later in this *Guide*, illustrate how local governments capitalized on help and cooperation from the private sector and other local governments.

9. **Take advantage of opportunities:** A flood at any location can be used as a teaching tool when you explain how similar flooding and damage can occur in your community. Similarly, a meeting on a new Flood Insurance Rate Map will bring in many people who didn't realize how much they should learn about flooding. Seize that interest to convey your messages on flood protection.

   Open houses make the most of the interest in flooding that results after a flood or when a new Flood Insurance Rate Map is announced. Pasadena staff convey their messages every time there is a flood-related call to the Mayor's Action Line (see case studies p. 53).

10. **Evaluate and revise:** Nothing works perfectly the first or second time. Things change. A community's programs and projects should be evaluated at least annually to determine what is working, what is not, and what should be changed.

    Pasadena evaluates its program each year and prepares a formal annual evaluation report (p. 55). Open houses in Illinois were improved based on the lessons learned from the state association's analysis (see case studies p. 61).

# SECTION THREE

## Education and Outreach Tools

# Education and Outreach Tools

There are many tools in the *NAI Toolkit*, and this *Guide* does not pretend to cover them all. Instead, five tools that communities can utilize are described here. These show how the 10 factors for effective programs can help change behavior and move people or communities closer to the NAI approach of floodplain management.

How the five tools can be used is illustrated in Section Four with four case studies. The tools and their related case studies are displayed in the table on page 27.

Paragraphs with the CRS logo describe how using these tools can result in receiving credit under the CRS.

continued on page 27

# Education and Outreach Tools, cont.

| Education and Outreach Tools | Denver Urban Drainage District | Model Users | Pasadena | South Chicago Suburbs | Various communities |
|---|---|---|---|---|---|
| Page number | 63 | 67 | 53 | 61 | 48 |
| Planning Tools | | | | | |
| 1. Master public information program | | | X | | |
| 2. Open houses | | | | X | |
| 3. Educating developers and contractors | X | | | | |
| 4. Flood models | | X | X | X | |
| 5. High water marks | | | | | X |

# Tool 1: Master Public Information Program

The "Factors for Effective Education and Outreach" reviewed in the previous section should seem obvious. What makes them most effective is when the community conscientiously applies them. For example, instead of coming up with a great message and spending your energy and resources on copying and dissemination, it would be more effective to sit down with other agencies to determine how they can convey the message to their audiences.

That is the key to a master public information program – do not do a smattering of projects independently. Instead, work with others to assess the community's education and outreach needs, identify target audiences, determine the messages that these audiences need, and develop projects and programs, with others if possible, to convey those messages.

The Community Rating System now provides credit for such a program, called a Program for Public Information in Activity 330 (Outreach Projects). The PPI makes a variety of education and outreach programs more effective by incorporating the factors for effective programs like repeating the message from different sources, coordinating, evaluating, and revising. As a result, a credited PPI can add more than 100 points to a community's score. This *How-to Guide* summarizes the steps to prepare such a master program.

continued on page 29

# Tool 1: Master Public Information Program, cont.

## HOW-TO PREPARE A MASTER PUBLIC INFORMATION PROGRAM

### STEP 1. ESTABLISH A COMMITTEE

The master program needs to be developed by a committee of people from inside and outside the local government. As with most committees, the heavy work is done by staff (or a consultant). The committee's role is to be the sounding board for staff ideas, reflect community needs, and provide guidance on what will work best in the community.

The participants on the committee are determined by the community, but they should be a mix of local government, floodplain residents, and stakeholder representatives. Several communities that want to work together can join in a multi-jurisdictional committee.

### STEP 2. ASSESS THE PUBLIC INFORMATION NEEDS.

This step has some substeps:

Many communities' hazard mitigation planning committees have the type of representation that would qualify as a PPI committee. Des Plaines, IL, mitigation planning committee. Photo by: French Wetmore.

- #### SUBSTEP 2.1. DELINEATE TARGET AREAS.

  Target areas are areas with significant or similar flooding, building, and population demographics. The objective is to identify areas with similar needs and similar audiences (see box, next page).

- #### SUBSTEP 2.2. DETERMINE TARGET AUDIENCES.

  A target audience is a group of people who need information on flood-related topics. They can be residents or businesses in a target area or they can be selected based on other reasons (see box, next page). They can include people from outside the community, such as upstream property owners whose actions could increase runoff or pollution. Committee members can be very helpful identifying target audiences.

There is another substep that can be taken for extra CRS credit: assess flood insurance coverage in the community. The results would be used to prepare appropriate messages and projects to encourage improved coverage where needed.

# Tool 1: Master Public Information Program, cont.

### EXAMPLE TARGET AREAS

- Flood-prone neighborhoods
- Waterfront business district
- Beachfront hotels and rental units
- Repetitive loss areas
- An area subject to unmapped hazards, such as sinkholes or tsunamis
- An area protected by a levee or subject to flooding from a dam failure

### EXAMPLE TARGET AUDIENCES

- Repetitive loss area residents
- Building contractors who need to know about permit requirements
- Insurance agents who need to know more about flood insurance
- Tourists who don't know the flood warning and evacuation procedures
- Non-English speakers
- Student drivers ("turn around, don't drown")
- Home improvement or building supply stores that serve the community

- **SUBSTEP 2.3. INVENTORY OTHER PUBLIC INFORMATION EFFORTS.**

  A good master program builds on what is already being done and avoids duplication of efforts. Other organizations and agencies need to be contacted to find out what activities they are implementing or plan to implement to reach your community's audiences. Who are their audiences? What are their messages?

  The end product is a list of the organizations or agencies that are sending messages and what the messages are. This job can be easier if people from these kinds of organizations are invited to serve on the committee.

## STEP 3. FORMULATE MESSAGES

Staff and the committee determine public information messages needed for each target audience. Messages are specific statements or directions the community considers important for its audiences. The messages should either:

**continued on page 31**

# Tool 1: Master Public Information Program, cont.

- Clearly state what the audience should do (e.g., "Turn around, don't drown" or "Get a floodplain development permit from …"), or
- Provide some basic information with a note on where to get more information (e.g., "You may live in a floodplain. Find out by calling 555-1234" or "Information on ways to protect your property from flooding can be found at www …").

There should also be a desired outcome for each message. What do you want the audience to do? When possible, the outcome should be measured, such as reducing the number of contractor permit violations or increasing the number of flood insurance policies in a target area.

## STEP 4. IDENTIFY OUTREACH PROJECTS TO CONVEY THE MESSAGES.

Once the needed messages and desired outcomes have been agreed upon, the next step is to consider what projects would best convey the message(s) to the target audience(s). Some projects are probably already underway, so an analysis should be conducted to identify what messages are not getting out.

It is tempting to just continue or revise existing public information and outreach efforts. But remember the research findings that a program will be more effective when the same message is repeated from different sources.

### EXAMPLE NAI MESSAGES

- Don't fill in the floodplain – it harms natural floodplain functions and can send floodwaters on to someone else.
- Go the extra step – elevating your house three feet above flood level can pay for itself in less than eight years with lower flood insurance premiums.
- Don't dump in the creek – the house you flood may be your own.
- Tired of being flooded? Call us for information on a buyout grant.

At this step, various agencies and stakeholder organizations should agree on specific, consistent messages, and plan projects that will complement each other. The committee can be a great source to sort this out.

## STEP 5. EXAMINE OTHER PUBLIC INFORMATION INITIATIVES.

Traditional outreach projects are not your only public information tools. The messages should be repeated on your website. Your permit office should be repeating them to

# Tool 1: Master Public Information Program, cont.

> "Convince groups (including your own) to stop providing unique messages," said Mileti.

customers. The public works staff who investigate drainage problems should be familiar with and repeat your messages.

## STEP 6. PREPARE THE DOCUMENT.

The master program needs to be recorded in a formal document. Sometimes these are parts of a larger activity, such as the public information chapter to a hazard mitigation plan. The document does not have to be large or formal. Much of the key information can be displayed in a spreadsheet that lists messages and outcomes by target audience, and the projects that will convey the messages (see Table 4, p. 54).

It is important to include measurable outcomes or objectives for the messages and projects. Examples could be:

- Increase website visits by 10 percent or more,
- Increase the number of applications for retrofitting permits,
- Reduce the number of citations for floodplain ordinance violations, or
- Increase the number of flood insurance policies.

It is recommended that the program be adopted by the community's governing body to ensure cooperation and support from other departments.

## STEP 7. IMPLEMENT, MONITOR, AND EVALUATE THE PROGRAM.

The committee should meet at least annually to monitor the implementation of the outreach projects, and it MUST meet at least annually for CRS credit. The committee assesses whether the desired outcomes were achieved and what, if anything, should be changed.

Pasadena followed this seven step process in developing its Program for Public Information. Its activities are reported in the case study on p. 53.

# Tool 2. Open Houses


Mitigation advisors, like the ones above at an open house in South Holland, IL, can be experienced building code staff who are familiar with floodproofing and self-help measures. Photo credit: French Wetmore.

Open houses have been shown to be a very effective education tool. They are more effective than simple public meetings, where people sit in a large audience and passively listen to speakers. Open houses have the advantages of being quick to implement, inexpensive to administer, and flexible to meet local needs. Open houses about floodproofing have been conducted for many years in different parts of the country. Some have been conducted within a week or two after a flood. Recently, FEMA, states, and communities have been using open houses to explain new flood hazard maps to citizens.

There are no official criteria for something to be called an "open house." For the purposes of this *Guide*, open houses are public events that have the following features:

- The objective is to educate people on flood hazards and protection measures, and help them get answers to their questions;
- People can come and go as they please;
- There are handouts or materials on the desired measures;
- There are opportunities for one-on-one conversations with experts;

- Participants can talk to a variety of experts;
- It is usually a cooperative effort among several agencies and private industry.

The following step-by-step procedure has been taken from the lessons learned at floodproofing open houses conducted by the Illinois Association for Floodplain and Stormwater Management, and mapping open houses conducted by FEMA and its mapping partners. Copies of their more detailed guidance documents are available on their websites, as noted in Resources (p. 69).

