

Social Vulnerability: Overview and Analysis

Corps of Engineers Planning CoP Webinar

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US Army Corps of Engineers
BUILDING STRONG[®]



Look Ahead

- **Other Social Effects**
- **Social vulnerability Analysis**
- **Primer on Social Vulnerability Identification and Engagement**
- **SOVI-X (Social Vulnerability Tool)**
- **Example**
- **Questions**
- **Discussion**



Look Back

Other Social Effects

- **Flood Control Act of 1936**
- **Green Book (1950) and 1958 Revision**
- **Senate Document 97**
- **Rivers and Harbors Act of 1970**
 - **Principles and Standards**
 - **Principles and Guidelines**
- **WRDA 2007**
 - **EC 1105-2-409**



What Are They?

“The other social effects account registers plan effects from perspectives that are relevant to the planning process but are not reflected in the other three accounts.”

Income, Employment

Life, Health, Public Safety

**Education, Cultural,
Recreation**

Community Cohesion

Aesthetics

Resilience



Why Are They Important



Why Are They Important?

- **“Significance— they are integrally related to the basic values and goals of society”**
- **What is the purpose of our studies and actions?**
 - **Define the problem well—better solutions**
 - **Value in informing evaluation of alternatives**
 - **Can be critical to overall project justification**



How Do We Do It?

- Fully utilize the authority and flexibility of the P&G
- Link NED, RED, EQ, OSE
- 2 Primary Components
 - Engagement
 - Data/Methods
 - Social Vulnerability and “hot-spots”



How Do We Do It?

- **Metrics**
 - Identify, qualitative, quantitative
 - Positive/negative
 - Beneficial/adverse
 - Monetize
- **Evaluation**
 - Completeness
 - Effectiveness
 - Efficiency
 - Acceptability

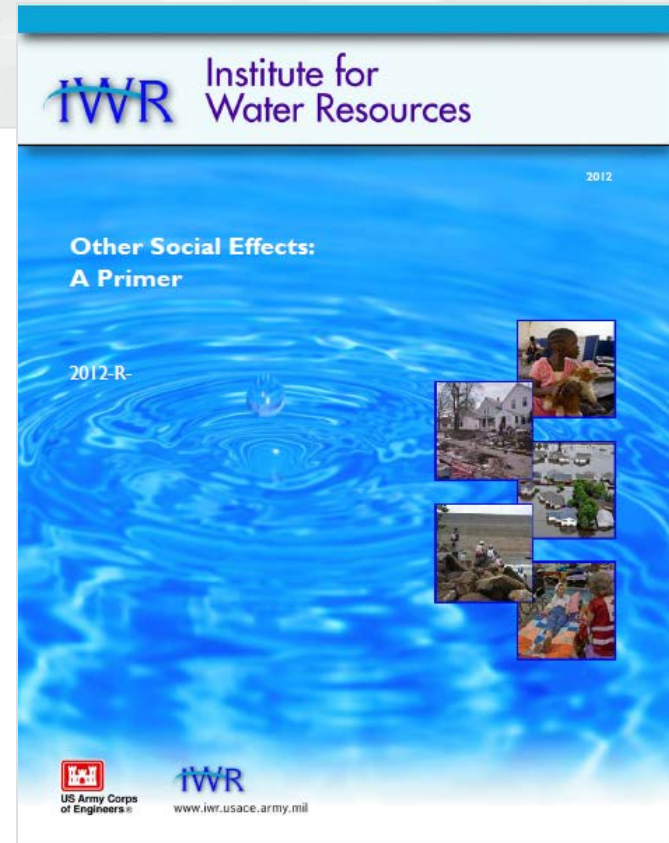
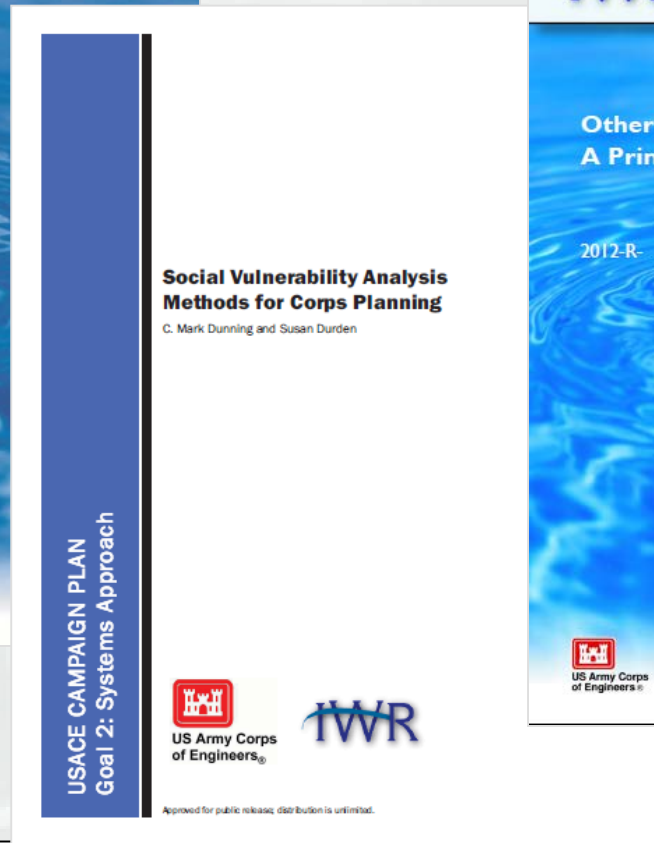
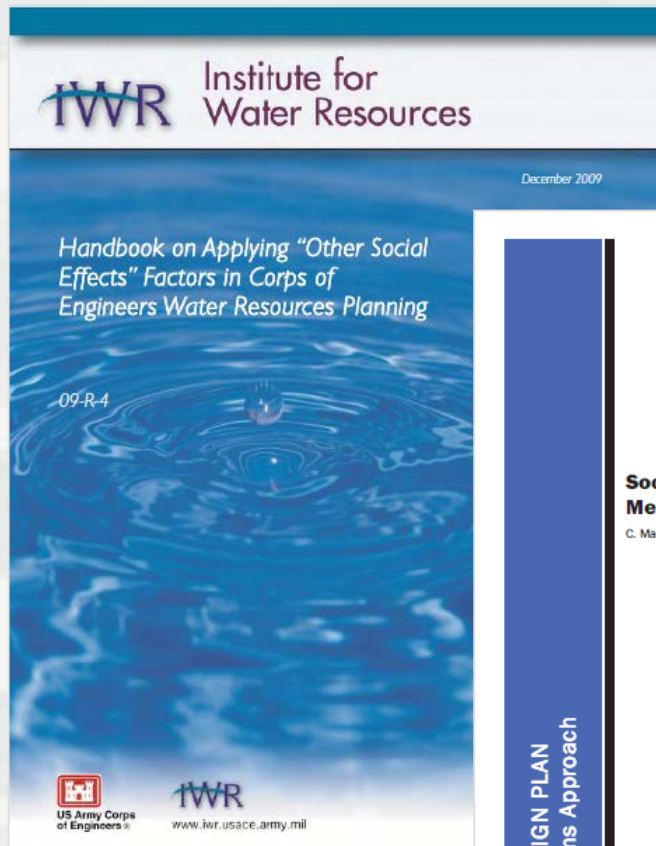


