The Institute for Water Resources

IDENTIFICATION AND ENGAGEMENT OF SOCIALLY VULNERABLE POPULATIONS IN THE USACE DECISION MAKING PROCESS

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Foreword

Following the loss of life and devastation from Hurricane Katrina in August 2005, the U. S. Army Corps of Engineers (USACE) announced a set of concepts to guide USACE in transforming to more sustainably solve problems that limit national welfare. As part of this "Actions for Change" initiative, USACE commissioned a report on how to increase public involvement in USACE's flood risk management program, with a special focus on involving those publics who will most bear the risk. The resulting September 2010 Flood Risk Management Public Involvement Framework and Implementation Plan (produced by CDM and led by James L. Creighton) identified a critical need for training in public involvement, risk communication, and working with socially vulnerable communities. This primer is a critical step in meeting that need.

The primer presents the basics on how to identify and engage socially vulnerable populations during USACE water resources studies and processes and gives a rationale for the need to focus on these populations at risk. I am pleased to endorse its use as a resource for USACE staff across the US to better engage our most vulnerable citizens. By doing so USACE will better be able to reduce loss of life and property and better serve the American public.

—Hal Cardwell, Ph.D., USACE Collaboration and Public Participation Center of Expertise and Community of Practic

Acknowledgements

This Primer on Identification and Engagement of Socially Vulnerable Populations is one in a series of Primers on important topics for USACE. The, Other Social Effects, and other Planning and Economics Primers can be found on the Institute for Water Resources (IWR) web site, www.iwr.usace.army.mil. The Primers support the Planning and Collaboration and Public Participation Communities of Practice. USACE's Actions for Change Program provided funding for the development of the primer by USACE's Collaboration and Public Participation Center of Expertise. Dr. Seth Cohen of USACE's Collaboration & Public Participation Center of Expertise and IWR was the project manager and co-lead author along with Mr. Chris Baker (Economist for Southwest Division). Mr. Baker provided invaluable contributions to the development of the primer, especially the Dam and Levee Safety chapter. Ms. Gigi Coulson contributed greatly to the chapter on why and how to engage vulnerable populations in the USACE 6-Step Planning process. Ms. Susan Durden (IWR) and Mr. Ed Rossman (retired Sr. Planner from Tulsa District) were both contributing authors and senior advisors for the development of content. Valuable editorial review of the document was provided by Ms. Maria Wegner,(USACE Headquarters), Mr. Jason Needham (USACE Risk Management Center), and Ms. Jennifer Salak (Outreach and Public Involvement Specialist, Omaha District), and members of the Editorial Board at USACE's Institute for Water Resources.
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Ideas, and encouraged development of this Primer.

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1 Purpose

This primer is intended to help those in the U.S. Army Corps of Engineers (USACE) and those who work with USACE to build greater awareness of the importance of identifying and engaging people who due to social, cultural, economic, and physical factors are more vulnerable to floods and other environmental hazards. While this primer is primarily focused on identification and engagement of populations that are more vulnerable to environmental hazards, the concepts described can be used across USACE business lines and are relevant to other government programs. The following sections provide strategies, tools, and examples of how to identify and work with socially vulnerable populations and describe how including them in the decision making process can impact and improve the formulation of water resource management alternatives and sound water resource decisions. This primer addresses the following:

1. Who are "Socially Vulnerable Populations"? (Section 2)
2. Why is it important to identify and engage socially vulnerable populations during the decision making process? (Section 3)
3. What implications does social vulnerability have on the Dam and Levee Safety Programs? (Section 4)
4. What tools and techniques are available to identify socially vulnerable populations? (Section 5)
5. Where can I find more information and assistance? (Section 6)
6. "Frequently Asked Questions" (FAQs) (Section 7)
7. Key planning terms (Appendix 1)
8. Summary history of social effects (Appendix 2)

Basic social science concepts are presented in this primer. Resources for obtaining more information on social vulnerability analysis, tools, and techniques are provided in sections 5 and 6.

Social Vulnerability: An Historical Example

Historically, people of different social characteristics experience catastrophic events in diverse ways. For example, on the night the *SS Titanic* sank, 1,316 passengers died in the icy North Atlantic Ocean a first class passenger on board the Titanic had a 62% chance of survival, while other passengers had a 30% chance of survival. Many factors can explain why people survived that night. However, the mortality rate reflects the vulnerability of different social classes.

Source: Hall, W. " Social Class and Survival on the SS Titanic". Social Science and Medicine 22(6). 1986.

2 Who are "Socially Vulnerable Populations?"

2.1 Definition

The social impacts of hazard exposure often fall disproportionately on the most vulnerable people in a society—the poor, minorities, children, the elderly and the disabled. These groups often have the fewest resources to prepare for a flood, live in the highest-risk locations, and occupy substandard housing. They may also lack the social and political connections necessary to access information and resources that would help them to avoid exposure to hazards or to speed their recovery after a disaster.

Individual and social characteristics are key to vulnerability. One's age and health are just two examples of individual characteristics that might affect the impact of a hazard on a population. Social vulnerability is linked to a lack of access to education, economic resources, health care and social networks. Cultural differences among groups, such as language use and belief systems, also affect vulnerability. Importantly, where people work and live adds a spatial dimension to their vulnerability.

From the Literature: Social Vulnerability

…."social vulnerability is a multidimensional concept that helps to identify those characteristics and experiences of communities (and individuals) that enable them to respond to and recover from environmental hazards."

Cutter, S., Boruff and Shirley, "Social vulnerability to environmental hazards" Social Science Quarterly, 84:2. 2003.

"the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood are put at risk by a discrete and identifiable event in nature or in society"

Blaikie P, Cannon T, Davis I, et al. At Risk: Natural Hazards, People's Vulnerability and Disasters. London, UK: Routledge; 1994.

2.2 Characteristics

Key characteristics of vulnerable populations include:

- Age (elderly and very young)
- Low income
- Language other than English spoken at home
- Limited access to transportation
- Inadequate housing/shelter
- Low educational attainment
- Ethnic minorities
- Physically and mentally challenged

These characteristics foster conditions that potentially increase adverse consequences of natural hazards. Vulnerable populations, based on their social and economic standing, have the fewest resources to prepare for a hazard, they tend to live in the highest risk locations, and they lack the social, political and economic capital necessary to take advantage of resources to adapt or recover from changes. As part of the Corps' mission to serve the nation, it is important to consider all social effects, and how our decisions impact the safety and well-being of all members of a population.

Social vulnerability is not a new concept for USACE, but is likely unfamiliar to many and warrants greater attention. Other Social Effects and Environmental Justice are two considerations in current USACE studies that help highlight the importance of addressing social vulnerability in practice.