## HOW-TO PREPARE AN NAI OPEN HOUSE

### STEP 1. ORGANIZE.

An organizational meeting is usually held to determine the following:

- What is the objective?
- When should it be held?
- Who is the target audience?
- How many people can be expected to attend?
- Who will handle site arrangements?
- What is needed at the site (e.g., parking, number and size of rooms, audio/visual equipment)?
- Who will handle publicity?
- Who will sponsor it and are they willing to have their names used in the publicity?
- What agencies, organizations, and businesses will be invited to participate?

At the end of the organizational meeting, the participants may conclude that an open house is not the way to go. For example, if only a few people are expected to attend, other agencies, organizations, and businesses may not be interested.

continued on page 35


Example floor plan for an open house on mapping from FEMA Region 3 Open House Toolkit for Local Officials. (p. 16). (link below)



**Links:** Open House Toolkit for Local Officials: http://bit.ly/1Q1Lcbb

# Tool 2: Open Houses, cont.

## STEP 2. SCHEDULE IT.

Here are some suggestions on timing:

- If the open house is being scheduled after a flood that caused structural damage, it should be held before people begin rebuilding their homes so they can incorporate the open house's recommendations during reconstruction.
- The open houses that had been scheduled and publicized one or two months before they were held had better turnouts than those held a week or two after a flood.
- If intervening in the post-flood rebuilding process is not vital, the open house should be scheduled at least two months after the organizational meeting to allow adequate preparation time, and to allow people to complete their post-flood cleanup and have some free time to attend.
- Lead time is needed more for publicity than for any other facet of preparation.
- Saturday sessions have not had very good turnouts. Evening sessions on weekdays have been most successful. Consider whether people need to work during the day or may not want to drive after dark.

## STEP 3. DETERMINE SITE ARRANGEMENTS.

A typical open house has three focal points:

1. A reception table should be inside the main entrance, allowing adequate space for people to line up indoors and sign in. The table should be located so everyone coming in must meet the greeters. The objective of the reception table is to make sure people know where to go to take advantage of all of the open house's activities.

2. A large room, such as a gymnasium, houses the information stations and/or exhibits.

3. The third focal point is optional. It is a separate room, such as a classroom, for an orientation. Floodproofing open house sponsors have found it helpful to repeat a 20-minute presentation on ways to protect properties from flood damage. These give the attendees an orientation to the exhibits and reinforce that the open house is a public service to educate people, not just a marketing effort by contractors. Greeters explain this to people as they enter and advise them to start at the presentation.

## STEP 4. SELECT THE SITE.

Site selection depends on how the open house will be set up. It is important to have a location near the target audience. A local site reinforces the message that the open house is something being done by the community for its residents.

The most common and readily available site for an open house is a school building. Schools are easy to find and have the facilities needed, such as parking, rooms, restrooms, and handicapped access. They also have cooperative governing boards interested in helping the community.

# Tool 2: Open Houses, cont.

## STEP 5. DETERMINE THE PARTICIPANTS.

What agencies and exhibitors to invite depends on the objective of the open house, although both types could have all of the following:

An **open house on mapping** typically has the sponsoring organization's employees staff the following stations:

- **Property identification on the new map:** Using paper maps, or better, a GIS-based computer display. Staff at this station help attendees locate their properties. If possible, a printout is provided for that part of the map.
- **Community staff:** Permit office staff explain the building requirements.
- **Flood insurance:** FEMA staff or local insurance agents answer flood insurance questions.
- **References:** This station has handouts and references, such as FEMA's Coastal Construction Manual.
- **Mitigation Ideas:** Experts discuss flood warning, safety, elevation, floodproofing, grants, and other mitigation topics that could directly affect the attendee.

Participants at a **floodproofing open house** will be needed for:

- **Mitigation tables:** Mitigation tables should be near the entrance so people can visit them first. Staff review the attendees flood problem and building condition, advise them on appropriate flood protection measures, and identify which contractors and government agencies can help.
- **Community staff:** Permit office staff explain the building permit requirements.
- **Flood insurance:** FEMA or local insurance agents answer flood insurance questions.
- **Contractor exhibits:** These displays often include moving water or interesting hardware that attract people to tables where they

# Tool 2: Open Houses, cont.

can learn more about different mitigation measures (see example in the photo below). Some points on having contractors present:

- "There has often been concern voiced that in a post-flood situation contractors will prey on flood victims and take unfair advantage of them. The research has shown that this is rarely the case. In fact, few contractors have actually made sales because of their open house participation. Of 160 open house attendees surveyed in 1993, only 13 (8%) reported that they actually used the services or got materials from an open house exhibitor. On the other hand, 37 (23%) stated that they got flood protection ideas from contractors and 13 volunteered that future open houses should have more contractors," from the Illinois Association for Floodplain and Stormwater Management's 1993 publication How to Conduct an Open House (p. 13) (*link below*).
- A concerted effort is needed to ensure that all appropriate local contractors are offered a chance to exhibit. There should be no appearance of favoritism.
- It is not a bad idea to include a disclaimer that the sponsors do not vouch for the contractors' work or recommend them over other area contractors. A handout on dealing with contractors could be part of the materials provided by the greeters.




**Links:** How to Conduct an Open House: www.illinoisfloods.org/documents/How-to-conduct-a-Floodproofing-Open-House.pdf

# Tool 2: Open Houses, cont.

## STEP 6. PUBLICIZE.

The success of the open house will depend on the publicity. If no one comes, no one is helped, and the exhibitors may not want to return for another one. Some suggestions:

- Have at least one local public information officer at the organizational meeting.
- The publicity needs to clearly state that people can drop in at any time. Otherwise, there is a crowd at the door when it opens.
- Direct notices to the target audience, such as mailers to each home or door hangers, have proven to be the most effective publicity for the floodproofing open houses.
- Press releases should be sent to local media. There are example news releases in the Illinois (*link below*) and FEMA (*link below*) open house guides.

## STEP 7. PREPARE THE HANDOUTS.

The following have proven helpful:

- A sign in form (can be useful to collect data on flood damage for planning purposes);
- An orientation form that lists the exhibitors, times of presentations, etc.;
- An evaluation form to improve future open houses;
- A flood protection handbook; and
- A handout on local programs, such as permit procedures.

Examples of the first three handouts listed in Step 7 can be found in the *Illinois (link below)* and *FEMA (link below)* open house guides. Many communities and states have locally-pertinent flood protection handbooks.

## STEP 8. IMPLEMENT.

Conduct the open house as publicized. In larger areas, the same teams may do several open houses during a week.

## STEP 9. EVALUATE.

A critique should be conducted after each open house and lessons learned recorded for the next one. A formal evaluation was conducted after several floodproofing open houses in the Chicago suburbs. The findings are reported in the case study on p. 61.

The CRS provides credit for open houses conducted annually under Activity 330 (Outreach Projects). Ongoing technical assistance, as provided by mitigation table advisors, is credited under Activity 360 (Flood Protection Assistance).



**Links:**

Illinois Press Release: www.illinoisfloods.org/documents/How-to-conduct-a-Floodproofing-Open-House.pdf
FEMA Press Release: http://bit.ly/1ITPQrw

# Tool 3. Educating Developers & Contractors

An educated contractor can be very supportive of good floodplain management. Photo credit: FEMA library.

Developers and building contractors are the people who start most floodplain development projects. Developers propose what will be built and where. They start the process of filling and building in floodplains, replacing wetlands and natural areas with streets and houses.

**The benefits:** It is often assumed that the desire by private industry to develop land, and the desire by local governments to grow and increase their tax base, are contrary to good floodplain management. This does not need to be the case. Both parties can benefit from following NAI criteria. The key is to show all parties what is in it for them.

Bill DeGroot of the Urban Drainage and Flood Control District tells a story of coming upon a historic warehouse in Denver that was being converted to shops and lofts. The developer was asked why he was preserving the old building. The developer replied, "To make money." DeGroot used that lesson to help develop a very effective program of

# Tool 3: Educating Developers and Contractors, cont.

educating developers, which is discussed in the case study on p. 63.

The message to developers is that they can make money by using NAI approaches. If they do not build in floodplains and wetlands, they will have:

- Lower construction costs;
- Faster permitting procedures because fewer permits are needed;
- Lower operation and maintenance costs for the buyer;
- Areas that can be used for open space requirements or tax credits;
- A positive response to house hunters inquiring about the flood hazard;
- Waterfront and open space locations that people will pay more for;
- A unique character that improves the marketability of their development; and
- A reputation as a steward of land and a community supporter.

The same applies to contractors, too. They will see how they benefit by following an NAI approach because then they can:

> Developers and contractors will support NAI approaches if they see the benefits.

- Make more money by building to higher protection levels;
- Speed up permit approval process by knowing the rules (time = money);
- Avoid fines, delays, and legal expenses for violating the rules; and
- Get marketing benefits when people see their buildings do not get damaged by floods.

Local governments benefit, too. Here are some ways:

- Public maintenance costs are reduced when streams and wetlands are left alone;
- Hazardous areas are turned into public assets;
- Developers may provide public park land and linear recreation corridors;
- Lower costs for flood response, recovery, debris removal, and other disaster-related expenditures;
- CRS credit is provided for floodplain open space and open space incentives; and
- The local government will develop a reputation as a more sustainable and resilient community, and one with high quality developments.

The greatest benefits come when the community, developers, and contractors work together. Each can support the other. For example, building contractors have been shown to be some of the best marketers for community mitigation programs. They do it because they benefit along with the property owners. Property owners look to building contractors for guidance. As noted in the "Research Finding" box on p. 41, contractors are one of the leading sources of flood protection information for homeowners. A knowledgeable contractor will mean more knowledgeable property owners, too.

# Tool 3: Educating Developers and Contractors, cont.

## HOW TO EDUCATE DEVELOPERS AND CONTRACTORS ON NAI

### STEP 1. COLLECT GOOD EXAMPLES.

The planning or permit offices may know of some good developments or construction projects. Get the details about what was done, why it was done, and what the developer or builder saw as the benefits. If there are no local examples, see the Urban Drainage District's "Good Examples" brochure (*link on the next page*) and select one or two that fit your situation.

### STEP 2. ASSESS THEIR NEEDS.

It is best to start an education process by talking to the developers and contractors. What are their concerns? What information do they think they need? What will it take to convince them of your suggestions?

