



# **Project Impact**

## **Western Territory Workshop**

*“Taking Hold in the West”*

**May 30 - June 2, 2000**

**San Francisco, California**

**Pam Pogue**

**NFIP State Coordinator**

**State Coordinator, Project Impact**

**Rhode Island Emergency Management Agency**

# Training Objectives

- **Identify primary hazard threats and associated impacts.**
- **Geographically define areas of high risk potential.**
- **Assess and quantify physical, economic, societal, environmental vulnerability to hazards.**

# *Do you know...*

- **what your most costly hazards are?**
- **where your highest risk locations are?**
- **which of your critical facilities are most vulnerable to hazards?**
- **where your most vulnerable populations live?**
- **how susceptible your local economy is to hazards?**
- **what environmental resources are most at risk?**
- **what your best opportunities to mitigate future impacts are?**

# Community Vulnerability Assessment Tool

New Hanover County, North Carolina Case Study

- Background Information
- Vulnerability Assessment Tutorial
- Case Study
- Data Tools



About this CD-ROM



NOAA Coastal Services Center

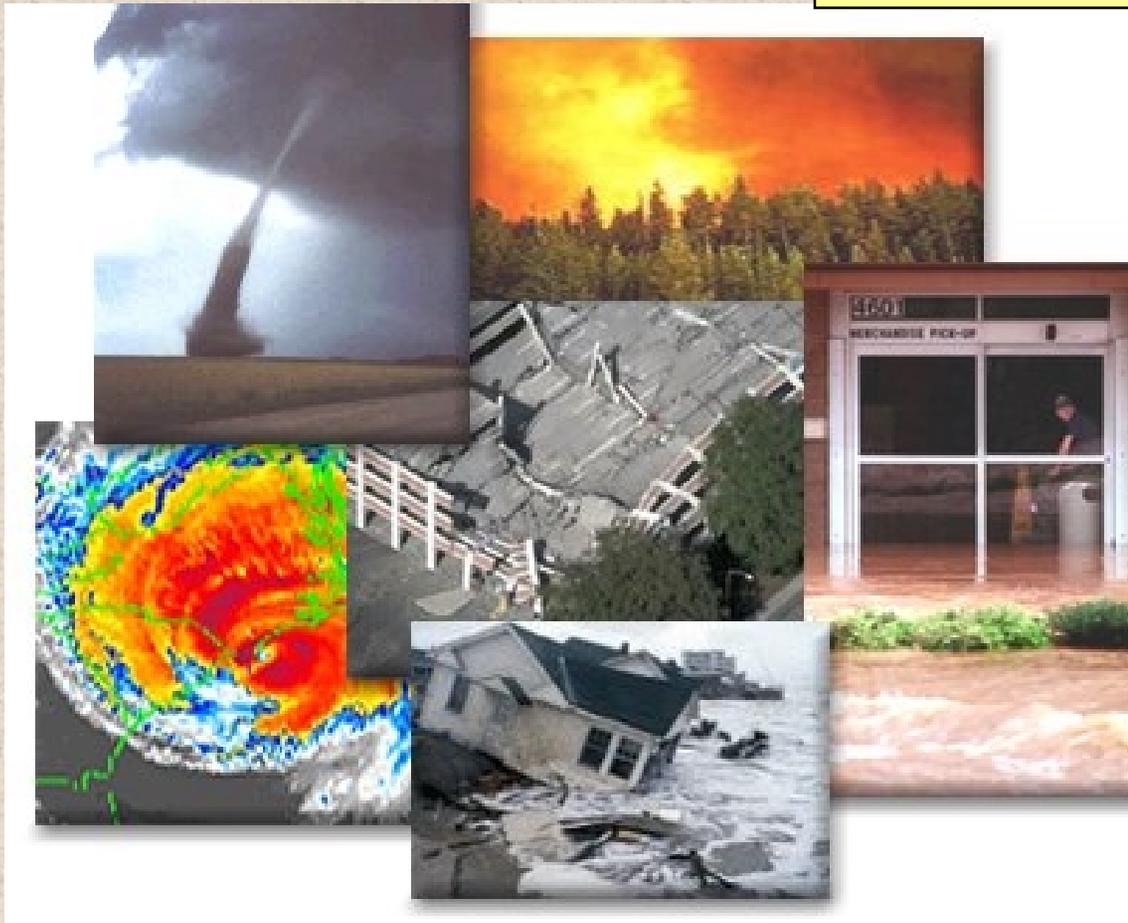
# Hazards



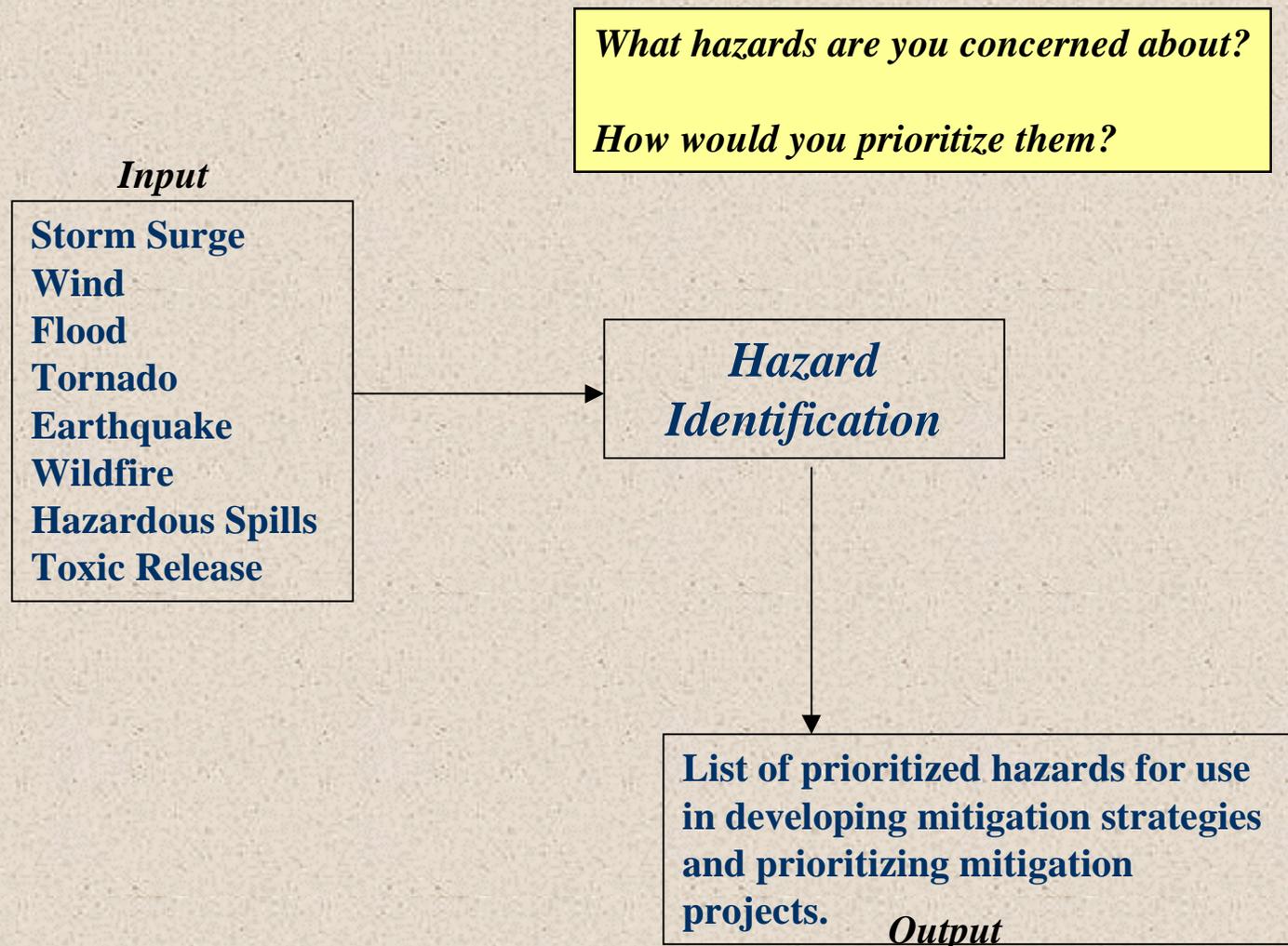
# Step 1-Hazard Identification

*What hazards are you concerned about?*

*How would you prioritize them?*



# Hazard Identification



# Hazard Identification

**Step 1a:** Identify hazards.

***Meteorological***

Hurricanes  
Storms/Flooding  
Tornadoes  
Winter Storms

***Geological***

Earthquakes  
Landslides  
Chronic Erosion

***Technological***

Toxic Releases  
Hazardous Spills

***Other***

Dam Failures  
Transportation  
Related Hazards

**Step 1b:** Establish relative priorities for your hazards.

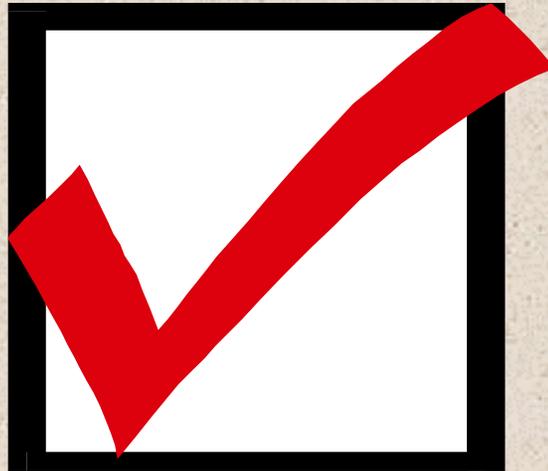
Example:

Frequency + Area Impact X Potential Damage Magnitude = Total Score