How Do We Do It?

- **Population characteristics**
- **Indices, Indicators**
 - **Civic Index**
 - **Trauma Indices**
 - **Place Vulnerability**
 - **Health and Safety Statistics**
 - **Economic Vitality**
 - **Social Connectedness**
- **Surveys**
- **Workshops**



Recent social effects analysis products



How Do We Do It?

“planning studies should explicitly recognize the limitations of current methods and explore innovative approaches to the identification and measurement of the social well-being account”



Take Aways

Include OSE in the PMP

Fund OSE Analysis

OSE is valuable throughout the process!

OSE is not a way to “get the right answer”



Social impacts often fall disproportionately on the most vulnerable, for example...



The Elderly



Mobile Home Residents



Minorities/Poor



The Disabled



Some evidence from Katrina

Death rates per 10,000 persons:

Elderly:

- All ages 11.5
- Younger than 65 4.3
- 65 and older **65.5**

Minorities:

- <65
 - White 2.7
 - Black **5.0**
- >= 65
 - White 52.4
 - Black **74.2**

Source: Sharkey, 2007



Social Vulnerability

- ***Social Vulnerability:***
- characteristics of a person or group and their situation
- influence their capacity to anticipate, cope with, resist, or recover from the impact of a hazard
- ***Social Vulnerability Analysis :***
- relationship between social characteristics and vulnerability to hazards
- the distribution of tangible and intangible hazard effects



Social Vulnerability Factors

| Vulnerability factor | During event | Recovery (Resiliency) |
|-----------------------------------|---|--|
| Low income/poverty level | Lack of resources may complicate evacuation | Lack of resources may hinder ability to recover |
| Elderly/very young | Greater difficulties in evacuation, more health and safety issues, potential for higher loss of life | May lack resources, willingness, ability to rebound |
| Disabled | Greater difficulties in evacuation, special health and safety issues, potential for higher loss of life | Lack of facilities and medical personnel in aftermath may make it difficult to return |
| Female-headed households | Lack of resources and special needs may complicate evacuation | Lack of resources may hinder ability to recover |
| Minorities | Lack of influence to protect interests; lack of connections to centers of power or influence | Lack of influence to protect interests; lack of connections to centers of power or influence |
| Occupants of mobile homes/renters | Occupy more vulnerable housing | Potential displacement with higher rents |
| Transient/homeless | Difficult to locate and provide information to; difficult to estimate numbers | |



Applications

- **Planning**
- **Emergency Management**
- **Regulatory**
- **Levee and Dam Safety**

- **Environmental Justice**
- **Budgeting**

- **NACCS**
- **Interagency—FEMA, Infrastructure Council**



A new Primer for USACE and its partners...

Identification and Engagement of Socially Vulnerable Populations

***Author(s): Chris Baker,
Seth Cohen, Gigi Coulson,
Susan Durden, Ed Rossman***



US Army Corps of
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Purpose of the Primer

- To help Corps personnel and those who work with USACE to:
 - a) Identify people who are more vulnerable to floods and other environmental hazards due to social, cultural, economic, and physical factors.
 - a) Engage vulnerable individuals and groups during planning and other phases of projects, and involve them in decision-making processes whenever possible.