2.3 Social Vulnerability and Other Social Effects (OSE)

Why does the Congress direct USACE to build projects? How does USACE determine how to operate projects? There are potentially many long and complicated answers to these questions but the fundamental answer is short and simple: to improve people's lives. At a fundamental level, the goal of improving peoples' lives should apply to all Federal agencies. Yet, how often do agencies explicitly address this basic truth? Sadly, the idea of improving peoples' lives can get lost in the data and science that occurs during project analysis. The good news is there is currently greater attention across Federal agencies to more fully consider the "people" part of their work or, in other words, the "social effects" that can be influenced by federal studies, projects, and regulatory decisions.

> *"Social effects, in a water resources context, refer to how the constituents of life that influence personal and group definitions of satisfaction, well-being, and happiness, are affected by some water resources condition or proposed intervention" (Dunning and Durden, 2009).*

Social effects refer to personal and group definitions of satisfaction, well-being and happiness. Social vulnerability is one of the social effects to be considered. It is likely to have a strong impact on assessing risks to impacted populations and in developing solutions to water resources problems.

Table 2.1: Other Social Effects As Expressed in Human Needs Theory and in USACE Planning Guidance

Key Human Needs Dimensions	Human Needs Focusing Questions for OSE Analysis	OSE Factors Listed in ER 1105-2-100 Planning Guidance Notebook
Health and Safety – of themselves and families	What risks and benefits to human health and safety are posed by conditions?	– Effects on security, life, health and safety – Effects on emergency preparedness

Social Vulnerability and Resilience – ensuring that the requirements of special needs populations in the community are adequately addressed	What risks to special needs populations in the community are posed by conditions?	– Effects on security, life, health and safety – Effects on emergency preparedness
Economic Vitality – having a stable or growing economic base with access to good jobs	How are jobs, incomes, employment opportunities, and population growth of communities likely to be affected by conditions?	– Long-term productivity effects including maintenance and enhancement of productivity of resources for use by future generations – Effects on the fiscal condition of the state and local sponsor
Social Connectedness – sustaining a sense of connection to the community and neighborliness	How are community interpersonal networks, leadership, vision for the future, and relationships among voluntary organizations likely to be affected by conditions?	– Urban and community impacts – Effects on population distribution and composition – Displacement of people, businesses, and farms
Identity – feeling pride in the community, pitching in to help the community bounce back after problems	How are communities' sense of civic pride and willingness to help residents likely to be affected by conditions?	– Other effects as relevant
Participation – feeling that one's participation is valued and recognized in community decision making	Are opportunities for all affected groups' participation provided for in all phases of the planning process?	– Other effects as relevant
Leisure and Recreation – having access to healthy and safe outdoor recreation	How are leisure and recreational opportunities affected by conditions?	– Effects on educational, cultural, and recreation opportunities

Social Vulnerability: Hurricane Katrina

When Hurricane Katrina struck Orleans Parish, the heart of the New Orleans, the chances of surviving the catastrophic flood were better than those associated with the sinking of the Titanic. Yet social factors still influenced the chance to survive. The tidal surge and subsequent flood waters were responsible for 680 deaths. Residents over 75 years old represented 50 percent of those who died (338 victims) even though only 6% of the total population fall into that age range. There was also a drastic difference in the fatality rate for those over and under the age of 75. The fatality rate was 121 per 10,000 for persons aged 75 and older, but only 14 per 10,000 for those under the age of 75. Bothexamples of the *Titanic* and Hurricane Katrina demonstrate how some segments of the population are more vulnerable than others to the adverse consequences of catastrophic events.

Source: Brunkard, J, Namulanda and Ratard. Hurricane Katrina Deaths, Louisiana, 2005. Disaster Medicine and Public Health Preparedness. 2008.

Consideration of Other Social Effects is closely connected to examining Environmental Justice issues, another important field that considers people who are often part of a socially vulnerable population.

2.4 Executive Order 12898 on Environmental Justice

"Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" EO 12898 (EO) directs federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The EO is intended to prevent the exclusion of minority and low-income populations from Federal programs, policies and activities. Section 2-2 of the EO describes this more fully. The EO reflects recognition that some populations are more vulnerable and need specific consideration in the implementation of programs, projects, and policies. The two identified groups of people – low income and minority populations—generally are more vulnerable than the population as a whole and therefore must be given special consideration when documenting the impacts of projects, programs, etc.

This executive order reflects the fact that vulnerability varies between social groups. Understanding who socially vulnerable populations are and how actions to mitigate for natural hazards impact those populations is a key part of understanding environmental justice issues. Yet, as noted in section 2.1, identifying characteristics of socially vulnerable peoples goes beyond predominant Environmental Justice considerations of income and minority status.

The next section addresses the relevance of social vulnerability in the planning process and its relevance to all USACE business lines for developing holistic and comprehensive approaches to decision making.

3 Why Identify and Engage Socially Vulnerable Populations in Decision Making?

3.1 What is the Problem?

In order to effectively and efficiently solve problems it is critical to fully understand the problem. This general truth applies to water resources issues and other challenges addressed by USACE and other agencies. Socially vulnerable populations have unique characteristics (chapter 2) that require special considerations in decisions made in planning for, or responding to, an environmental hazard. They may need longer to evacuate, lack resources to relocate, or have limited English language communication skills. Engaging these stakeholders in the planning process (whether for USACE projects or elsewhere) produces more positive outcomes and changes than a plan prepared in isolation by a single person or Project Delivery Team (PDT). In order to be aware of socially vulnerable individuals, and understand their interests and concerns, project teams must identify where these populations reside and then make an effort to engage directly with them, or those organizations serving them, to gain a more complete picture of the water resource needs and challenges and in doing so better define the problem(s) to be addressed (see techniques in chapter 5).

3.2 Guidance

One critical element of developing appropriate solutions to water resource problems is knowing how people will be impacted. As part of the civil works planning process, the Corps identifies impacts to both the natural and human environments. These environmental and social impacts are declared and discussed in the National Environmental Policy Act (NEPA) document and in the USACE decision document. An important part of understanding social impacts is knowing if a socially vulnerable population is in the area and what impacts to their well-being may occur.

The importance of considering socially vulnerable populations in the planning process fits within a broader need for well-conceived communication and public involvement. Decades of experience across the Corps and other agencies have proven that effective stakeholder engagement will produce better solutions to America's toughest water resource challenges. Socially vulnerable groups may be marginalized from many resources including the decisions that are made in mainstream politics, economics, and government planning. If they have less access to resources, or are unknown to decision makers, for example, they become hard to reach and engage in the decision-making process on critical projects that will ultimately impact them and may save their lives. Even if they are aware of the opportunity to participate, socially vulnerable people may have urgent daily concerns and limited time, making engagement difficult. The socially vulnerable may therefore be left with greater risks to environmental hazards than those who are equipped with the information or ability and to take action and mitigate their risks (see Section 3.4).