<b>Hazard</b>	<b>Frequency +</b>	<b>Area Impact x</b>	<b>Magnitude =</b>	<b>Total</b>
Storm Surge	2	4	5	<b>30</b>
Wind	3	5	4	<b>32</b>
Flood	4	4	4	<b>32</b>
Tornado	2	1	5	<b>15</b>
Coastal Erosion	3	2	3	<b>15</b>
Earthquake	1	4	5	<b>25</b>
Wildfire	3	3	3	<b>18</b>

# Local Hazards Priorities

**Develop priority matrix from local hazards list.**



*Prioritize the hazards  
within your community*

*Fill out matrix*

# Risks



# Vulnerability

- **What is vulnerability?**

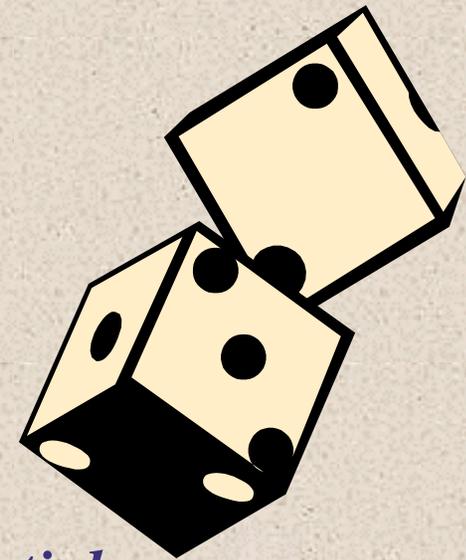
*The susceptibility of resources to negative impacts from hazard events*

- **Why conduct vulnerability assessments?**

*Know where you are before mapping out where you are going*

# Hazards vs. Risks vs. Vulnerability

- *Hazards are events*
- *Risk is the probability of hazard impact*
- *Risk areas are locations with high risk potential*
- *Vulnerability is the susceptibility of resources to the impacts of events*