Need for a primer:

- Field requests for techniques for OSE
- PI in FRM Report and Actions for Change
- E.O. 12898--Environmental Justice
- Katrina focused concern on:
 - vulnerability; individual/community vulnerability characteristics
- Increased awareness of need to include vulnerable populations in Corps studies and projects
- Emphasis on Public Safety, Loss of Life
- Useful to Cost Sharing Partners



Why identify and engage SV pops?

- They may be marginalized from many resources and from government decision-making processes
- With less access to resources, and less engagement, they become harder to reach and involve in critical projects that may ultimately save their lives.
- They may have urgent daily concerns and limited time, making engagement difficult
- They may therefore be left with greater risks to environmental hazards than those that have info. and ability to take action



Overview of Primer

- Characteristics of Socially Vulnerable Populations
- Why it's important to identify and engage socially vulnerable populations in planning and associated public involvement activities
- The importance of social vulnerability to the Dam and Levee Safety Programs
- Available tools and techniques to identify socially vulnerable populations (SOVI-X and others)
- Where one can find more information and assistance
- “Frequently Asked Questions”



Drafting and Review Process

- CPCX initiated the effort and identified a team of USACE experts.
- Multiple-authors with guidance from senior advisors Ed Rossman and Susan Durden.
- Reviewed by peers at HQ, RMC, and the field, including those who are new to the subject.



Social Vulnerability Index (SOVI)

- **Comparative metric-- snapshot of an area's relative social vulnerability to hazard exposure**
- **Prof. Susan Cutter Department of Geography, University of South Carolina**
- **Created across selected Census geography level (i.e. county, tract or block group) for a “parent area” and “study area”**
 1. **Synthesizing socio-economic ‘profile’ variables (28 – 32) from Census provided datasets**
 2. **Applies Principal Components Analysis to transform into statistically significant vulnerability “dimensions” (6 to 9)**
 3. **Algebraically combining to create a cumulative SOVI score for each of the Census units**



SOVI-Explorer (SOVI-X)

The SV-X is a graphical user interface tool that enables Corps planners to construct SoVI and social vulnerability profiles for study areas and to perform SV analyses of Population at Risk under “without project” and “with project” assumptions.



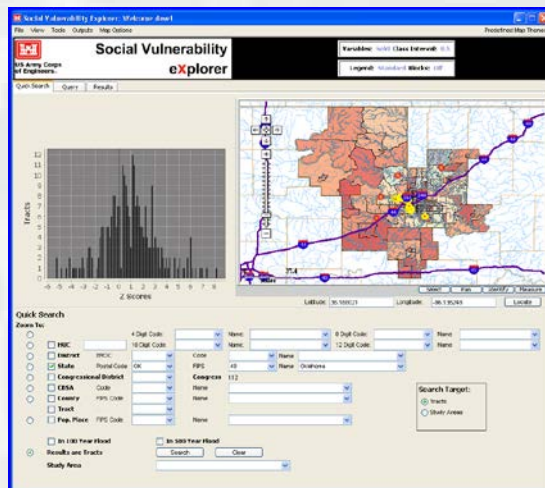
SOVI-X Key Actions

1. Assemble SVA base map, “parent area”
2. Delineate “study area” boundaries
3. Create SoVI for study area
4. Identify relevant “sub-areas” (i.e. reaches, neighborhoods, etc.)
5. Create table of “population at risk” under “without project” and “with project” assumptions for study area/sub-areas
6. Export relevant information to planning documents