There are also many laws, policies, and internal guidance that make stakeholder engagement imperative for USACE projects such as the Water Resources and Development Act of 2007 and 2014, the Planning Guidance Notebook, the National Historic Preservation Act, and the National Environmental Policy Act (NEPA). Public engagement is legally required under the umbrella of NEPA and other Federal and state laws including Executive Order 12898 for Environmental Justice.

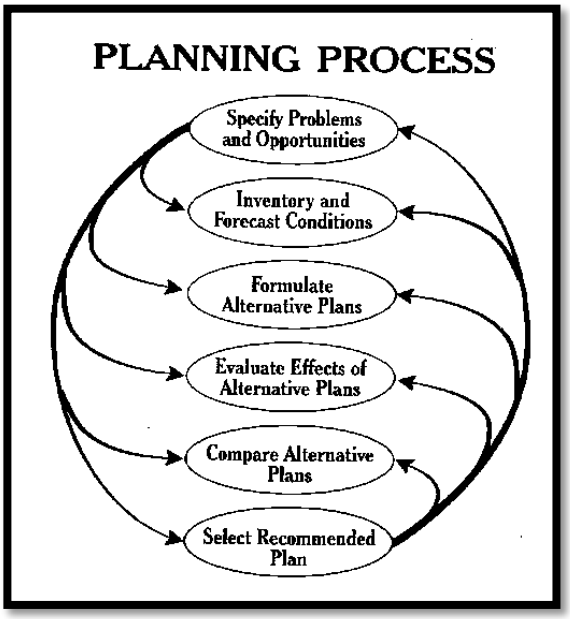
A primary reason to engage the public in the USACE planning process is to develop a better understanding of problems and opportunities so that better plans can be developed. With increased

knowledge gained through the public involvement process, planners can tell a better "story" of the overall need and thus help decision makers to better understand the significant issues. USACE Engineering Regulation (ER) 1105-2-100 states that "district offices shall conduct planning studies in an open atmosphere to attain public understanding, trust, and mutual cooperation and shall provide the public with opportunities to participate throughout the planning process." The regulation further states that each district office shall "develop and implement an effective public involvement strategy as an integral part of the planning process for each study." Incorporating simple steps into our planning process will ensure our work encompasses all those impacted.

When it comes to planning a project it is therefore critical to consider and appropriately engage socially vulnerable groups in the Corps' 6-Step planning process or other collaborative decision-making efforts that occur as studies, projects, or regulatory processes are implemented.

3.3 The USACE 6-Step Planning Process

In this section, typical activities within each step of the 6-step planning process are highlighted in relation to the identification and engagement of vulnerable populations:



Step 1 - Identifying the problems and opportunities is an important first step in identifying the issues that will impact all stakeholders. During this first step, the study team can gain a better understanding of the potential social impacts by using Census information and local demographic reports to identify the socioeconomic characteristics of the study area population. Because social

Questions to ask about Socially Vulnerable Populations (SVP) during the 6-Step Planning Process

Step 1: What social statistics can be used to describe the populations? Where do they live, work, and play in relation to the project area? How can I best engage them to ask how they feel about the problem(s) and opportunities.
Step 2: How are the socially vulnerable being affected by current conditions? What are the conditions likely to be in the future?
Step 3: What kinds of measures are needed to achieve the desired social conditions for the socially vulnerable populations?
Step 4: What are the plans' effects on the socially vulnerable?
Step 5: How do the plans' effects compare in regards to the socially vulnerable populations?
Step 6: How were the effects of the alternative plans considered in regards to socially vulnerable populations?

Source: OSE Primer

impacts often fall disproportionately on the most vulnerable people in a community, an initial analysis of who the at-risk groups are and where they are located is vital to effective and efficient plan formulation. Planning charrettes and scoping meetings that might only include only Corps personnel, project sponsors, and other agency stakeholders might consider inviting representatives from socially vulnerable groups and other stakeholders to participate in at least part of the workshops (see Appendix C? Spectrum of Engagement). At a minimum, ensure that analysis occurs to determine when engaging socially vulnerable groups is appropriate. **Ask:** What social statistics can be used to describe the populations? Where do they live, work, and play in relation to the project area? How can I best engage them to ask how they feel about the problem(s) and opportunities?

Step 2 - Inventorying and forecasting conditions is a "gathering" step where Project Delivery teams (PDTs) look at historic data and data on potential future conditions. Planners are generally most concerned with the conditions of the natural, economic, or social resources that will be affected by an implemented solution to the problems identified in step one. During this second step, the study team continues to compile and refine socioeconomic information about the study area. This gives them a better understanding of historic, baseline, and possible future social conditions. Gathering data on socially vulnerable populations during this step is critical to developing a complete understanding of the study area. The future without-project condition is the condition that evolves in the absence of the implementation of a water resources solution. The future with-project condition is the condition that evolves in the presence of an implemented solution. The development of these scenarios can be improved by using a combination of demographic statistics, focus groups, expert panels, and community workshops that consider and engage high-risk individuals. During the post-Hurricane Katrina work in New Orleans, for example, the project planners facilitated over 19 public meetings in the neighborhoods of socially vulnerable populations in order to ensure they had an opportunity to engage in the planning process. These locations were identified by asking community leaders where foreign language, economically disadvantaged, and demographically unique communities existed.

Ask: How are the socially vulnerable being affected by current conditions? What are the conditions likely to be in the future?

Step 3 - Formulating alternatives allows the team to identify ways to achieve its planning objectives and solve water resource issues. Understanding the locations of socially vulnerable populations, and what impacts they might incur, is key to moving from formulating these alternatives to evaluating them. While formulating alternatives it is a good idea to involve stakeholders as much as possible in the development process. Engagement could entail attending a workshop-charrette, a public meeting/open-house to receive comments on possible solutions, and asking stakeholders questions -- via email, social media, or through surveys -- about their impressions of potential solutions that are being developed. In addition to your own analysis, ask key stakeholders "who is missing from the process that should participate?" This extra effort will ensure better inclusion of all potentially impacted groups. Keep in mind that some socially vulnerable populations may not have access to certain types of technology so you may have to reach them directly. Project team members could meet with community representatives to get an idea of the best means of outreach, be it a community newsletter, religious group bulletin board, non-governmental organization roster, or other medium of communication. Members of your team that are familiar with the area are good leads to find out what organizations exist. **Ask:** What kinds of measures are needed to achieve the desired social conditions for the socially vulnerable populations?

Step 4 - Evaluate alternative plans with an emphasis on how they affect social, economic, and environmental resources. At this point the team should have engaged the socially vulnerable

populations enough to be able to describe the effects of each plan on the populations in terms of magnitude, location, timing/duration, and risks. **Ask:** What are the plans' effects on the socially vulnerable?