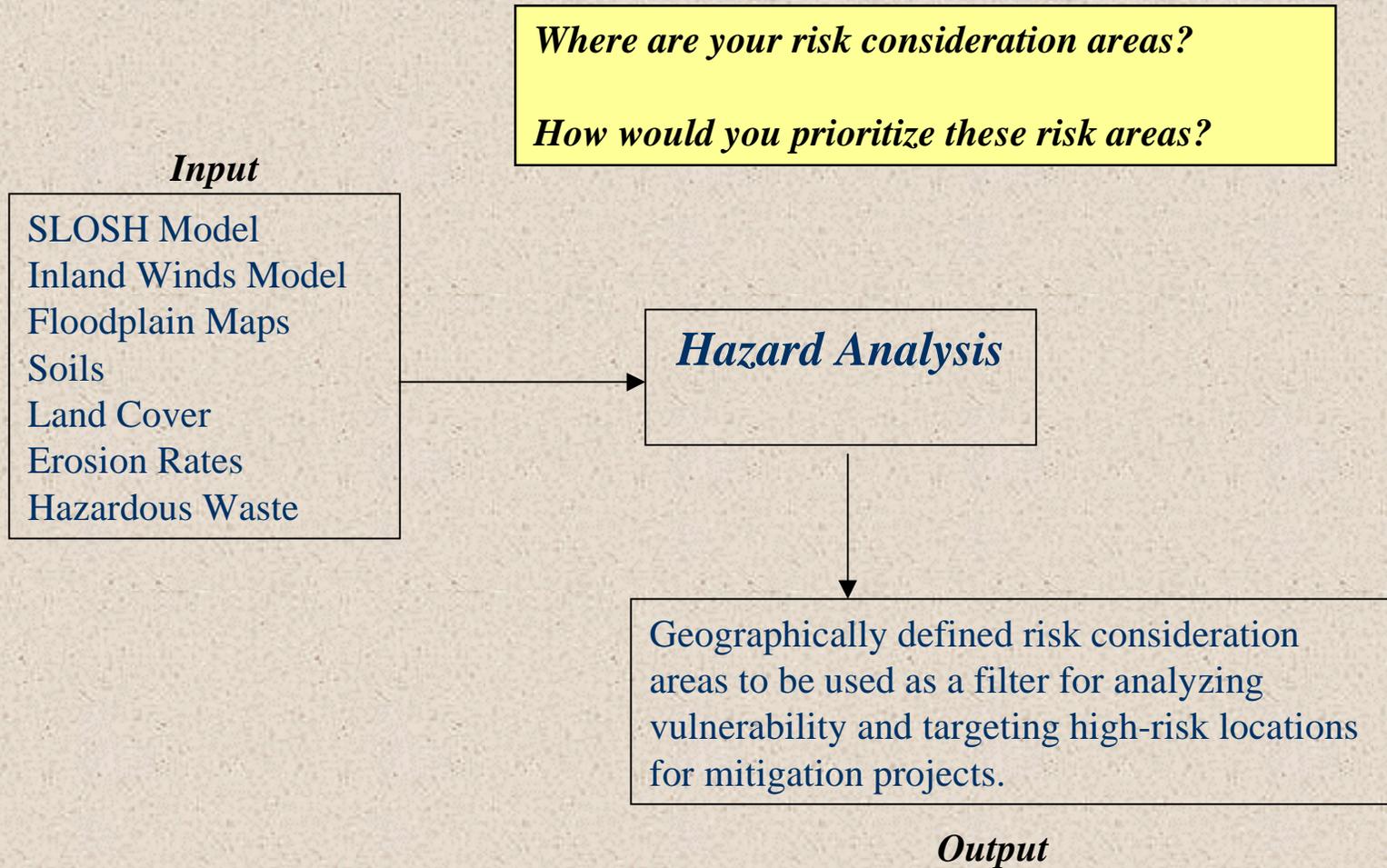
# Key Sociological Factors Affecting Risk Perception

- **Decreasing death rates**
- **Increasing accessibility and urbanization of the coast**
- **Relatively few catastrophic events**
- **Lack of agreement concerning risk**