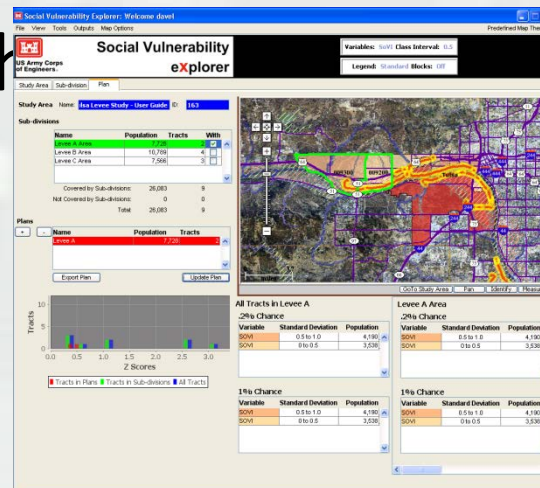


Steps in the SV-X workflow

1. Define a parent region/create a study area
2. Define subdivisions
3. Define plans



Parent region
view

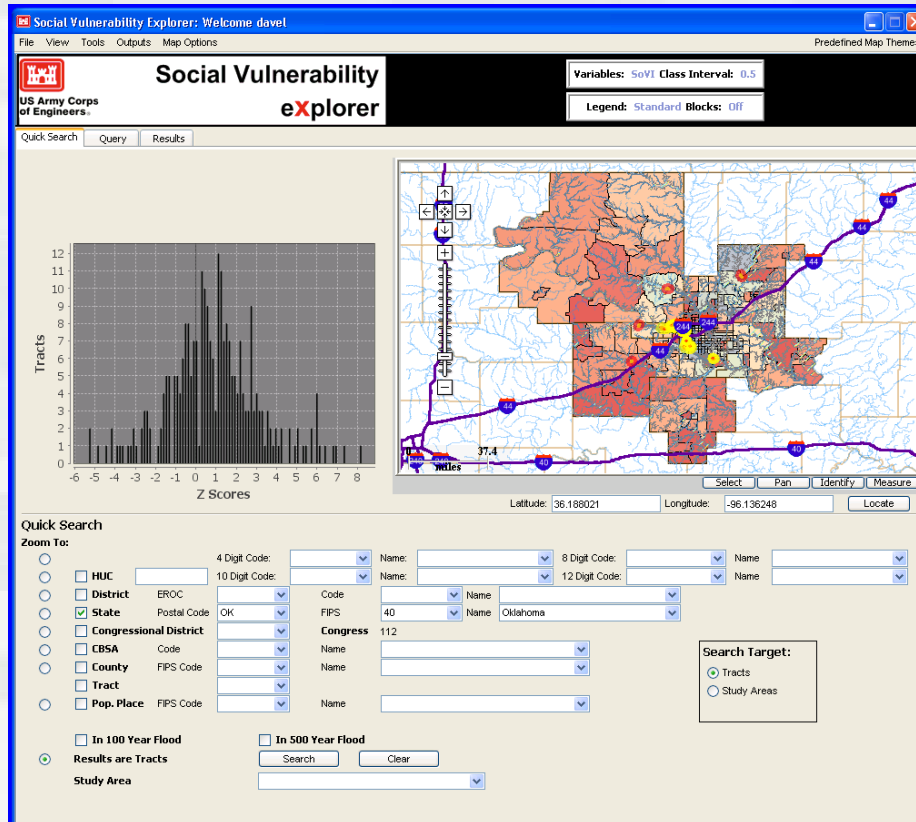


Study area view

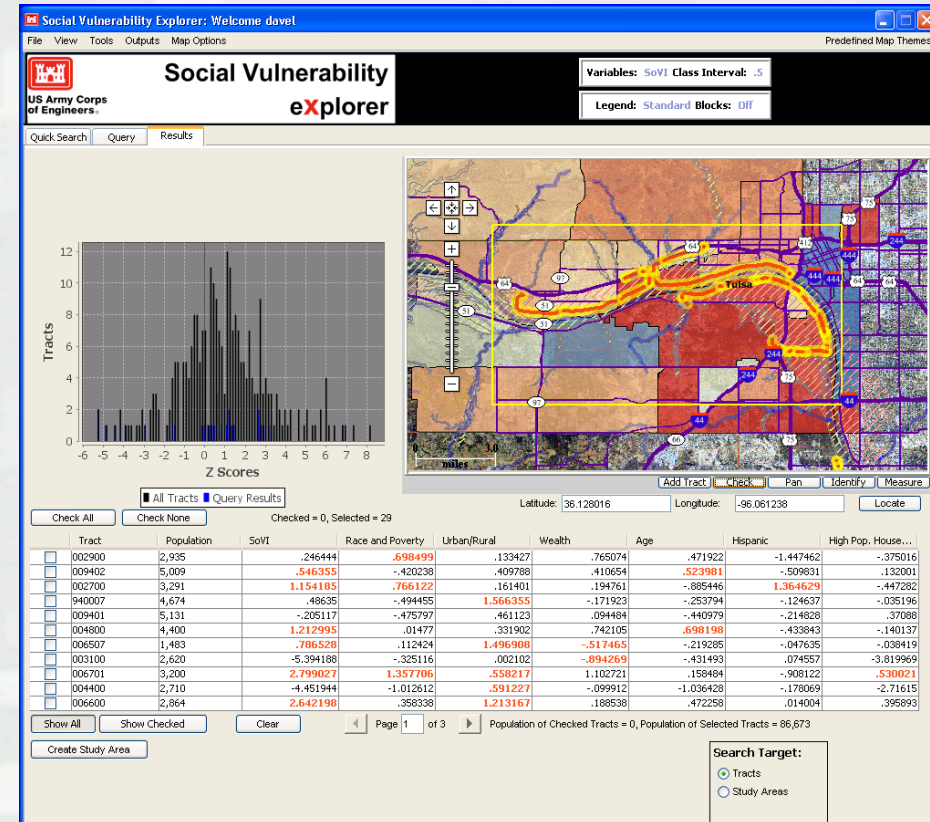
| Study Area: Tulsa Levee Study - User Guide | | | | | |
|--|--------|-----------------|-------|------------------|-------|
| Population | | 1% Chance Flood | | .2% Chance Flood | |
| | | Without | With | Without | With |
| Total: | 26,083 | 15,301 | 7,728 | 16,774 | 7,728 |
| 1% Chance Flood: | 23,029 | | | | |
| 2% Chance Flood: | 24,502 | | | | |
| Vulnerability Index | | Class Breaks | | | |
| Index | SoVI | Low | | High | |
| | | Low | High | Low | High |
| | 2.5 | | | 7,015 | 7,015 |
| | 2.0 | 2.5 | | | |
| | 1.5 | 2.0 | | | |
| | 1.0 | 1.5 | 3,035 | | 3,742 |
| | 0.5 | 1.0 | | 4,190 | 4,190 |
| | 0 | 0.5 | 5,251 | 3,538 | 6,017 |
| | -0.5 | 0 | | | |
| | -1.0 | -0.5 | | | |
| | -1.5 | -1.0 | | | |
| | -2.0 | -1.5 | | | |
| | -2.5 | -2.0 | | | |
| | -3.0 | -2.5 | | | |