Step 5 - Compare alternative plans with an emphasis on the positive and negative social, economic, and environmental effects. During this step stakeholders may bring new information in the form of comments or questions to the study team. Often, less vulnerable residents do not have the time and resources to attend public meetings or to contact the District office. Because of these barriers, it is important to plan for reaching out to vulnerable populations to gather their feedback on alternatives. This is also the step where a comparison matrix of the social effects of alternative plan features is useful to identify effects on the socially vulnerable population. **Ask:** How do the plans' effects compare in regards to the socially vulnerable populations?

Step 6 - Select the plan to recommend to the decision maker. The team member responsible for evaluating Other Social Effects aids the study team in weighing the beneficial versus adverse effects (economic, social and environmental) of the array of alternative plans in order to recommend a plan that avoids or minimizes negative social effects, especially to those socially vulnerable populations. **Ask:** How were the effects of the alternative plans considered in regards to socially vulnerable populations?

Engaging low-income, Spanish Speaking residents in Schuyler, Nebraska: A Section 205 feasibility study to inform the Public about Flood Inundation risks from the Platte River and Shell Creek.

USACE Omaha District conducted a NEPA process that performed Public Involvement in Spanish as well as English after identifying the native Spanish Speaking population of Schuyler as a very large portion of the total community. Mark Nelson describes the effort here: "We identified this need early in the feasibility study on the basis of the 2000 Census figures. According to the 2010 Census, Hispanics account for 65% of the total population, with slightly lower Hispanic population percentage figures noted in the 2000 Census. Many within the Hispanic population have recently arrived from Mexico and Central America to work in the local meat packing plant and they do not have a good command of the English language. Additionally, many of the newer businesses in Schuyler's Downtown, located within the 100-year floodplain, were incorporated to serve that new immigrant community within the past 20 years, and have store signs in Spanish. Our effort to engage that population in our 2009 public scoping meeting took the form of meeting announcements in Spanish, which were published in local Spanish-language newspaper ahead of the meeting. At the meeting we hired a Spanish language interpreter and prepared comment forms and a PowerPoint on project features in Spanish. In the main public meeting during the feasibility phase, the presentation and the question and answer period were covered by the local Spanish language public-access television network. The camera man trained his camera on the attached Spanish-Language Power Point, which I ran during the meeting, since I understand some Spanish and knew when to advance the slides."

Although this section focuses primarily on the Corps' planning process, the recommended steps for identifying and engaging socially vulnerable populations can be useful in any Civil Works, Military, or Regulatory process where human lives are impacted by decisions. The following section examines the relevance of social vulnerability to the USACE Dam and Levee Safety programs.

4 Implications of Social Vulnerability in the Dam and Levee Safety Programs

"Successful risk communications leads to a common recognition and understanding of the hazards, risk management options, and a shared acceptance of the risk management decisions."

ER 1110-2-1156 Safety of Dams – Policy and Procedures

Flood risk management projects, especially dams and levees, can give populations a false sense of security. It is critical to be able to effectively communicate the benefits of dams and levees, while also increasing awareness of the fact that there is "residual risk."[1] In order to effectively communicate risk and to adequately define the risks it is critical to understand the demographic and social characteristics of the population living within the potential inundation area. This will help to ensure that the most vulnerable people are not overlooked.

The Risk Framework for the Dam and Levee Safety Program is built on three activities for evaluating and reducing risk. These activities, as shown in Figure 4.1, are Risk Assessment, Risk Management, and Risk Communication. Within that framework risk is defined as the probability and severity of undesirable consequences. Figure 4.2 shows the multiple components that make up risk, including: hazard, performance, exposure, vulnerability, and consequence.

Figure 4.1 - Risk Framework

[1] Residual risk is defined as the risk that remains after a project is completed

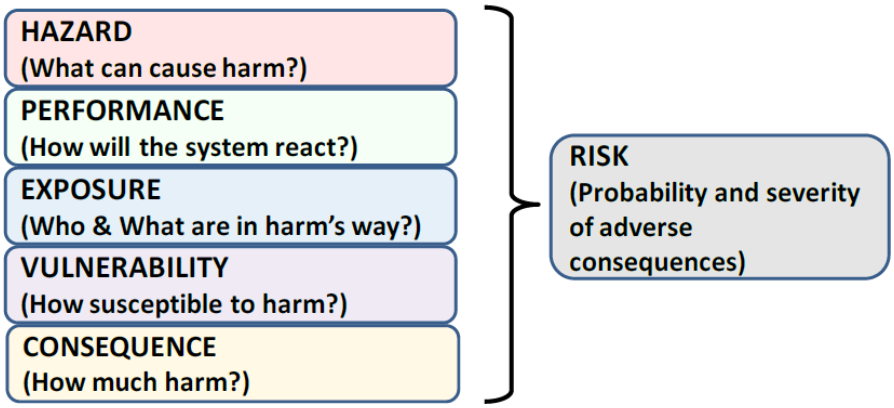


Figure 4.2 – Components of Risk

This chapter will focus on the exposure, vulnerability, and consequence components of risk and the idea that communicating risk is a shared responsibility; it will also help planners, Levee Safety Program Managers, and Dam Safety Program Managers understand how to tie these ideas into addressing and engaging socially vulnerable populations through risk communication during projects.

4.1 Exposure

Those who may be exposed to harm from a flood hazard are more generally referred to as the population at risk. It is imperative that teams seek to understand who is at risk because it can drive the assessment, management and communication of risk.

The answers to this type of risk assessment can typically be found through the use of census data or other tools (see Chapter 5) and by holding meetings with local stakeholders. Local stakeholders can be an invaluable tool when identifying exposure, because they are already familiar with the project area. For example, there may be large transient or homeless populations that are not captured in traditional estimates. They will also usually be able to provide information that captures the cultural values of the community and goes far beyond what is accessible online. It is important to include local stakeholders in the planning process as early as possible to avoid the potential exclusion of key information during risk identification. Once it has been determined who is in harm's way, the next step is to determine how susceptible to harm they are.

> *"Today's risk communication goes beyond just communicating technical information – it includes recognition of important cultural values and ideas that affect decisions. Social context and culture can influence the beliefs and actions for all parties – technical and non-technical."*
>
> *Source: Chapter 10 – Dam Safety Risk Communication ER 1110-2-1156*

4.2 Vulnerability

Vulnerability measures how susceptible the population at risk is to a given harm. For the purposes of this primer, we will look at the social vulnerability of the population at risk to assess how these characteristics affect their ability to respond to or recover from flooding. When identifying the population at risk make sure to highlight areas of potential vulnerability. Some key questions to consider are:

1. Will there be any language barriers?

2. Does everyone have access to transportation?
3. What is the education level of the population?
4. Is there a large transient population?
5. What percent of the population is over the age of 65?
6. What percent of the population is under the age of 5?
7. Are there any institutional facilities in the area?
8. Does everyone have access to warning systems? TV, radio, cell phones, etc?