### STEP 3. TALK TO YOUR PERMIT OFFICE.

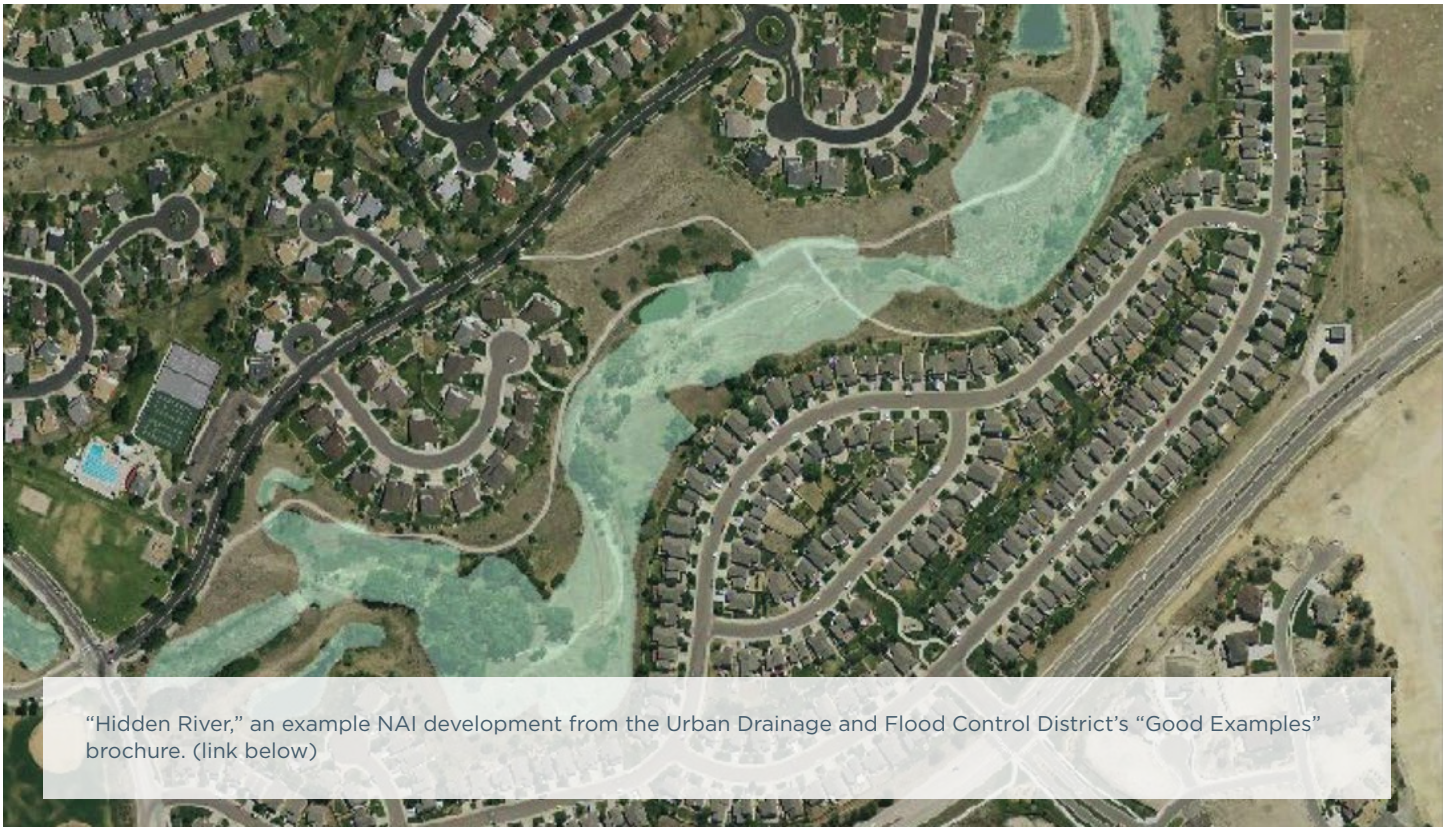
It is quite possible that the developers and contractors are concerned about what they see as arbitrary impediments to getting a permit or unfair treatment by inspectors. These concerns must be addressed in order to get their attention to your NAI message. Review the concerns that have been voiced and see how they could be resolved.

Then, discuss with permit staff how the development review process could encourage NAI developments. For example, is there a time when NAI approaches can be introduced, before the development plans are too far along, such as at a pre-application meeting? There are likely to be open space requirements for all developments over a certain size. Would developers get a bonus if the open space was a floodplain, wetland, or critical area? Once the subject of saving money is brought up, the permit applicant is likely to be more receptive to NAI.

### RESEARCH FINDING

In her 1991 study of floodproofing open houses, *Floodproof Retrofitting – Homeowner Self-Protective Behavior*, Dr. Shirley Laska surveyed residents in two areas that had recently been flooded. One had no government effort to encourage retrofitting, and one had open houses. She found that almost half of the people in the area with no effort had no source of information. Those who did get information listed contractors as their number one source. In areas with open houses, contractors were the second most frequently cited source, after government programs (p. 98).

# Tool 3: Educating Developers and Contractors, cont.



"Hidden River," an example NAI development from the Urban Drainage and Flood Control District's "Good Examples" brochure. (link below)

## STEP 4. MEET.

A meeting with an organization, such as the local homebuilders association, is best. If there is no organization, just call an informal meeting. When they hear that it is hosted by the agency issuing permits, they might be motivated to attend.

The focus of the meeting should be to review issues they have raised, and NAI concepts you would like them to consider. You will probably need to get their issues out of the way first. An alternative to a group meeting is to meet one-on-one with developers or contractors during the development or permit review process.

Here are some things that can really help when explaining NAI concepts:

- Cite the benefits to them, as noted earlier in this section;
- Show good examples of NAI projects;
- Line up one or more developers or contractors who have done the kinds of projects you are promoting. It is much more convincing if one of their own agrees with you;
- Identify other constituencies who would support these approaches. These could include environmental groups, open space advocates, historic preservation organizations, fishermen and hunters, golfers, and groups that support trails and outdoor recreation. These



**Links:** Urban Drainage District's "Good Examples": http://www.udfcd.org/downloads/pdf/other/good_examples_brochure.pdf

# Tool 3: Educating Developers and Contractors, cont.

groups may well support NAI development proposals when they go up for review before the planning commission; and

- Use the floodplain model to convey NAI concepts. It works! See Michigan example on p. 68.

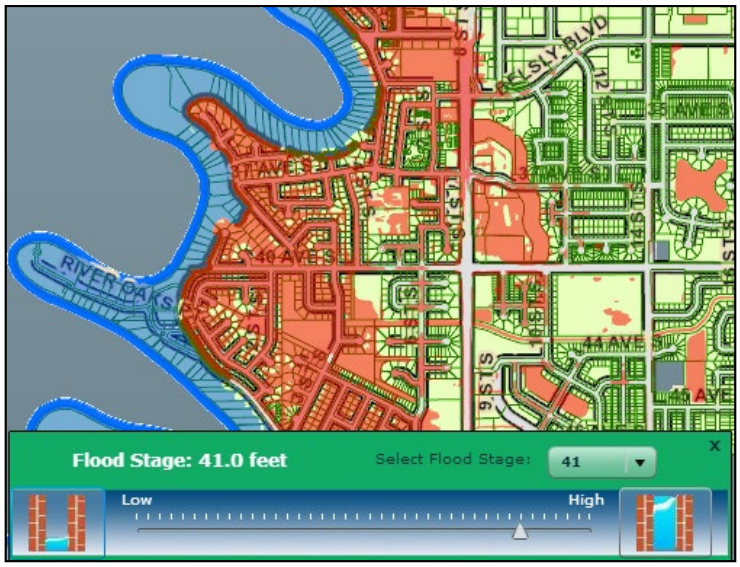
## STEP 5. REPEAT.

The message might not sink in with just one meeting, so provide multiple opportunities to repeat the message, such as:

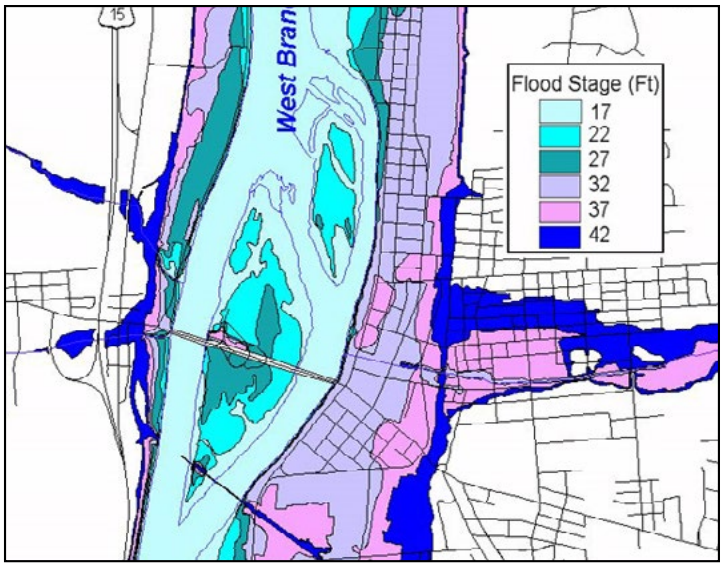
- Handouts on NAI development approaches and NAI construction approaches would be reminders and materials they can use when talking to clients;
- Attend pre-application meetings when the concepts should be proposed;
- Mention approaches during inspections or when you run into a developer/contractor;
- Publicize success stories; and
- Request an annual meeting on the topic.


The CRS credits an annual educational effort under Activity 330 (Outreach Projects). It credits regulatory approaches to encourage preserving floodplain open space, such as offering transfers of development rights and density bonuses, in Activity 420 (Open Space Preservation). There is also credit for natural shoreline protection measures in Activity 420.

# Tool 4. Flood Models




Moorhead, MN, automated flood inundation map - interactive GIS maps. (link on the next page)




A straightforward flood stage forecast map from Pennsylvania.