With/without
analysis report

Creating a parent region & study area



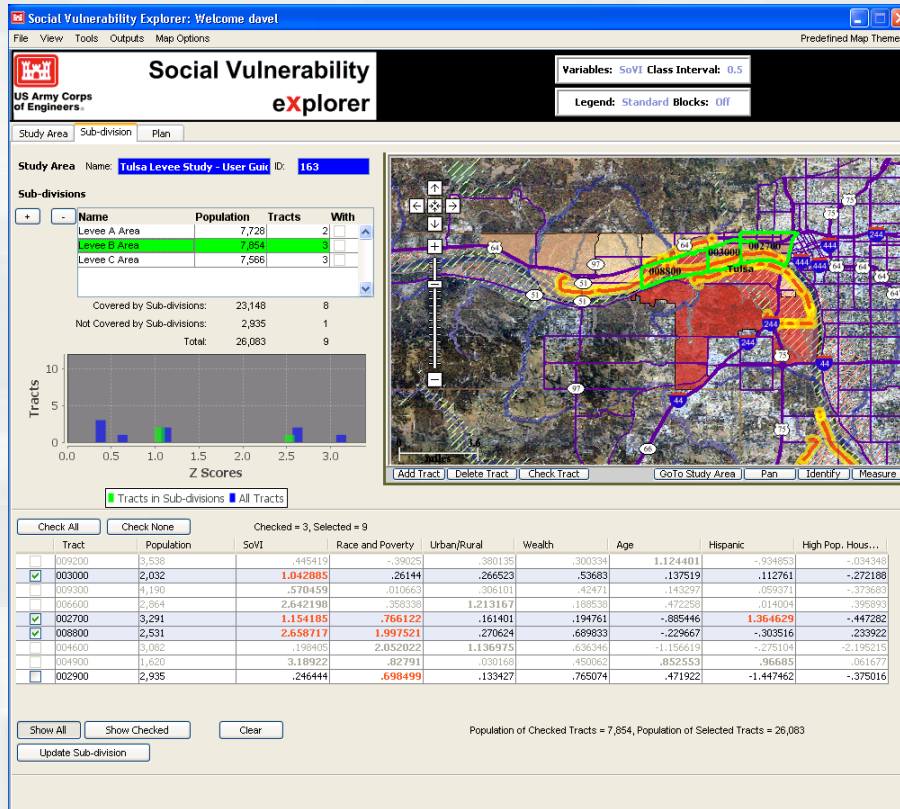
Identify a parent region,
prepare and integrate datasets.