These questions help to understand the community's ability to cope with hazards. For the dam and levee safety program we have to think about how these variables affect an individual or a community's ability to issue or respond to a warning, how long it takes the warning to reach the population at risk, and how it impacts a person's ability to mobilize (or take protective action).

"Communities that have thought through the warning decision process and prepared plans, procedures and the relevant tools for arriving at rapid decisions will perform better than those communities who have left warning decisions to be made in an ad-hoc manner (…) Having been trained on the warning issuance process and exercised it on a periodic basis will improve the effectiveness of the decision process. Moreover, understanding the communications process and knowing the people one is communicating with will also reduce issuance time."

Source: Mileti and Sorensen. 2014. Warning Issuance Delay, Time Estimation for Controlled Dam Releases, Dam Breaches, and Leveed Area Flooding

4.2.1 Warning Issuance Delay

Warning issuance delay describes the time it takes from when a threat is identified to the time a warning is issued to the public. Delays in warning issuance are caused by a lack of planning. In order to determine the level of emergency planning that has taken place, the community's income level can be used as an indicator. Communities with lower income levels will typically have less political and social capital, and therefore may not have adequate plans, processes, and training in place to efficiently issue a warning in a timely manner. However, it is important to remember that this is not always true. There can be low income communities that have detailed plans and high income areas that have done no planning. Several variables to consider while gauging the income level of the community are per capita income, percent living below the poverty line, and mean value of owner-occupied housing units. If there is an indication that warning issuance might be a concern, it is important to talk with the local government and emergency management agencies to identify what plans, processes, and training are in place to ensure adequate warning. Two-way communication is vital to successful action.

4.2.2 Warning Diffusion Time

Warning diffusion time is defined as the time it takes for an initial warning to efficiently spread throughout the population at risk. The most efficient way to disseminate a warning through a population is the use of a wide range of communication channels, especially in areas where the population is very diverse. There are multiple social factors that can affect the efficiency of warning diffusion. First, a lack of access to technology can significantly impede a person's ability to receive a warning. Without access to television, radio, or telecommunications (i.e., cell phones, Internet) the most efficient way to issue a warning may be door-to-door or vehicles equipped with loud speakers, which can be time consuming based on the spatial extent of the population at risk. Secondly, if large portions of the population are over the age of 65, there may be sensory constraints on warning diffusion (e.g. someone cannot hear a flood warning siren). If warning diffusion time is expected to be a concern it is useful to engage with the local population about this challenge through public involvement

activities. This will provide the project delivery team with a better sense of how people in the area communicate and receive their information. A clear example of this occurred at the Tulsa District during a public outreach campaign to communicate the risks of the Tulsa-West Tulsa Levees. During preparation for a public meeting in the area the District discovered that the local neighborhood association communicates door-to-door through flyers because it is the most efficient way to disseminate information. After learning this, the District had to rethink its communication strategy for the area and plan how to decrease the diffusion time as part of interim risk reduction measures. These types of factors are important to consider in any public involvement plan and when evaluating alternatives.

"Pre-event knowledge refers to what the person who receives an alert/warning knows about the hazard, the protective actions associated with that hazard, and how warnings about that hazard might be delivered to them in their specific location. In general, the more a person knows about these items beforehand, the less likely they are to delay initiating a recommended protective action contained in an alert or warning."

Source: Mileti and Sorensen. 2014. Protective Action Initiation Delay, Time Estimation for Controlled Dam Releases, Dam Breaches, and Leveed Area Flooding

4.2.3 Mobilization Rate

The mobilization rate is the time between when a person at risk receives a warning and when they take action. The primary factor that influences how quickly someone mobilizes is the content of the warning message. Social characteristics can influence what a properly constructed message needs to include. Planning is also an important factor if the population will need assistance evacuating. Some key factors to consider when assessing the populations are:

1. Age of the population
2. Transportation access
3. Number of persons with disabilities
4. Education level
5. Population living in group quarters

These factors are indicators for a person's ability to understand a warning (education) and the ability to successfully mobilize (age, vehicle, disability).

Additionally, household characteristics can have an impact on the time it takes a person to take action. For example, a person is less likely to take a protective action until they are reunited with members of their immediate family. Households with pets also face challenges during evacuation if they have not prepared adequately in advance. A recent study found that as many as 20% of households will refuse to evacuate because they do not have accommodations for their pets (Heath et al., 2001).

…as many as 20% of households will refuse to evacuate because they do not have accommodations for their pets (Heath et al., 2001).

It is imperative to work with local emergency managers to determine the level of community awareness of flood risk and the amount of planning and personal preparedness of the community, as these can go a long way in mitigating some of the factors that contribute to non-mobilization. If the population at risk is shown to be socially vulnerable, and there is a lack of community planning and awareness, it is recommended to work with the local sponsor and emergency managers to educate the community about flood risk and the importance of developing a family plan and emergency kit for natural disasters.

4.3 Consequence

Consequences can be defined both monetarily and non-monetarily and include loss of life, economic damages, and environmental impacts. Life safety is paramount for the dam and levee safety program. The main factors affecting loss of life are warning and mobilization effectiveness, how much time is available before flood waters arrive, the characteristics of the flood water (depth, velocity, etc), and ability of the shelter where someone is located to be able to withstand those flood waters. Social vulnerability can play a large role in the magnitude of life loss during a flood, as was evident by the distribution of fatalities among different population groups in the aftermath of Hurricane Katrina. Social vulnerability also plays a larger role in the four phases of disasters (shown in Figure 4.3) beyond just response to a disaster, because these vulnerable populations often lack the resources and political capital to recover from, mitigate, or prepare for a disaster.

In projects where the vulnerability of the population is seen as significantly increasing consequences and overall risk, consider reaching out to the District floodplain management services, public affairs office, district public involvement specialists, and the state Silver Jackets[2] team to help with outreach on new projects, or as part of interim risk reduction measures for existing projects.

4.4 Stakeholder Engagement

"Communicating risk to the public is a shared responsibility among USACE and its various stakeholders. An open, interactive and ongoing dialogue is critical. Communicating risk is as important as assessing and managing risk."

ER 1110-2-1156 Safety of Dams – Policy and Procedures

There are several guiding policies that direct the USACE to actively engage the public for the Dam and Levee Safety Programs[3]:

1. ER 1110-2-1156 Safety of Dams – Policy and Procedures,
2. *ECB No. 2014-X Placing Levee Systems in a Risk Context, Emphasis on Communication and Public Sponsor Engagement (Draft),*
3. *EC 1110-2-6072 Levee Safety Program – Policy and Procedures (Draft).*[4]
4. Planning Guidance Notebook

The guiding philosophy for the Dam and Levee Safety Programs is that communicating risk is a "shared responsibility." The USACE must be transparent and interactive when dealing with sponsors and local stakeholders. Both management measures and interim risk reduction measures must be implemented by various parties, so that their participation in the development, selection,

Figure 4.3 – The Four Phases of Disasters

[2] http://www.nfrmp.us/state/
[3] http://planning.usace.army.mil/toolbox/index.cfm
[4] https://intranet.usace.army.mil/centers/iwr/RMC/lsp/lspecdocs/Forms/AllItems.aspx

implementation and communication of risk reduction measures is integral to project success. During this process it is important that all of those affected, including residents and business owners, are not left out.