Flooding can be a complicated concept for many people to understand. While "lots of rain or snow melt" means "the river will rise," it is important that people understand how human activity affects this simple picture. Fortunately, there are aids to conveying this message. Two kinds are reviewed here: map models and physical models. Each has advantages and disadvantages, but all can be used to show "what if" scenarios, like what are the results of different activities, or what a future flood would look like.

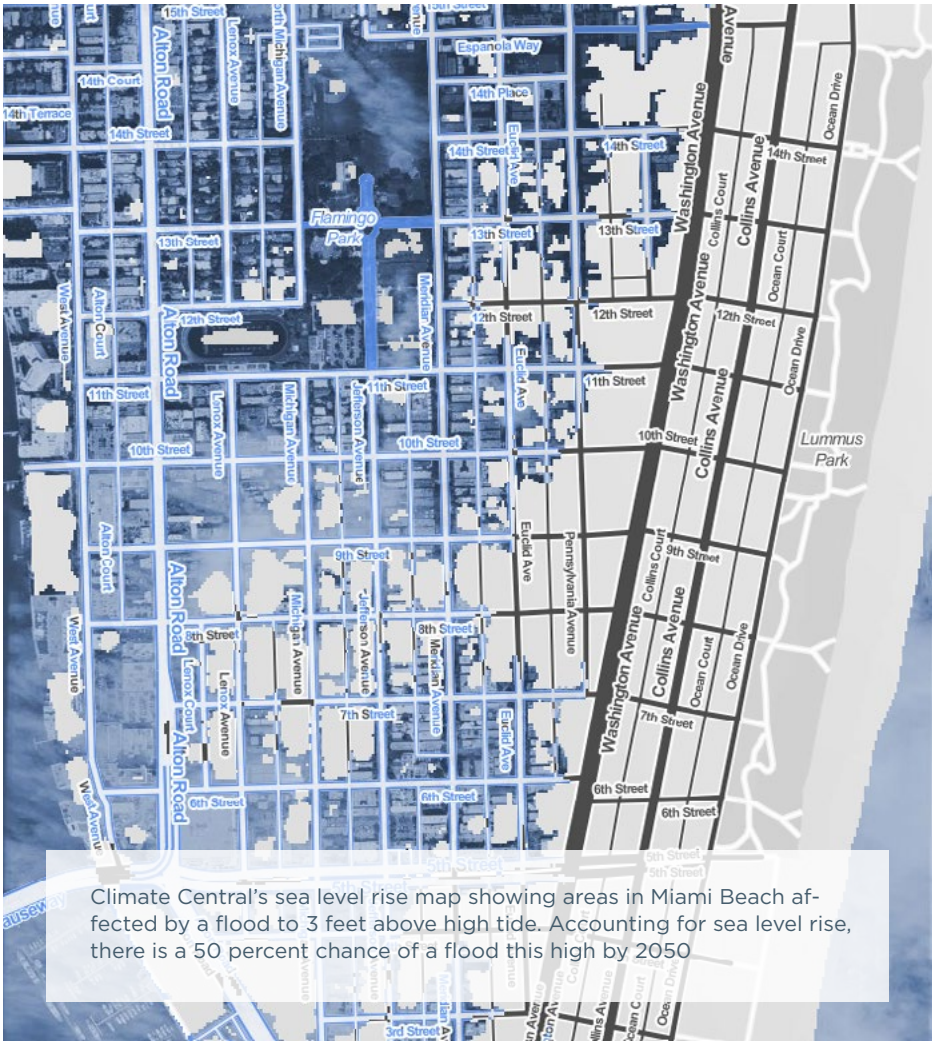
## HOW TO OBTAIN AND USE MAP MODELS

Map models range from simple lines on a paper map, to very sophisticated software programs used in floodplain mapping. For the purposes of an education and outreach program, this *Guide* addresses the simpler approaches that do not require expensive software.

**Rivers:** Relating river gage flood stages to areas affected can be very useful to the lay person and emergency manager. A static map can be prepared by simply showing areas affected by different flood levels (above right). Emergency managers call these flood-stage forecast maps or flood inundation maps.

Some communities have developed programs that allow the user to pick a flood level and get a map that shows areas flooded. Moorhead, MN, has such a map on its website (above left). The National Weather Service has provided such maps for some of its real time reporting gages. You can find gages with such maps at the Weather Service's national inundation mapping site (*link on the next page*).

# Tool 4: Flood Models, cont.




Climate Central's sea level rise map showing areas in Miami Beach affected by a flood to 3 feet above high tide. Accounting for sea level rise, there is a 50 percent chance of a flood this high by 2050

These maps are similar to Flood Insurance Rate Maps, but they show more flood levels than the 1 percent flood. They can show where historical floods have gone, where the more common, smaller floods go, and the impact of a change in flood conditions. For example, if a community was debating whether to restrict filling in the flood fringe, a flood inundation map can show the effect of a one foot rise in the flood elevation that will result when fill is allowed up to a floodway boundary set by the FEMA one foot rise mapping standard. In flat areas, the inundation map may show the floodplain boundary expanding.

**Coastal:** Similar maps are available for coastal areas. Most coastal emergency managers have access to computer models that show areas affected by storm surge. These models are used for real-time mapping of an oncoming hurricane or tropical storm. A presentation in the community's emergency operations center can be educational and it would likely draw a large crowd.

The National Oceanic and Atmospheric Administration website has maps that depict the impact of sea level rise. The Sea Level Rise and Coastal Flooding Impacts Viewer (*link below*) is available for most of the Atlantic, Gulf, and Pacific coasts. This online tool can show areas affected by different levels of water, but it can also highlight areas of particular vulnerability that will be affected by those levels. A similar tool has been developed by Climate Central (see image at left and *link below*).



**Links:**

Gage Maps: http://water.weather.gov/ahps/inundation.php
Automated Flood Inundation Map: http://gis.cityofmoorhead.com/floodstages/index.html
Sea Level Rise and Coastal Flooding Impacts Viewer: http://coast.noaa.gov/digitalcoast/tools/slr
Climate Central: http://sealevel.climatecentral.org/ssrf

# Tool 4: Flood Models, cont.

**Advantages:** Using map models in an education and outreach program has the following advantages:

- They offer an alternative visual to a narrative discussion;
- People are more interested when they can see what will happen to their homes or properties; and
- They can demonstrate the impacts of different scenarios, such as increased flood heights caused by watershed development, floodplain obstructions, or sea level rise.

Make sure to couple these visuals with messages on how people and communities can prepare for or prevent the adverse impacts shown by the models.

## HOW-TO: OBTAIN AND USE PHYSICAL MODELS

Physical floodplain models provide 3-D interactive tools that can help explain floodplain management and NAI concepts. Two types of physical models are discussed here.

**Product models:** Some flood protection products are easy to display. These include moveable or inflatable floodwalls, watertight barriers, sump pumps, and valves that prevent sewer backflow. When moving water is added to show how they work, they become even more attractive to passers-by.

As noted in the section on educating developers and contractors, private industry is also interested in making money. Educating property owners can result from what a contractor considers to be marketing. This has proven to work very well in open houses (see Tool 2, page 33, and the South Suburban open houses case study, page 61).

**Landscape models:** Landscape models can help demonstrate things on a larger scale, such as what a watershed is and what happens when obstructions are constructed in a floodplain. One model was developed by staff from the National Weather Service, ASFPM's Michigan Chapter, and a high school science teacher. WARD's Stormwater Floodplain Simulation System (*link below*) is an example of a physical model with running water that clearly shows the impact of different actions in the floodplain.

Another company, EnviroScape, (*link below*) makes a variety of similar landscape models to demonstrate nonpoint source pollution prevention, coastal protection, and wetlands conservation.

Both companies' products come with guides for teachers. The floodplain model has guidance for explaining things like what happens to runoff when a watershed is paved over, and what happens to flood levels when a levee is constructed. It also has an NAI curriculum. Watch a video demonstration of how the model works (*link below*).



**Links:**

WARD's Stormwater Floodplain Simulation System:
www.wardsci.com/store/catalog/product.jsp?catalog_number=805770
Floodplain Simulation Video: www.youtube.com/watch?v=E5ZI-55J9V8
EnviroScape: www.enviroscapes.com
Levee Video: www.mlive.com/news/grand-rapids/index.ssf/2014/01/2013_flood_demonstration_shows.html

The Michigan Stormwater-Floodplain Association provides free demonstrations of its model to schools. Its brochure notes the model can help explain:

- How land use affects the risk of flooding;
- The value of wetlands and retention ponds in floodplain management;
- How levees affect downstream communities;
- The dangers of driving on a flooded road; and
- Runoff volume and hydrographs of stream flow.

**Other uses:**

- Pasadena, TX, has used physical models to educate adults and school children at open houses and other public venues (see p. 67).
- One engineer uses a model to convince developers to incorporate NAI standards in their programs (see the "Michigan" testimonial on p. 68).
- Another engineer was called as an expert witness in a lawsuit initiated after a landowner built levees that increased flood heights on existing levees managed by a levee district. The engineer used the model to explain the concept of how new floodplain development can have an adverse impact on existing development. The district won on appeal (2012 IL App (5th) 100564-U).

The CRS credits projects that use models under Activity 330 (Outreach Projects). Website models like Moorhead's (p. 44) can be credited under Activity 350 (Flood Protection Information). Flood inundation maps are also needed for credit under Activity 610 (Flood Warning and Response).

# Tool 5. High Water Marks


One of Nashville's "Know your Line" signs.
Photo courtesy of Nashville Metro Water Services.

# Tool 5: High Water Marks, cont.

High water mark signs can be an effective way to notify people of the local flood hazard, and have the following advantages:

- They are seen by anyone in the area during daylight hours;
- They convey the message regardless of the language the viewer speaks; and
- They delineate an actual historical occurrence, not a predicted theoretical flood level.

FEMA and seven other federal agencies have recently initiated a national campaign, called "Know Your Line," (*link below*) to use high water marks to generate public interest in the local flood hazard and in taking flood protection steps. Here are some notes and lessons learned from communities that have erected high-water-mark signs:

- Locate them on public property, where people can see the connection to the source of flooding, such as waterfront parks, trails, docks, and boat launching sites;
- Do not locate them too close to private properties where owners may be concerned about the sign's impact on property values. As one local official put it, you do not need "in your face" confrontation. Your audience is the general public;
- To avoid being vandalized, put them out of reach, which may be an accurate reflection of the high water line. See the Hartford and Alton examples below;
- In Frankfort, KY, signs are made of a composite material and are attached with security bolts, so they do not tempt thieves looking for scrap metal; and
- Orange Beach, AL, put its signs on local geocaching lists to encourage people to go look for them.