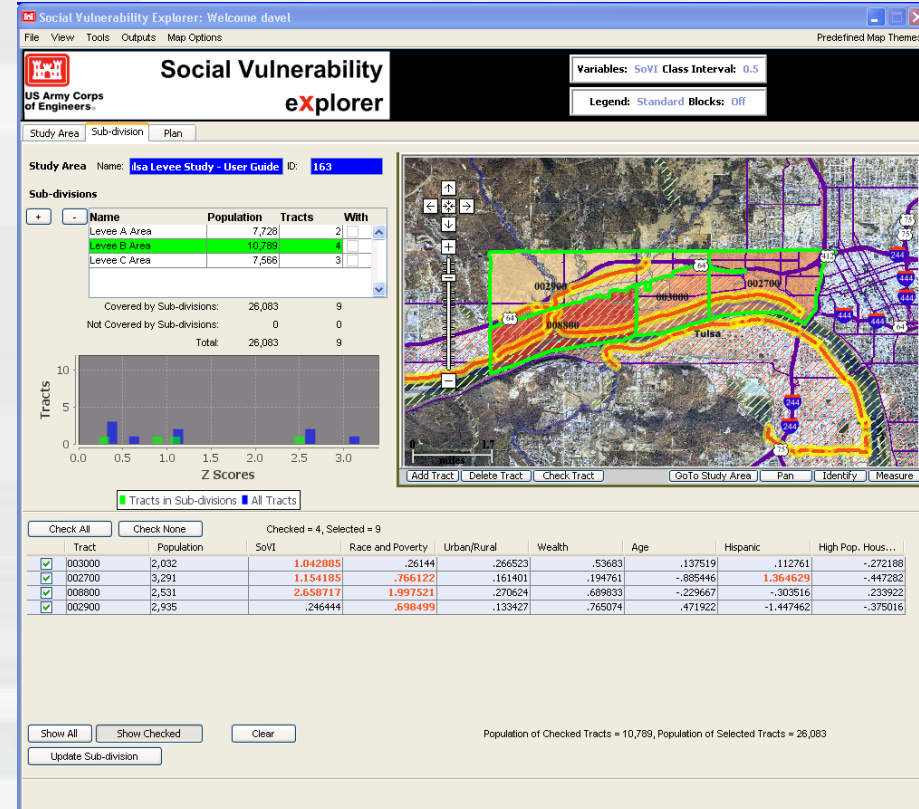
Define the study area



Defining study area subdivisions



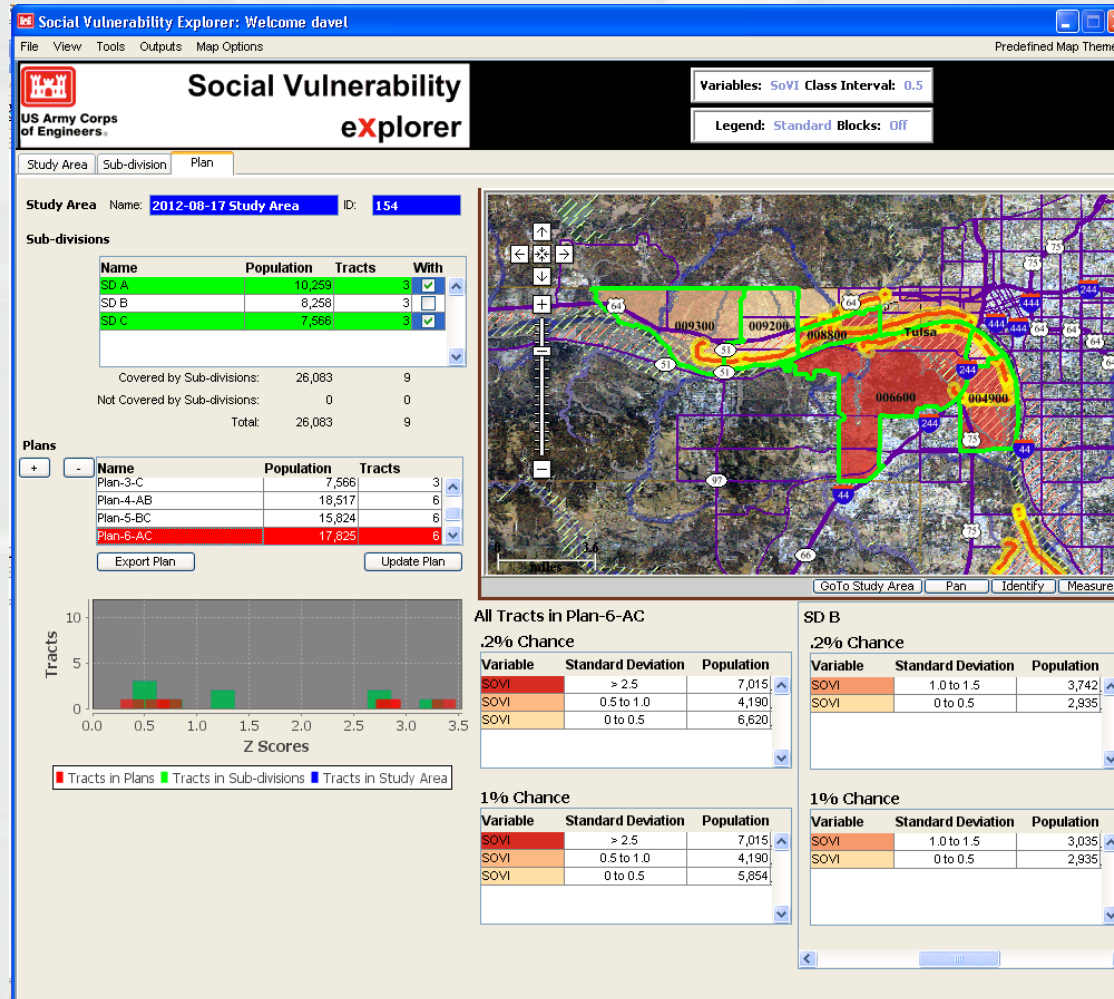
Select census units...



to define each subdivision.



Identifying Population At Risk with/without comparisons



Drilling down to better understand social vulnerability characteristics of PAR

| Study Area: | | Plan-6-AC | | | | | |
|---------------------|--------------|-----------|-----------------|--------|------------------|--------|--|
| Population | | | 1% Chance Flood | | .2% Chance Flood | | |
| | | | Without | With | Without | With | |
| Total: | 26,083 | | 5,970 | 17,059 | 6,677 | 17,825 | |
| 1% Chance Flood: | 23,029 | | | | | | |
| .2% Chance Flood: | 24,502 | | | | | | |
| Vulnerability Index | Class Breaks | | | | | | |
| | Low | High | | | | | |
| SoVI | 2.5 | | | 7,015 | | 7,015 | |
| SoVI | 2.0 | 2.5 | | | | | |
| SoVI | 1.5 | 2.0 | | | | | |
| SoVI | 1.0 | 1.5 | 3,035 | | 3,742 | | |
| SoVI | 0.5 | 1.0 | | 4,190 | | 4,190 | |
| SoVI | 0 | 0.5 | 2,935 | 5,854 | 2,935 | 6,620 | |
| SoVI | -0.5 | 0 | | | | | |
| SoVI | -1.0 | -0.5 | | | | | |
| SoVI | -1.5 | -1.0 | | | | | |
| SoVI | -2.0 | -1.5 | | | | | |
| SoVI | -2.5 | -2.0 | | | | | |
| SoVI | | -2.5 | | | | | |

(Tables can be exported to Excel.)