In summary, socially vulnerable populations should be considered in dam and levee safety program activities, due to a lack of political and social capital and the fact that they are more likely to live in the high hazard areas. It is the responsibility of USACE and the local sponsor to ensure that these groups are included in the discussion so that the cultural and social aspects of projects are considered during the evaluation of management measures and reflected in the residual risk of the project. The team should reach out to these communities through public meetings, news media outlets, or other innovative methods. Activities should be coordinated through the Public Affairs Office, District Public Involvement Specialists, Flood Plain Management Services, the Flood Risk Management Community, and the state Silver Jackets team for additional support and consistency of messaging.

The following sections offer supporting information for what is covered in sections 1-4 of this primer. Sections 5 and 6 discuss resources for obtaining more information on social vulnerability analysis, tools, and techniques for conducting such an analysis, and section 7 addresses Frequently Asked Questions.

5 Tools and Techniques to Identify Vulnerable Populations

This section explores some of the techniques and tools to properly identify socially vulnerable populations. A thorough analysis of an impacted area is the foundation for appropriate and effective stakeholder engagement.

5.1 Introduction—Initial Evaluation

When considering an initial evaluation it is useful to remember that different work efforts will require different levels of effort. Additionally, it is usually wise to use an iterative approach with increasing levels of effort identified based on initial information. Three steps are recommended during the scoping/initial investigations stage of work. They are basic but informative, effective, and inexpensive. They are listed in a recommended order but it is likely that each will be performed more than once, so the order is not compulsory.

1. Check the census data.
    - Look for large populations of the elderly or very young; low incomes; non-English speakers; renters; those living in mobile homes; shelters, minorities. These are key characteristics in establishing vulnerability.
2. Visit the area.
    - Observe. Check for indications of the vulnerability characteristics identified in the census data. Note seeming discrepancies and questions.
3. Talk with stakeholders.
    - A stakeholder means every individual or entity that has a stake (an interest) or that is impacted by a project, study etc. USACE personnel may assume that stakeholders are only agencies or parties that are directly involved in a project and not the general public, but members of the public potentially impacted by a project are also stakeholders. Native American Tribes that have an interest or "stake" in a Corps civil works project or regulatory issue should not be referred to as regular "stakeholders" and should be consulted based on Tribal Consultation guidance.
    - Conversations with stakeholders are likely to be more useful to the analyst and less burdensome for stakeholders if the prior steps have been performed. Allow stakeholders to tell you what they think is important as well as asking them specific questions based on your previous research.

For some studies, this will provide enough information to support useful input to the overall study including the formulation and analysis of alternatives. In some cases more detailed analysis focusing on one vulnerable group, such as the elderly, may be done. A limited analysis of this type can provide essential information to study efforts. A detailed technical analysis is not always essential to provide critical input.

5.2 Further Analysis - Tools to Identify Socially Vulnerable Populations

A variety of tools are available from USACE and other agencies if detailed technical analysis is justified based on the range of population characteristics, complexity of alternatives or other concerns. Below is a list of useful tools that help with data gathering and the identification process:

5.2.1 USACE Tools

Social Vulnerability Analysis Methods for Corps Planning

IWR Report 2011-R-07 (Dunning and Durden, 2011)

This handbook presents two practical methods for identifying socially vulnerable groups in study areas and illustrates how the information they provide about social vulnerability, the drivers of vulnerability, and their spatial distribution in flood hazard zones can be used in the planning process. The report can be found on IWR's website: http://www.iwr.usace.army.mil/docs/iwrreports/2011-R-07.pdf

Handbook on Applying "Other Social Effects" Factors in Corps of Engineers Water Resources Planning

IWR Report 09-R-4 (Dunning and Durden, 2009)

This handbook provides the foundation for applying OSE to the Corps' planning process. It can be found on the IWR's website: http://www.iwr.usace.army.mil/docs/iwrreports/09-R-4.pdf.

Theoretical Underpinnings of the OSE Account

ERDC/CHL SR-07-1 (Dunning and Durden, 2007)

This white paper provides the history of OSE in the Corps, as well as the theoretical and academic basis for understanding OSE. A copy of this document can be found here:

www.usace.army.mil/CECW/PlanningCOP/Documents/library/theo_under_aug07.pdf.

For additional information and resources on Other Social Effects and Social Vulnerability see Section 6.

5.2.2 Tools from Other Federal Agencies

HD.gov

An informational website dedicated to the human dimension of natural resource management. Most content is from U.S. government agencies. As stated on the website, "HD.gov guides users to credible on-line information, including methods, on-line tools, publications, and a calendar of events. HD.gov adds value to existing sites by highlighting the widely applicable aspects of their content, while retaining links to more detailed information."

http://www.hd.gov

EPA EJ Viewer

Environmental justice analysis, a statutory requirement for Federal project analysis, is a measure of disproportionate impact (usually negative) on vulnerable (minority and low income) communities.

http://epamap14.epa.gov/ejmap/entry.html

Social Development Department of the World Bank

This department was formed to increase social capacity and assets of recipients of Word Bank Projects and has four focus areas: community development and social capital formation, social analysis, participation and civic engagement, and conflict prevention. You can find the World Bank Social Development Department on the web at http://web.worldbank.com. The World Bank has also developed the "Social Analysis Sourcebook," which provides useful information on the application of social analysis and assessment.

U.S. Forest Service

The U.S. Forest Service has put together a comprehensive guide for conducting social assessments called "*A Human Dimensions Framework: Guidelines for Conducting Social Assessments*." It is available at http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs065.pdf

National Oceanic and Atmospheric Administration (NOAA), Coastal Services Center

This website contains a plethora of information on the human dimensions (OSE) of coastal planning. SOVI- Social Vulnerability Index) scores have been determined for the coastal counties of the U.S. and can be found at: http://coast.noaa.gov/digitalcoast/data/sovi

A particularly interesting and innovative tool is the Human Dimensions "Wheel" (see figure 5.1 - below). Many of their resources are applicable on a broader scale. http://www.csc.noaa.gov/