Multiple flood levels of the Connecticut River are shown in downtown Hartford.

The red line on the grain elevator in Alton, IL, shows the height of the 1993 Mississippi River flood. The lower, black, line marks the 1973 flood. Photo credits: French Wetmore.



**Links:** "Know Your Line": www.fema.gov/know-your-line-high-water-mark-initiative

# Tool 5: High Water Marks, cont.


This sign was posted in a parking lot at an ocean front park in Monterey, CA. Photo credit: French Wetmore.

**Changing behavior.** One major benefit of these signs is they can motivate people to seek more information. To do this, they need to show more than a line and a date. The "Know Your Line" program encourages this (see the example on p. 48).

Here are some examples of including messages aimed at changing behavior, along with the message about the historical flood hazard:

- Nashville's sign reads, "For flood safety information, visit *www.weather.gov* or *www.ready.gov* ;"
- The tsunami sign (above) includes simple instructions on what to do if a tsunami threatens; and
- Frankfort's signs have a QR code people can read with a smart phone app, which sends them to the county's website.

**Program catalyst.** One sign does not make a public information program. But, a high water mark sign can be a catalyst for starting or improving a public information program.

The "Know Your Line" program encourages communities to hold unveiling ceremonies that involve high-level officials and the media. Here are some examples of how communities and organizations have used signs or the concept as part of a bigger program.

- In Nashville, the first sign was displayed on the third anniversary of the 2010 record flood. The mayor and the US Army Corps of Engineers district commander (next page) used the occasion to review progress in redeveloping parts of the floodplain and improving the local flood warning system;

# Tool 5: High Water Marks, cont.


Unveiling the first high water mark sign in Nashville drew lots of media attention. Photo courtesy of Nashville Metro Water Services.

- Orange Beach includes information about the sign program in its annual mailing to floodplain residents. The floodplain manager has a sign he takes to different meetings and presentations;
- Frankfort used the unveiling of a sign as a media event to publicize upcoming meetings to review new flood insurance maps;
- A program in Charleston, SC, resulted in 90 businesses putting blue tape, decals, or posters in their windows. The tape represents the high tide water line in 2100, which accounts for sea level rise. The program encourages businesses to refer inquirers to a website (*link below*) that explains what people can do; and
- A similar program (*link below*) in Hawaii has school children using blue chalk to identify the water line of a one meter rise in sea level.

NFIP/CRS

The CRS credits signs as outreach projects under Activity 330 (Outreach Projects). High water mark signs that also include information on what one can do receive more credit.



**Links:**

Inquiry Website: www.scbars.org
Hawaiian Program: http://www.oceanink.org/OceanInk/Projects_files/BlueLine%20Handout%20Final.pdf (p. 2)

# SECTION FOUR

## Case Studies


Pasadena used the physical flood model at many events. It is particularly effective when school students explain the processes to fellow young learners. Photo by: Luz Lucke.

# Program for Public Information: Pasadena, TX

The city of Pasadena is a suburb of Houston on Galveston Bay. Public Works staff had developed educational and outreach projects over the years with input and support from numerous partners. A number of these projects were done in conjunction with the city's Municipal Separate Storm Sewer Systems (MS4) program. The program is part of the US Environmental Protection Agency's efforts to reduce pollution from stormwater runoff. The major goal was to keep the city's storm system and waterways clean.

For six years, the outreach program experienced challenges in effectiveness and coordination due to changes in the economy and stakeholder priorities. In 2011, the MS4 Coordinator Luz Locke, was given the additional duty of CRS coordinator. She decided to review each past activity and develop an overall, coordinated outreach effort, especially one that coordinated the MS4 water quality efforts with flood messages.

A meeting of Pasadena's PPI committee. Note the variety of stakeholders present. Photo is from the Pasadena PPI (p. 3).

# Program for Public Information, cont.

At about this time, the CRS proposed a new planning tool, the Program for Public Information (*link below*). The timing was convenient for Pasadena, which had been an active participant in the CRS since 1991. As a result, the city was the first community in the country to prepare and implement a PPI after the CRS credit criteria was published. The city's PPI (*link below*) was prepared following the seven-step process listed in Tool 1.

## STEP 1. ESTABLISH A COMMITTEE.

The work was spearheaded by Luz Locke. She invited various stakeholders from the community to be part of the PPI committee and they agreed to help support the city's outreach efforts (see photo, p. 53).

## STEP 2. ASSESS THE PUBLIC INFORMATION NEEDS.

While the city and some of the stakeholder organizations had already been doing many education and outreach projects, the PPI helped identify gaps, especially target audiences that had not been served. One example was landscaping and mowing companies that had not been implementing required best management practices.

Substep 2.3 of the seven-step process calls for an inventory of existing public information activities. The table on p. 55 shows some of the many projects and programs identified during the inventory.

| MESSAGE | OUTCOME |
|---|---|
| Know your risk of flooding | More map information inquiries to Public Works |
| You need flood insurance | Increase in the number of flood insurance policies |
| Turn around, down drown | Fewer water rescues and police citations for ignoring barricades |
| Keep your waterway clean | Reduced amount of debris removed by Public Works |
| All construction projects must meet flood protection and water quality rules | Reduced number of building department citations |
| Only rain goes down the drian | Improved water quality as reported by TCEQ |
| Know the flood protection construction rules | Reduced number of building department citations |
| You can protect your house from flooding | Increased number of applications for permits for flood protection projects |
| Everyone in the city can buy flood insurance | Increased the number of flood insurance policies in the X Zone |

**Messages and Desired Outcomes Table**

## STEP 3. FORMULATE MESSAGES.

Nine core messages were agreed to by the PPI committee. Desired, and measurable, outcomes for each were determined (see table above).

## STEP 4. IDENTIFY OUTREACH PROJECTS TO CONVEY THE MESSAGES.

The PPI committee identified 15 outreach projects that would be implemented. These are listed in tabular format in the table on p. 57.



**Links:**
Program for Public Information: http://crsresources.org/files/300/developing_a_ppi_for_credit_under_the_crs_2014.pdf
City's PPI: http://www.floods.org/PDF/Pasadena_PPI_12-5-12_Annotated.pdf

## STEP 5. EXAMINE OTHER PUBLIC INFORMATION INITIATIVES.

In addition to the 15 outreach projects (see table on p. 57), the messages were also to be disseminated through the city's website and map information staff.

## STEP 6. PREPARE THE DOCUMENT.

Pasadena's PPI is only 15 pages long. A lot of information can be included when tables are used.

## STEP 7. IMPLEMENT, MONITOR, AND EVALUATE THE PROGRAM.

City staff and the PPI committee continually critique the projects. Annual evaluation reports are prepared each year and submitted to the City Council.

| Organization | Project | Subject Matter | Frequency |
|---|---|---|---|
| Armand Bayou Nature Center | Fall Festival | Keep the bayous safe | Every November |
| | Materials at the Center | Natural floodplain functions | Year-round |
| | Presentations to different groups | Watershed and wetlands protection | Year-round |
| Armand Bayou Watershed Partnership | Outreach presentations and events | Wetlands | Year-round |
| Bounce Energy | Flyers in electric bills | Evacuation and safety | 2 each summer |
| Cable Channel 16 | Short shows explaining stormwater and flooding | Take care of your storm drain<br>Protect natural functions | 24 hours, year-round |
| Chamber of Commerce | Business Expo | Up to each exhibitor | Every February |
| City of Pasadena | Handouts and brochures at various locations | Various flood-related topics | Year-round |
| City Communication Office | Facebook and Twitter messages | Various flood-related topics | Year-round |
| | Pasadena Now newsletter | Various flood-related topics | Every month |
| | Press releases | Various flood-related topics | As needed |
| | Website | Various flood-related topics | Year-round |
| City Library | Hispanic Fest | Whatever exhibitors want to say | Every November |
| City Engineering Dept. | Map inquiry service | Take care of your storm drain | Year-round |
| | MS4 projects: marking drains, letters left on door handles, street and park cleanings by citizens | Protect water quality, no illegal dumping, Flood hazard areas, insurance, flood protection | Year-round |
| City Public Works | Adopt a Waterway | Protect and clean the waterway | Year-round |
| | Walk the Waterway | Protect the waterway | Year-round |
| Galveston Bay Foundation | Trash Bash | Keep the bayous clean | Every March |
| Harris County Flood Control District | Website and outreach projects | Flood protection programs | Year-round |
| Insurance agencies | Handouts on flood insurance | Flood insurance | As needed |
| Neighborhood Network | Convention Center expo, "Together We Can" | Helping neighbors | Every October |
| | Outreach to neighborhood associations | Various flood-related topics | Year-round |
| Regional TV and Radio channels | FloodSmart commercials | Be Prepared<br>Get flood Insurance | Year-round |
| San Jacinto Day Foundation | Strawberry Festival | Whatever exhibitors want to say | Every May |
| Southeast Regional Local Emergency Planning Committee | Website and outreach projects | Protection from hazards | Year-round |
| | Hurricane Workshop | Hurricane preparedness | Every June |
| City Water Department | Billing mailings | Topics of importance to the City | Every month |
| | Post card message | Protect storm water & prevent flooding | Once A Year |

**A sampling of Other Public Information Efforts from Pasadena's PPI.**

# Program for Public Information, cont.

## FACTORS FOR EFFECTIVE EDUCATION AND OUTREACH

Pasadena has been successful in conveying its flood protection and water quality messages to its audiences. The program has examples of all 10 factors. Here are notes on how the process and some of its projects have done that.