“With:” Population in the FZ included in plan

“Without:” Population in the FZ not included in plan

| Population | | | 1% Chance Flood | | .2% Chance Flood | | |
|----------------------|--------------|------|-----------------|--------|------------------|--------|--|
| | | | Without | With | Without | With | |
| Total: | 26,083 | | 5,970 | 17,059 | 6,677 | 17,825 | |
| 1% Chance Flood: | 23,029 | | | | | | |
| 2% Chance Flood: | 24,502 | | | | | | |
| Vulnerability Index | Class Breaks | | | | | | |
| | Low | High | | | | | |
| SoVI | 3.0 | | | 1,620 | | 1,620 | |
| SoVI | 2.0 | 3.0 | | 5,395 | | 5,395 | |
| SoVI | 1.0 | 2.0 | 3,035 | | 3,742 | | |
| SoVI | 0 | 1.0 | 2,935 | 10,044 | 2,935 | 10,810 | |
| SoVI | -1.0 | 0 | | | | | |
| SoVI | -2.0 | -1.0 | | | | | |
| SoVI | -3.0 | -2.0 | | | | | |
| SoVI | | -3.0 | | | | | |
| Race and Poverty | 3.0 | | | | | | |
| Race and Poverty | 2.0 | 3.0 | | | | | |
| Race and Poverty | 1.0 | 2.0 | | 2,316 | | 3,082 | |
| Race and Poverty | 0 | 1.0 | | 2,531 | | 2,531 | |
| Race and Poverty | -1.0 | 0 | 5,970 | 8,674 | 6,677 | 8,674 | |
| Race and Poverty | -2.0 | -1.0 | | 3,538 | | 3,538 | |
| Race and Poverty | -3.0 | -2.0 | | | | | |
| Race and Poverty | | -3.0 | | | | | |
| Urban/Rural II | 3.0 | | | | | | |
| Urban/Rural II | 2.0 | 3.0 | | | | | |
| Urban/Rural II | 1.0 | 2.0 | | 5,180 | | 5,948 | |
| Urban/Rural II | 0 | 1.0 | 5,970 | 11,879 | 6,677 | 11,879 | |
| Urban/Rural II | -1.0 | 0 | | | | | |
| Urban/Rural II | -2.0 | -1.0 | | | | | |
| Urban/Rural II | -3.0 | -2.0 | | | | | |
| Urban/Rural II | | -3.0 | | | | | |
| Wealth | 3.0 | | | | | | |
| Wealth | 2.0 | 3.0 | | | | | |
| Wealth | 1.0 | 2.0 | | | | | |
| Wealth | 0 | 1.0 | 5,970 | 17,059 | 6,677 | 17,825 | |
| Wealth | -1.0 | 0 | | | | | |
| Wealth | -2.0 | -1.0 | | | | | |
| Wealth | -3.0 | -2.0 | | | | | |
| Wealth | | -3.0 | | | | | |
| Age | 3.0 | | | | | | |
| Age | 2.0 | 3.0 | | | | | |
| Age | 1.0 | 2.0 | | 3,538 | | 3,538 | |
| Age | 0 | 1.0 | 4,260 | 8,674 | 4,967 | 8,674 | |
| Age | -1.0 | 0 | 1,710 | 2,531 | 1,710 | 2,531 | |
| Age | -2.0 | -1.0 | | 2,316 | | 3,082 | |
| Age | -3.0 | -2.0 | | | | | |
| Age | | -3.0 | | | | | |
| Hispanic | 3.0 | | | | | | |
| Hispanic | 2.0 | 3.0 | | | | | |
| Hispanic | 1.0 | 2.0 | 1,710 | | 1,710 | | |
| Hispanic | 0 | 1.0 | 1,325 | 8,674 | 2,032 | 8,674 | |
| Hispanic | -1.0 | 0 | | 8,385 | | 9,151 | |
| Hispanic | -2.0 | -1.0 | 2,935 | | 2,935 | | |
| Hispanic | -3.0 | -2.0 | | | | | |
| Hispanic | | -3.0 | | | | | |
| High Pop. Households | 3.0 | | | | | | |
| High Pop. Households | 2.0 | 3.0 | | | | | |
| High Pop. Households | 1.0 | 2.0 | | | | | |
| High Pop. Households | 0 | 1.0 | | 7,015 | | 7,015 | |
| High Pop. Households | -1.0 | 0 | 5,970 | 7,728 | 6,677 | 7,728 | |
| High Pop. Households | -2.0 | -1.0 | | | | | |
| High Pop. Households | -3.0 | -2.0 | | 2,316 | | 3,082 | |
| High Pop. Households | | -3.0 | | | | | |



Implementation

SOVI Data Development Tool

ACE-IT Approved (Install)

Manipulate Census Data

GIS Display

Exportable

Installation Guide

User Guide

SOVI-X

CorpsMap

Repository of all SOVI Analyses Done

Planner's Toolbox

IWR library <http://iwrlibrary.planusace.us>



Credits

- **Funding and Sponsors**
 - **Shore Protection Assessment**
 - **Bill Curtis**
 - **Guidance Update Maintenance Program**
 - **Lillian Almodovar, Harry Kitch**
 - **R&D**
 - **Bill Curtis**
 - **Campaign Plan**
 - **Kate White, Bob Banks, Gary House**