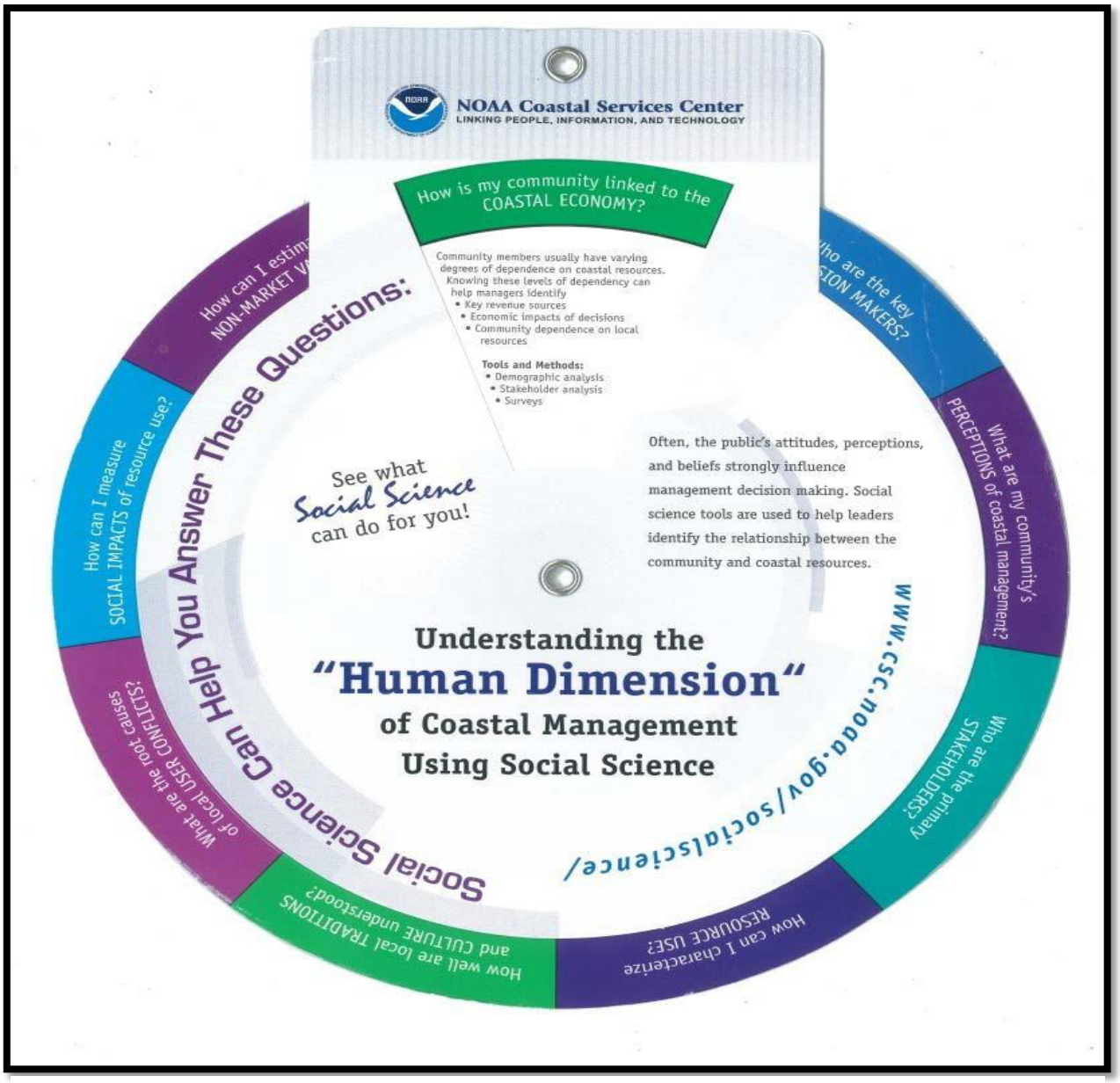


Figure 5.1: Understanding the "Human Dimension" of Costal Management Using Social Science

5.3 Detailed Analysis

The Social Vulnerability Index is the recommended tool for projects which would benefit from a detailed technical analysis of vulnerable populations. A Corps-specific version of the tool (SOVI-eXplorer) is in final beta testing and will be available on the Planning Technologies website or by contacting IWR. It includes a graphical user interface data extraction and formatting framework to facilitate social vulnerability analysis.

5.3.1 SOVI—Social Vulnerability Index

The social impacts of hazard exposure often fall disproportionately on the most vulnerable people in a society—and these populations are often overlooked and underestimated.

- Based on the research findings of Dr. Susan Cutter, et al., Department of Geography, University of South Carolina
- Comparative metric that provides a snapshot of an area's relative social vulnerability to hazard exposure
- Can be used for any hazard
- Index created across selected Census geography level (i.e. county, tract or block group) for a "parent area" and a "study area"
    - Synthesizes a number of socio-economic 'profile' variables (28 – 32) from Census provided datasets
    - Applies Principal Components Analysis to transform them into a smaller number (e.g. 6-9) of statistically significant vulnerability "dimensions"
    - Algebraically combines to create a cumulative SoVI score for each of the Census units

The University of South Carolina Hazards and Vulnerability Research Institute has done extensive work in geo-referencing social vulnerability and resiliency. Additional information can be found at http://webra.cas.sc.edu/hvri/products/sovi.aspx and http://www.iwr.usace.army.mil/docs/iwrreports/2011-R-07.pdf

Overlaying the spatial distribution of vulnerable populations as identified by the SOVI or Social Vulnerability Profile with hazard zones using GIS technology can help identify hazard "hot spots" (circled in red in Figure 5.2 below) having the greatest hazard potential as well as vulnerable populations that would likely require special consideration in the planning process.

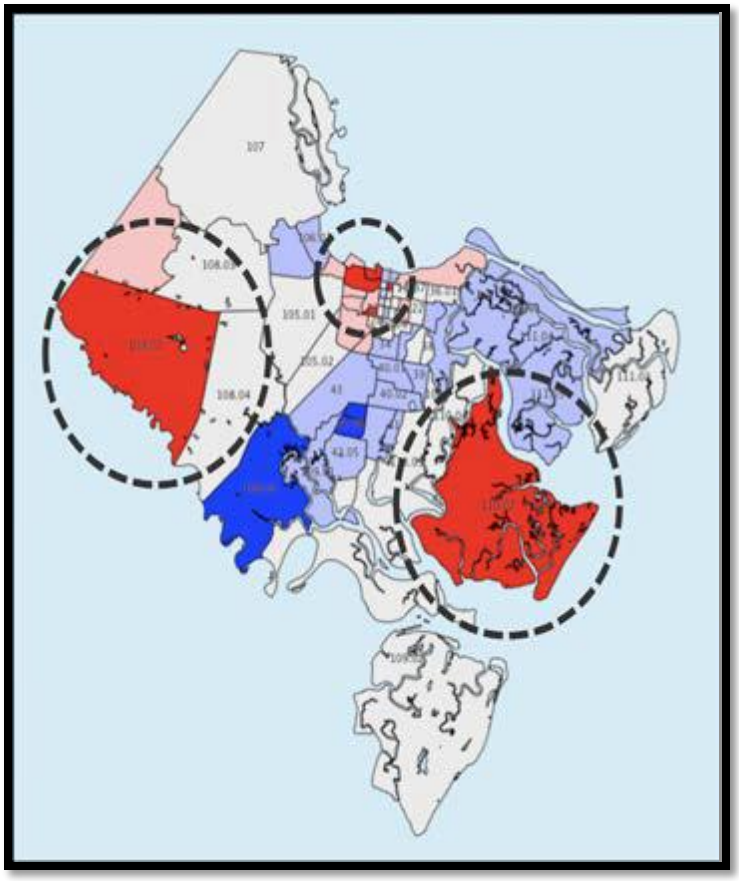


Figure 5.2: SoVI Analysis of Chatham County, Georgia[5]

The following section contains additional resources for those interested in learning more about Other Social Effects and Social Vulnerability.