1. **Communicate to your audience:** A large portion of Pasadena's population speaks Spanish. Most of the city's handout materials are available in English and Spanish. It is important to note that Spanish terms and meanings can differ from country to country. Locke, who was born in Colombia, does the initial translations and then gives them to two others fluent in Spanish to make sure the messages would be understood by people who speak different dialects. They have had to explain some terms that do not have equivalents in Spanish, like "bayou" and "nonpoint source."
2. **Use tools that will reach your audience:** Even people who speak different languages can understand the physical floodplain model. More information on Pasadena's use of models is on p. 67. There is a special emphasis to reach children. One imaginative and inexpensive way is the storm drain game, described on p. 58.
3. **Be positive:** Locke's policy is to talk about the advantages of the measures they are promoting, and then wait for questions before covering the details or any downsides.
4. **Tell people what they should do:** All the projects have messages such as:
   - "Make sure your sump pump is working"
   - "Clear debris from gutters and downspouts"
   - "Anchor any fuel tanks"
   - "Move furniture, valuables, and important documents to a safe place"
   - "Create a personal 'flood file' containing information about all your possessions and keep it in a secure place, such as a safe deposit box or waterproof container."
5. **Show people the results:** One interesting way Pasadena did this was to invite a woman from a disaster clean up company to talk to a group of businesses. She tells flood cleanup stories and how property owners can do things that keep her from coming back after the next flood.
6. **Repeat the message:** The mantra in Locke's shop is, "One time is not enough." The table on p. 57 shows how many times several messages are repeated. For example, "only rain in the storm drain" is seen on water bills, handouts, goodies given away at events (p. 59), and during the storm drain game.

# Program for Public Information, cont.

| Target Audience | Message(s) (See Table 4) | Outcome (See Table 4) | Project(s) | Assignment | Schedule | Stakeholder |
|---|---|---|---|---|---|---|
| | E. Get a permit, G. Know the flood protection construction rules | E, G | OP 10. Permit handouts | City Building Department | Handouts provided at permit counter and at all meetings | |
| 2. Repetitive loss areas | A-F, H | A-F, H | OP 11. Repetitve loss mailing | City Environmental Svcs Coordinator | Annual mailing that cover all the topics, tailored for repetitive flooding | |
| | A-I | A-I | OP 12. Presentations to neighborhood associations | City Environmental Svcs Coordinator | Presentations on flood protection to neighborhood associations or meeting of repetitive loss area residents | Neighborhood associations |
| 3. Spanish speakers | A-F, H, I | A-F, H, I | OP 13. Handouts in Spanish<br>OP 9. Guidebook in Spanish<br>OP 5. Booth | City Communication Office<br>City Evnironmental Svcs Coordinator (speaks Spanish)<br>City Environmental Svcs Coordinator | OP 3 handouts translated into Spanish and distributed together<br>All displays and provided at all meetings<br>November Hispanic Fest | Same as OP 3 and OP 4 |
| | | | OP 6. Insurance agents<br>OP 12. Bilingual presentations to neighborhood associations | Spanish speaking insurance agents<br>City Environmental Svcs Coordinator (speaks Spanish) | Discussions with clients as they happen<br>Presentations on flood protection to neighborhood associations or meetings of repetitive loss area residents | Spanish speaking insurance agencies Hispanic neighborhood associations |
| 4. Landscapers | E. Get a permit, C. Construction rules | E, G | OP 13. Presentation at Neighborhood Network associtaion meeting | Cleveland-Ripley Neighborhood Center | Schedule meeting with association by February 15 | Cleveland-Ripley Neighborhood Association |

**PPI Projects and Initiatives Outreach Projects (OP). This table is a reproduction of the city's PPI on p. 14.**

# Program for Public Information, cont.

The storm drain game is a popular way to reach young children. The speaker (to the left) throws something in front of a simulated storm drain and asks the participants if it should be removed or left there. Because it doesn't belong down the drain, the students take it to the appropriate recycling bin. This game also builds on the success factor of repetition. Photo credit: Luz Locke.

7. **Repeat the message from different sources:** The table on p. 55 shows some of the many city offices and organizations that convey the flood protection messages to the residents of Pasadena.

8. **Coordinate with others:** The PPI committee members helped with this by including the North Pasadena Business Association and the Pasadena Citizens' Advisory Council. Locke attended many of these groups' meetings and learned of their concerns and interests. She is on their agenda for at least one meeting each year when she shares her message in a context that relates to their activities. As a result, the city receives help and donations from the business community. One example is the annual Trash Bash, which is an area-wide activity sponsored by many government and non-profit organizations. At the last Bash, more than 600 volunteers showed up for a two-hour shift cleaning the bayous. The effort is supported by industries and businesses like Exxon, canoe and kayak rental companies, and local trash haulers. For those who linger for the meal or wait for their shift, there are educational booths conveying some of the PPI messages (see photo p. 60).

# Program for Public Information, cont.



9. **Take advantage of opportunities:** In addition to using floods at any location as an opportunity to talk about flooding, Locke makes sure every relevant call to the Mayor's Action Line is followed up. She finds it more effective to discuss flood protection when a person is already interested in a water problem.

   **Open houses:** New Flood Insurance Rate Maps are another opportunity. When a new County FIRM was ready for public review in 2013, FEMA and the county set up two open houses near the city, and the city publicized the event heavily in English and Spanish.

   Pasadena had its own booth at the open houses. Staff focused on the impact of the new maps on insurance rates and used this as an opportunity to talk about retrofitting methods that could reduce premiums.

10. **Evaluate and revise:** City staff and the PPI committee continually critique the projects and prepare annual evaluation reports. These have resulted in revisions to some projects each year.

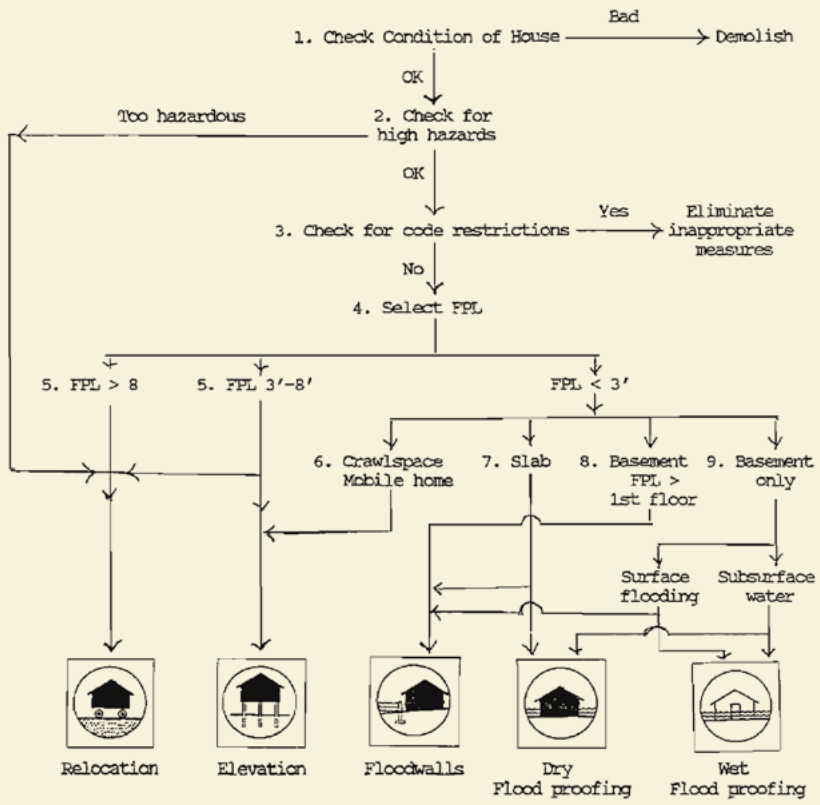
# Program for Public Information, cont.

Pasadena's PPI plus the projects that were implemented pursuant to the PPI received the maximum credit for Activity 330 (Outreach Projects).

The PPI work brought renewed interest in the CRS. The city applied for some new credits and other activities received more points. In 2014, the city improved from a CRS Class 7 to a Class 5, the highest classification of any city in Texas.

The Trash Bash, Walk for the Wetlands, and similar events provide opportunities for young and old in Pasadena to have hands-on learning experiences about protecting natural floodplain functions. Photo credit: Luz Locke.

# Floodproofing Open Houses in South Suburban Chicago




This flow chart was developed for mitigation tables at the open houses. It provides a quick decision tree to identify appropriate floodproofing measures and helps ensure consistency in the advice given by the various mitigation table staff. Graphic from How to Conduct a Floodproofing Open House (*link below*), Illinois Association for Floodplain and Stormwater Management, 1993.

After a record flood in November 1990, the local, multi-jurisdictional, watershed committee worked with several Chicago suburban communities to host an open house. Co-sponsored by the state and the Illinois Association for Floodplain and Stormwater Management, the South Suburban Open House was held May 1991. Although six months after the flood, it had a turnout of 175 households (each household was represented by one to three people). One year later, the south suburban village of South Holland conducted its own open house. Approximately 150 households attended.

These open houses were ideal for an evaluation because they had a large attendance, the attendees' names and addresses had been collected on the open house registration forms, and some of the area had already flooded again. With funding support from FEMA, the IAFSM surveyed the participants to determine their



**Links:** How to Conduct a Floodproofing Open House:
http://www.illinoisfloods.org/documents/How-to-conduct-a-Floodproofing-Open-House.pdf

attitudes toward the open houses and whether they had implemented any flood protection measures.

Here are some key findings. The full report can be found in Analysis of the 1991 and 1992 Floodproofing Open Houses (*link below*).

- The majority (67 percent) of the respondents implemented one or more flood protection measures after the open houses were held. These measures ranged from inexpensive, such as replacing a bad sump pump, to moderately expensive ($3,000 - $5,000), such as installing overhead sewer lines. While it cannot be proven that the open houses were the only reason why the measures were taken, it is likely that they had a considerable impact on the property owner's decision to mitigate.
- The majority (79 percent) of the respondents who had been flooded after they installed their protection measures said the measures proved effective in preventing or reducing damage during the later floods.
- All of the open houses' activities helped the participants. The flood protection handbook, the presentation, talking with contractors, and speaking with other homeowners, were rated as most helpful. Talking with government officials was rated as less helpful, but this may be explained by the fact that their job was to explain permit rules and community activities, not to help people with flood protection ideas. Even so, many respondents reported they wanted more information about government programs.
- Many of those with negative answers still recommended more open houses.