Team

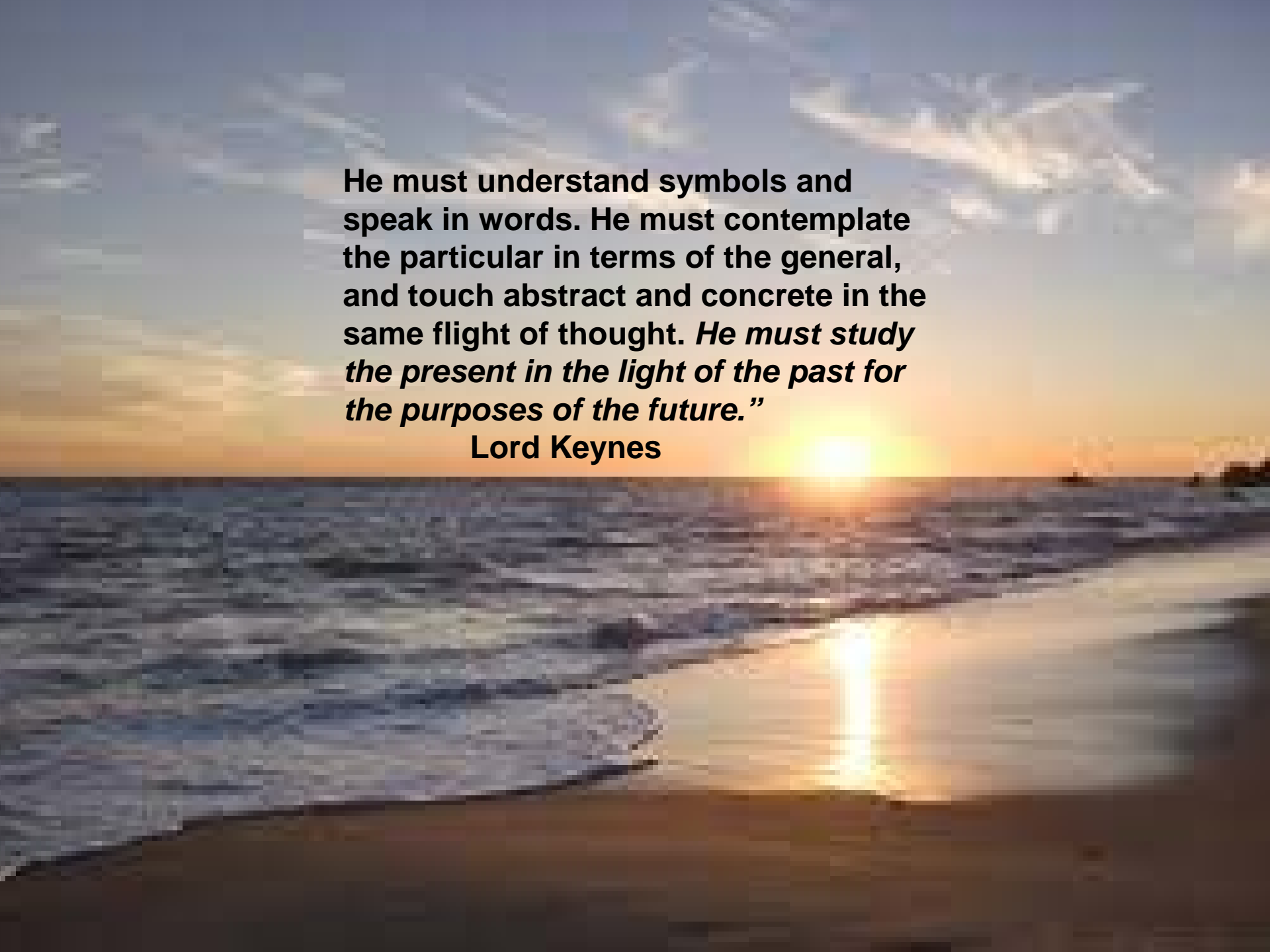
- **Corps: IWR, HQ, NAD, SWD, SAD, Tulsa (Chris Baker), Alaska, Galveston, Fort Worth, Savannah (Martin Harm)**
- **Agencies: NOAA, EPA, Bureau Rec, Interior, Navy, USGS**
- **Other**
 - **U. of GA**
 - **Notre Dame**
 - **U. South Carolina**
 - **Middlesex Flood Hazards Centre, UK**
 - **HR Wallingford, UK**
 - **Organization for Economic and Community Development, Paris**
 - **CDM, ABT, URS (contractors)**



Resources

- **An Introduction to OSE (05)**
- **Theoretical Underpinnings of the OSE Account (Sep 07)**
- **OSE Handbook, (Dec 09)**
- **Social Vulnerability Analysis Methods (May 11)**
- **Social Vulnerability Analysis: a Comparison of Tools (May 13)**
- **OSE Primer (May 13)**
- **Applying OSE in Alternatives Analysis (May 13)**
- **Social Vulnerability Analysis Handbook**
- **Socially Vulnerable Population Primer (Aug 2016)**



A photograph of a sunset over the ocean. The sun is a bright, glowing orb on the horizon, casting a long, shimmering reflection on the water. The sky is a mix of soft blues and oranges, with wispy clouds. The ocean waves are visible in the foreground, and a sandy beach is at the bottom of the frame.

**He must understand symbols and
speak in words. He must contemplate
the particular in terms of the general,
and touch abstract and concrete in the
same flight of thought. *He must study
the present in the light of the past for
the purposes of the future.*"**

Lord Keynes

Questions and Discussion