[5] Chatham County, Georgia SoVI Analysis. A full example with discussion can be found at http://www.iwr.usace.army.mil/docs/iwrreports/2011-R-07.pdf.

6 Where to Find More Information

6.1 USACE Publications

Dunning, C. M., and S. Durden. 2009. *Handbook on applying "other social effects" factors in Corps of Engineers water resources planning*. Report 09-R-4. Alexandria, VA: U.S. Army Corps of Engineers, Institute for Water Resources.

Dunning, C. M. and Durden, S. May 2011 Social Vulnerability Analysis Methods for Corps Planning USA C E CAMP AIGN PLAN Goal 2: Systems Approach 2011-R-07.

Dunning and Durden. 2011U. S. Army Corp of Engineers, (2013). *Social Vulnerability Analysis: A Comparison of Tools.* Institute for Water Resources White Paper.

Durden, S. and Wegner-Johnson, M. Other Social Effects: A Primer 2013-R-02. Institute for Water Resources, U.S. Army Corps of Engineers.

6.2 Other Publications

Creighton, J. Flood Risk Management Public Involvement Framework and Implementation Plan. (see Appendix D: The Social Context for Flood Risk Management.

Cutter, S. L., Boruff, B. J., & Shirley, W. L., (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*, 84(2): 242-261.

Cutter, S. L., Mitchell, J. T., & Scott, M. S., (2000). Revealing the Vulnerability of People and Places: A Case Study of Georgetown County, South Carolina. *Annals of the Association of American Geographers*, 90 (4): 713-737.

Cutter, S. L., & Finch, C., (2008). Temporal and spatial changes in social vulnerability to natural hazards. *PNAS,* 105(7): 2301-2306.

Cutter, S., C. Emrich, and D. Morath. 2009. *Social vulnerability and place vulnerability analysis methods and application for Corps planning: Technical analyses*. Columbia, SC: University of South Carolina, Hazards and Vulnerability Research Institute.

Ferre, L, McCormick, B., & Thomas, S.K. (2014) Potential for Use of Social Vulnerability Assessments To Aid Decision Making for the Colorado Dam Safety Branch. Publisher: Association of State Dam Officials, Inc.

King, D., & MacGregor, C., (2000). Using social indicators to measure community vulnerability to natural hazards. *The Australian Journal of Emergency Management*. 15(3): 52-57.

Thomas, D. S. K., Phillips, B. D., Lovekamp, W. E., & Fothergill, A., (2013). *Social Vulnerability to Disasters*, (2nd ed.). Boca Raton, FL: CRC Press.

7 Frequently Asked Questions

What is Social Vulnerability?

A socially vulnerable population is one that is at greater risk due to its individual, social and cultural characteristics relative to the larger population (see section 2 of this primer for a full explanation). Social vulnerability is also represented as the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to environmental hazards. See the Hazards and Vulnerability Research Institute's web site for more info: http://webra.cas.sc.edu/hvri/products/sovifaq.aspx.

What Population Characteristics Affect Vulnerability?

- Age (Elderly and Very Young)
- Income
- Language other than English spoken at home
- Access to Transportation
- Educational Level
- Ethnic Minorities
- Physically and Mentally Challenged
- Housing

How are Social Vulnerability and Other Social Effects (OSE) related? *

Social Vulnerability is one of the "Other Social Effects" as expressed in Human Needs Theory and in USACE Planning Guidance. Addressing the human needs dimension in Other Social Effects analysis means ensuring that the requirements of special needs populations in the community are adequately considered. In order to focus an analysis on human needs, ask: What risks to special needs populations in the community are posed by conditions? OSE Factors Listed in ER 1105-2-100 Planning Guidance Notebook include: Effects on security, life, health and Safety. Effects on emergency. (For more information see: Other Social Effects: A Primer 2013-R-02)

What is the relationship between Social Vulnerability and Environmental Justice?

Environmental Justice (EO 12898) directs federal agencies to develop environmental justice strategies to aid federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. A key part of understanding environmental justice issues is understanding what socially vulnerable populations are and how actions to mitigate for environmental hazards may impact those populations. The concept and the associated measurement methods of social vulnerability facilitate compliance with the EO. Consideration of EJ issues and SV populations can help water resource planners to develop strategies that fully consider the needs of all populations in the project area.

What is the justification for applying study resources to SV analysis and engagement if it isn't required under current planning rules?

OSE and SV analyses add value for the USACE and sponsors by providing better knowledge of the full range of impacts and benefits from proposed actions. Social vulnerability analysis and engagement

leads to better informed decisions arising from thinking about the proposed alternatives' impacts on the community or the areas impacted by the actions. Analyzing and engaging SV populations can also contribute to mitigating risks (buying down overall risk from the project) and potentially preventing future conflicts with stakeholders by involving them early and being transparent.

How should a budget for SV and OSE analysis be developed?

A focus on the key questions that need to be answered (presented in this Primer, as well as in some of the resources identified in Section V) can help to develop an overall set of tasks and time lines to be included in the Project Management Plan (PMP). Consulting with others who have done similar analyses can also be helpful.[6]

What is the difference between OSE and SV analysis and Socioeconomic Impact Assessment?

The difference between OSE analysis and Socioeconomic Impact Assessment is the role of the analyst. In OSE/SV analysis, the analyst is an "action researcher," whose primary focus is on using social science to facilitate, communicate and build understanding to help shape the project. However, in Socioeconomic Impact Assessment, the analyst is more likely to be a "hands off" observer to promote full disclosure of effects and compliance with regulations. Effective SV analysis and engagement will require talking to (engaging) people from those SV populations in your project/study area.

Are there other Corps documents that address Social Vulnerability?

There are some good examples of SV analysis, primarily in Social Vulnerability Analysis Methods for Corps Planning and *Social Vulnerability Analysis: A Comparison of Tools.* Institute for Water Resources White Paper (see Corps Resources in previous sections for full reference). We recommend this Primer, and its listed resources, as a starting point to go beyond analysis to engagement of socially vulnerable groups. It is important to keep in mind that in each project the PM or analyst will need to ask the important questions in order to develop an approach to SV population issues relevant to the unique study area.