**The report concluded:**

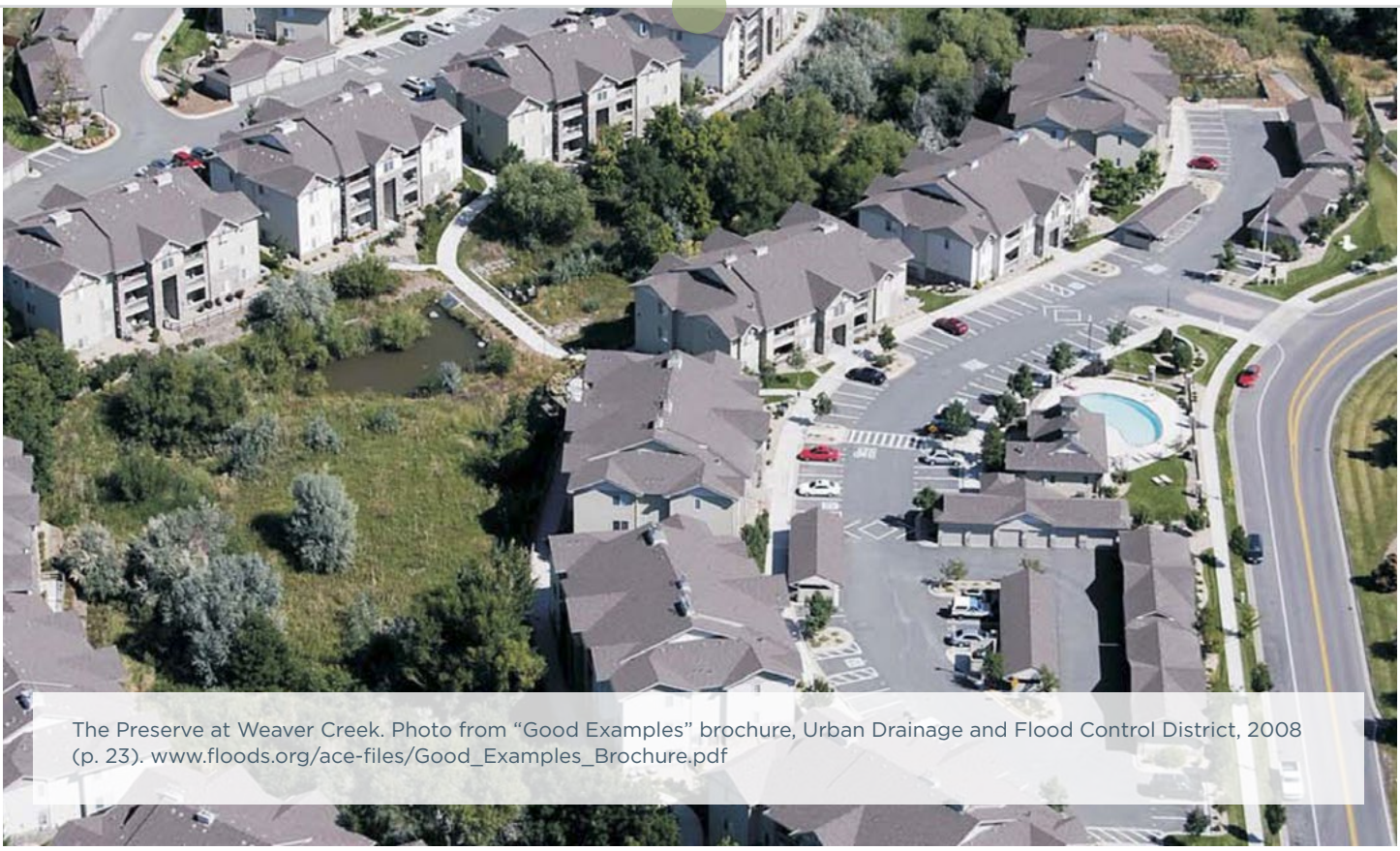
"In addition to acting as a vehicle to provide information, open houses facilitate interaction between floodprone residents and their local officials. The many positive comments show that residents appreciate the service from their local governments and the chance to talk to their local officials.

"The earlier studies by the University of New Orleans concluded that self-help flood protection should be viewed by all as part of a larger community flood protection effort. Open houses should be publicized as one of several flood protection efforts of the community. Neither the publicity nor the conduct should communicate an attitude that the local governments are abandoning their residents."
– Analysis of the 1991 and 1992 Floodproofing Open Houses (p. 15).



**Links:** Analysis of the 1991 and 1992 Floodproofing Open Houses:
www.illinoisfloods.org/documents/Analysis_of_the_1991_and_1992_Floodproofing_Open_Houses.pdf

# Educating Developers in the Denver Area



The Preserve at Weaver Creek. Photo from "Good Examples" brochure, Urban Drainage and Flood Control District, 2008 (p. 23). www.floods.org/ace-files/Good_Examples_Brochure.pdf

The Urban Drainage and Flood Control District includes Denver and parts of six surrounding counties. It serves approximately 45 percent of Colorado's population, and was created in 1969 to help local governments in the Denver metropolitan area with drainage and flood control.

According to the district's history page (*link below*), the district has the authority to regulate new development, but "has chosen not to do so as long as the local governments implement their own regulations." It supports local governments with funding, maintenance assistance, courtesy reviews of development projects, and public information activities. If a community wants assistance from the district with maintaining new stormwater or flood control facilities, the district must review and approve the plans.

In this role, the district has worked with many developers, even though it did not have direct regulatory



**Links:** District's History Page: www.udfcd.org/about_us/udfcd_history.html

# Educating Developers in the Denver Area, Cont.

authority over them. Staff encourage NAI approaches, like avoiding the mapped floodplain altogether. The district's approach is based on a win-win effort to show developers how and why NAI standards can save development costs and make the property more valuable and easier to market.

Some developers agreed and implemented NAI features while others did not. Over the years, the district's efforts became more persuasive and effective. One result is that while the area population has tripled during the existence of the Urban Drainage District, the number of homes in the Special Flood Hazard Area has decreased by 5,000.

## THE PRESERVE AT WEAVER CREEK

This development provides an excellent example of how the district educated a developer. Fairfield Homes had a 15-acre site in Lakewood with the SFHA of Weaver Creek running down the middle. In all, the SFHA took up 20-25 percent of the site.

In 2002, district staff attended an early coordination meeting with the developer and Lakewood city officials. The city invited the district because it was interested in the maintenance support that would be provided if the stormwater facility plans were approved.

District staff explained that there would be two immediate monetary benefits to the developer if nothing was put in the floodplain and the wetland:

1. The developer would not need certain permits that would take significant time and resources to obtain.
2. The developer's stormwater facility would not have to meet the district's depth and velocity criteria because the natural floodplain and wetland already attenuated flood flows. This would save significant construction costs.

The developer estimated that the direct dollar benefits of staying out of the floodplain came close to the income lost by not building more housing units in the floodplain. As it turned out, he came out ahead because he charged a premium for units that faced the open space. As documented by the district in its "Good Examples" brochure:

**"Key features:**
Provided trails, maintenance access and one stream crossing with low flow culverts and pond. Otherwise the riparian and wetland habitat was preserved.

**"Benefits:**
The developer charged a unit premium for the creek side units, $5,000, $7,000, and $10,000 for the first, second, and third floors respectively. The premiums offset the cost of drainageway improvements (walls, trails, crossing and pond, stream stabilization and extra land given over to habitat preservation). An added bonus: all units were presold."

# Educating Developers in the Denver Area, Cont.

## RECENT ACTIVITIES

In 2008, the district prepared a 100-page "Good Examples" brochure (*link below*) to document the success stories, but more importantly, to help developers and local officials understand the benefits of NAI developments. In 100 pages, it describes the features and benefits of numerous developments throughout the six counties.

There is a hard copy tri-fold version that includes a mini CD of the 100-page document. The brochure has been very helpful when district and community staff discuss plans with developers. It has also helped others around the country. The hard copy folder is on its third printing. It is sent directly to local officials, distributed at conferences, and made available at permit counters.

The district has started other approaches to echo the message that developers can make money by avoiding the floodplain. It meets periodically with some developers on the "neutral ground" of regional advisory committees, such as a task force on the future of the area around Denver's airport. Staff give presentations to various organizations, and the district is also helping establish a Program for Public Information committee (see Tool 1, p. 28) that will likely include a developer and/or contractor.

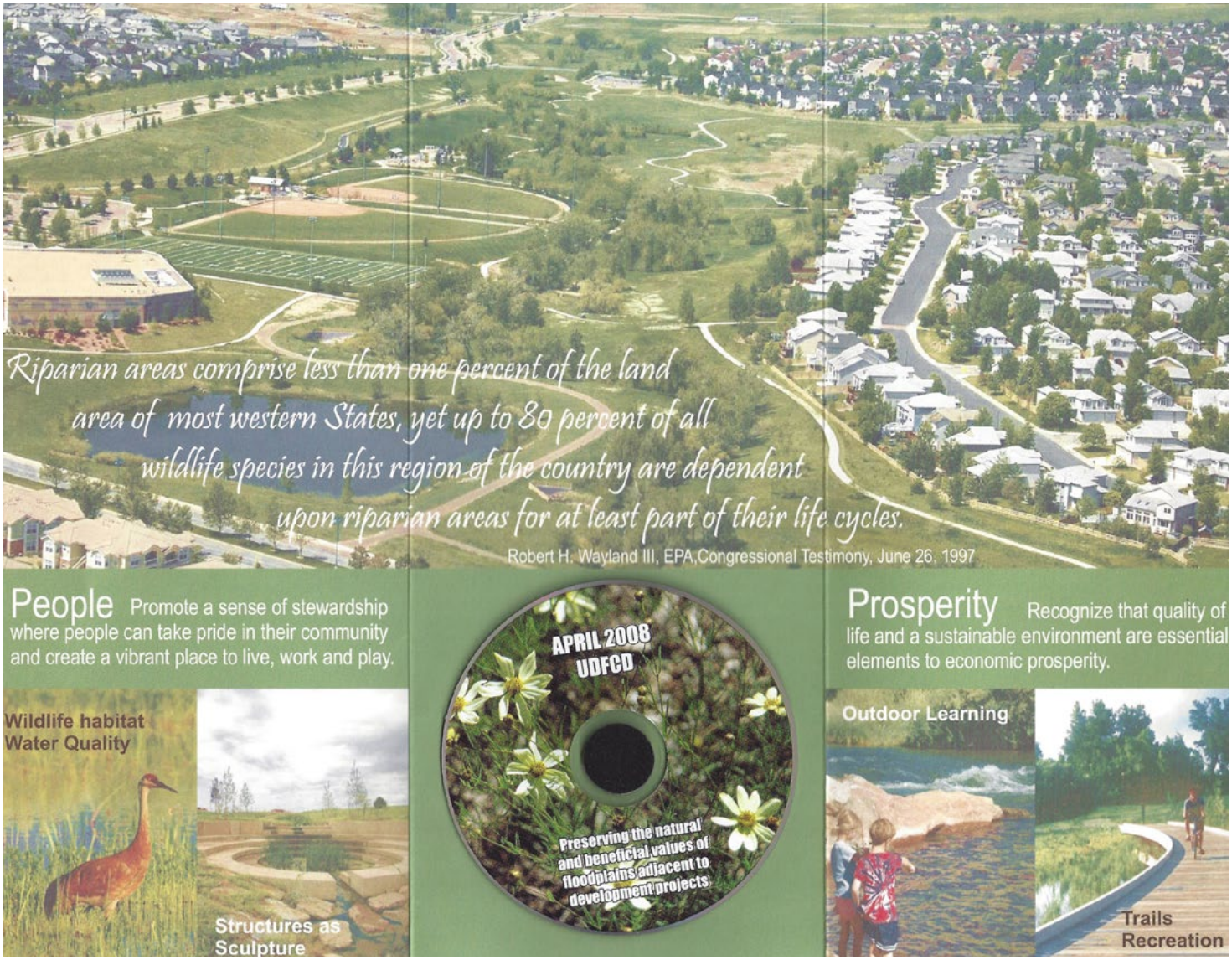
**NAFSMA video:** In 2012, the district worked with the National Association of Flood and Stormwater Management Agencies, and using a FEMA grant, created a short video (*link below*) on using floodplains as a community asset. It uses examples in Colorado, Texas, North Carolina, and Illinois.


The district is not a community in the NFIP sense, so it does not receive CRS credit. However, the cities that benefit from the district's programs can. The city of Lakewood, for example, is receiving credit for having 25 percent of its floodplain preserved as open space (Activity 420 (Open Space Preservation)). Communities can also receive credit for some of the district's public information activities under Activity 330 (Outreach Projects).



**Links:** "Good Examples" brochure: www.floods.org/ace-files/Good_Examples_Brochure.pdf
NAFSMA Video: www.youtube.com/watch?v=UPdSlp0Lcyk

# Educating Developers in the Denver Area, Cont.




The Urban Drainage District's "Good Examples" brochure with mini CD.

# Floodplain Model Users

Photo from www.enviroscapes.com

## TEXAS:

The Texas Floodplain Management Association purchased a WARD's Stormwater Floodplain Simulation System and made it available to its member communities. It did not take long for Pasadena, TX, to become the repository for the model because the city used it more than any other member.

City staff also use another model made by EnviroScape (*link below*) that was designed to explain nonpoint source issues and stormwater best management practices.

Both models are set up at booths and taken to meetings. City staff have found the following advantages to using models:

- They are very helpful in explaining concepts like impervious surfaces, good and bad construction sites, and how rainwater runoff concentrates to cause flooding.
- Young people can explain these concepts to their peers.



**Links:** EnviroScape: www.enviroscapes.com

# Floodplain Model Users, Cont.

Photos courtesy of Luz Locke.

- The presenters can watch their audiences so they can tell when they are getting the message.
- They attract people who then are more likely to stay and read the background information (see photos above).
- They attract people who may not linger, but who will take literature. At one event, staff counted more than 400 visitors to their booth in one day.

## MICHIGAN:

While created for school children and science students, some users found it helpful for adults, too. A testimonial:

"I have used the model to explain to developers and their engineers why they need to consider building not just at the 100-year floodplain. How not only increased development, but also changes in rainfall can result in increases to the 100-year floodplain elevation over time. I encourage developers to build above the 500-year floodplain whenever possible – and they often do that, knowing that the estimates for flood flow that were computed in the 1970s may not be totally accurate today…. To be able to see and feel the hydrologic parameters is an invaluable teaching tool to all audiences." – Jeffrey H. Bednar, P.E., CFM, Shelby Township, MI.

# SECTION FIVE

## Resources & Fact Sheet

Open houses give people an opportunity to go at their own pace to talk to experts (and each other) about their flood hazard and ways to protect their property from flood damage. 2001 open house held in South Holland, IL. Photo by: French Wetmore.

# Resources

## RESEARCH REFERENCES

- *Annotated Bibliography for Public Risk Communication on Warnings for Public Protective Actions Response and Public Education*, Dennis S. Mileti, et. al., 2006. *http://bit.ly/1cSnS30*
- *Building Public Support for Floodplain Management*, ASFPM, 2008. *http://bit.ly/1EIu0Ce*
- *An Evaluation of the National Flood Insurance Program's Community Rating System*, FEMA, 1998.
- *Floodproof Retrofitting – Homeowner Self-Protective Behavior*, Shirley Laska, 1991, University of Colorado.
- "Motivating Public Mitigation and Preparedness for Earthquakes and Other Hazards," in *Journal of Hazard Mitigation and Risk Assessment*, Dennis S. Mileti, Linda B. Bourque, Michele M. Wood, Megumi Kano, Spring, 2011. *www.brikbase.org/content/motivating-public-mitigation-and-preparedness-earthquakes-and-other-hazards*
- Dennis Mileti's PowerPoint presentation to the Oklahoma City ASFPM conference in 2010.
- *Perspectives on Increasing Hazard Awareness*, Saarinen, Thomas F., Editor, 1982. University of Colorado Institute of Behavioral Science.
- *Rethinking Outreach in the Community Rating System (CRS): Activity 330 Pilot Program*, Ogilvy Public Relations Worldwide for FEMA, 2010. *http://bit.ly/1KTmts9*

## TOOLS REFERENCES

- "Coastal Flood Risk Community Open House Toolkit for Local Officials," RAMPP for FEMA Region III, 2013. Found at *www.r3coastal.com/home/outreach/documents.*
- *Developing a Program for Public Information for CRS Credit, FEMA, 2014. http://bit.ly/1FtfRLW*
- *How to Conduct a Floodproofing Open House*, Illinois Association for Floodplain and Stormwater Management, 1993. *www.illinoisfloods.org/documents/How-to-conduct-a-Floodproofing-Open-House.pdf*

## CASE STUDIES

- *Analysis of the 1991 and 1992 Floodproofing Open Houses*, Illinois Association for Floodplain and Stormwater Management, 1993. *http://bit.ly/1RawlxG*
- "Good Examples" brochure, Urban Drainage and Flood Control District, 2008. *www.floods.org/ace-files/Good_Examples_Brochure.pdf*
- *Pasadena, TX, Program for Public Information*, 2013. *http://bit.ly/1MPEtnK*

# 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

Education and outreach activities are vital parts of an effective community floodplain management program. These activities advise people at risk on how to protect themselves from flooding and prevent new flood problems. It is important that education and outreach activities send the right messages and are effective in conveying those messages.

The messages should be about avoiding floodprone areas, building wisely, protecting oneself and one's property, and promoting and protecting natural floodplain functions. These are part of the overall message of NAI: Make sure your actions protect you and your property and do not adversely affect the property and rights of others.

There are many ways to convey NAI messages. Effective methods use one or more of the following factors:

- Communicate to your audience
- Use tools that will reach your audience
- Be positive
- Tell people what they should do
- Show people the results
- Repeat the message
- Repeat the message from different sources
- Coordinate with others
- Take advantage of opportunities
- Evaluate and revise

The right tools are needed to convey the community's NAI messages. While there are many flood risk education and outreach tools, five are reviewed in this *How-to Guide*, and have shown to be particularly useful for floodplain managers.

# Fact Sheet, cont.

## TOOL 1. MASTER PUBLIC INFORMATION PROGRAM

This is a conscientiously-designed, public information program that requires working with other agencies, organizations, and individuals to assess the community's public information needs, identify audiences, formulate appropriate messages, and determine what existing and new public information activities would best convey the intended message(s). The result is a coordinated effort that repeats key messages from different sources— an approach that research has shown to be most effective for getting people to take action.

## TOOL 2. OPEN HOUSES

Open houses are a more productive education and outreach arrangement than traditional public meetings with a speaker and an audience. Participants can come and go as their schedules dictate and can engage in two-way communication with experts in floodplain management and related topics. When well planned and executed, open houses have been shown to be very useful in getting floodplain residents to take steps to protect themselves from future flooding.

## TOOL 3. EDUCATING DEVELOPERS AND CONTRACTORS

Developers and contractors are key decision makers in how floodplains are developed. The How-To Guide reviews educational tools that show them how they can make money by avoiding flood hazard areas and implementing NAI-type developments. The result is a win for developers, future residents of the development, local government, and its taxpayers.

## TOOL 4. FLOOD MODELS

Some floodplain management and NAI concepts are difficult to explain. Explanations can be facilitated by two types of models that are reviewed in the Guide. Graphic computer models show the impact of different flood scenarios, such as sea level rise, on maps and aerial photographs. Physical models provide a 3-D experience to demonstrate important messages, such as the impact placing fill, a levee, or other obstruction in the path of moving water has on surrounding property.

## TOOL 5. HIGH WATER MARKS

High water mark signs are very effective in showing people the local flood hazard. They show an actual historical occurrence, not a predicted theoretical flood level. Communities have used high water marks as a catalyst to trigger other public information activities.

## IN SUMMARY

There are several important messages communities should convey to their residents and businesses. There are many ways to convey these messages, but the more effective methods build on certain factors that make for a successful floodplain management program. The How-To Guide reviews five tools that can be highly effective and shows how different communities, local agencies, and organizations have used these tools to further the NAI message.

## RESOURCES

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