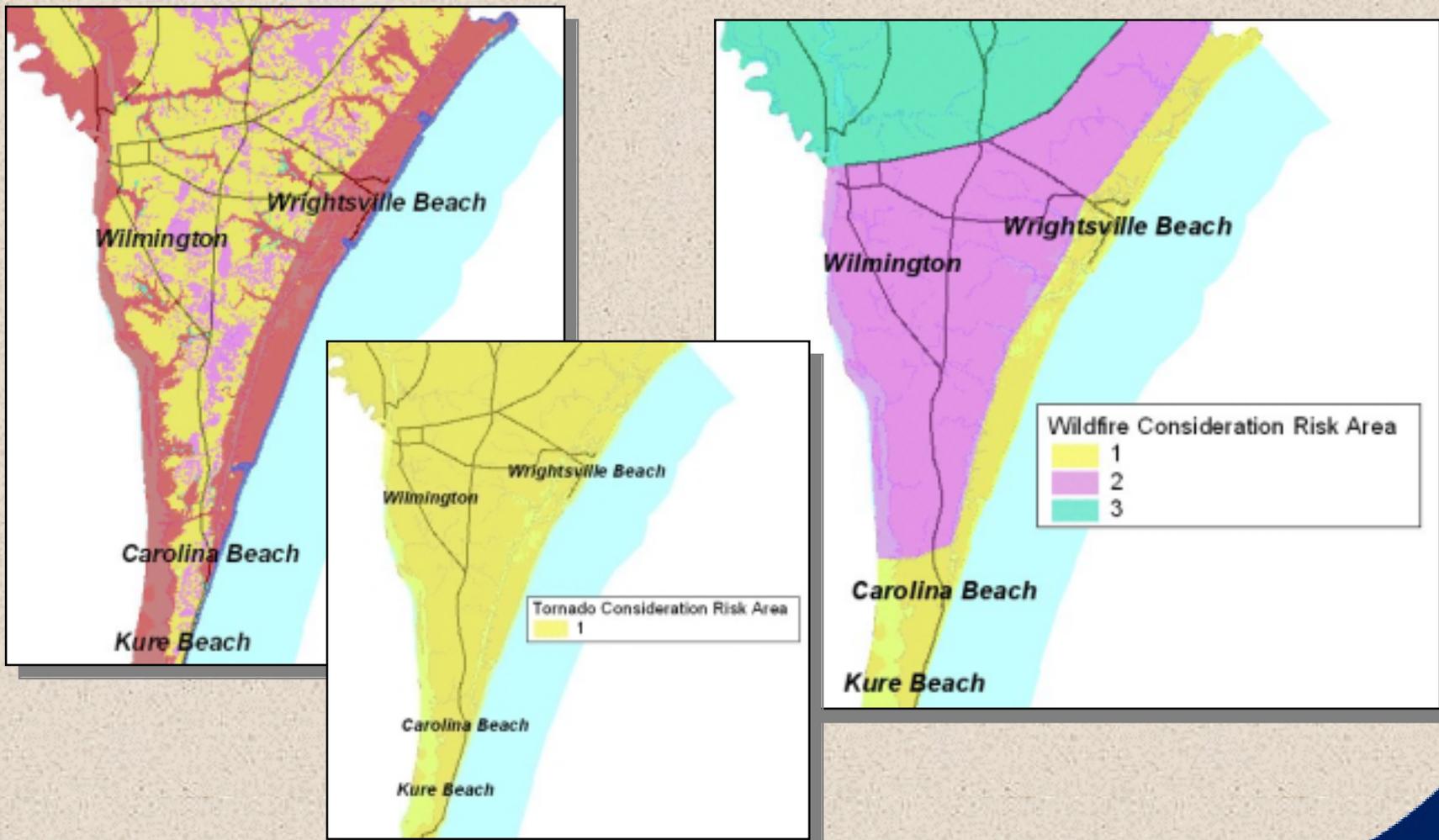


# Hazard Analysis - Risk Areas



# Hazard Analysis - Risk Areas

**Step 2a:** Map risk consideration areas for hazards.

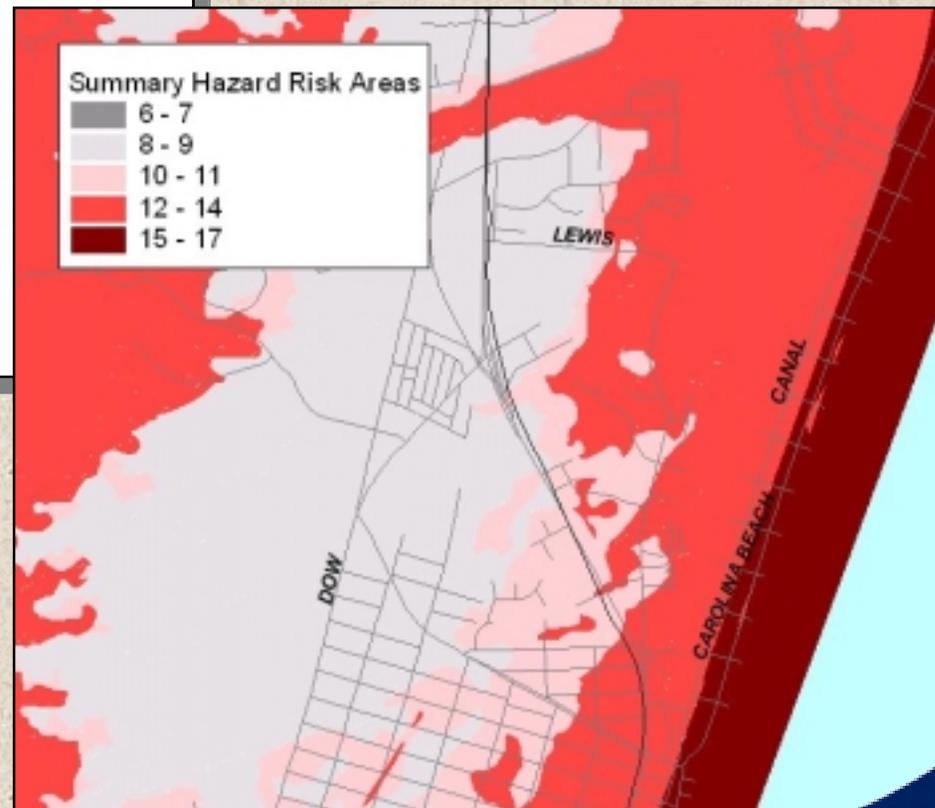
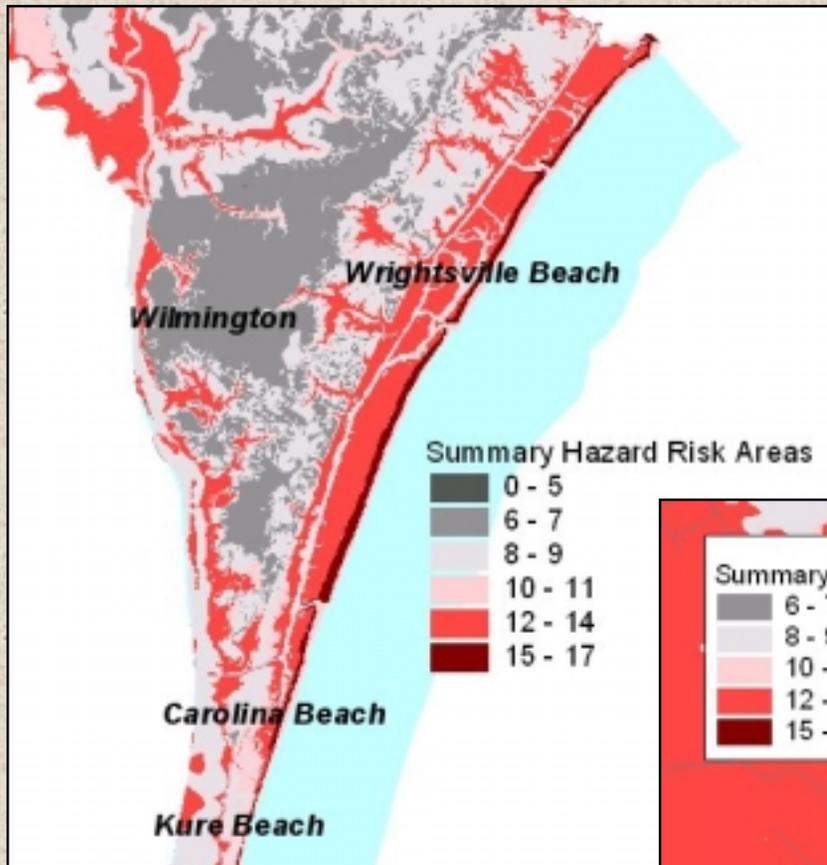


## EXAMPLE

**Step 2b:** Assign scores within risk consideration areas, where possible.

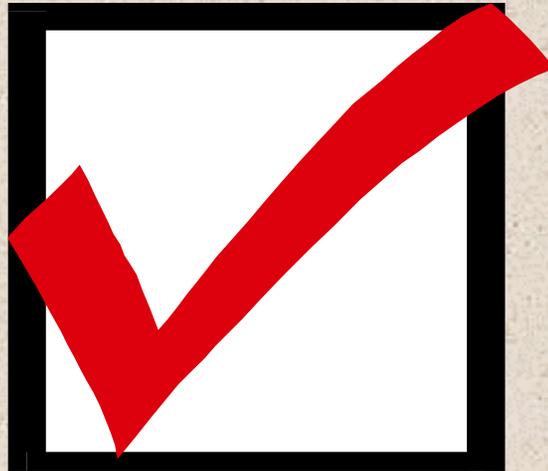
<i>Natural Hazards</i>			
<b>Hurricane Storm Surge Risk Areas</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
Storm Surge Category 1 & 2	4	4	0
Storm Surge Category 3	3		
Storm Surge Category 4 & 5	2		
Storm Surge Buffer (0.25 mile from entire surge coverage)	1		
Remainder of County	0		
<b>Flood Risk Areas</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
Flood V & VE Zones (Velocity Zone)	5	5	1
Flood A & AE Zones (100 Year Floodplain)	4		
Flood X500 Zone (500 Year Floodplain)	3		
Flood Prone Soils (Outside Flood Zones V, VE, A, AE, & X500)	2		
Remainder of County	1		
<b>Erosion Consideration Risk Areas</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
High (immediately adjacent to ocean)	3	3	0
Medium (near ocean)	2		
Low (remainder of barrier island)	1		
Remainder of County	0		
<b>Wind Consideration Risk Areas</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
Barrier Islands (Seaward of the Intercoastal Waterway)	2	2	1
Remainder of County	1		
<b>Wildfire Consideration Risk Areas</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
High (highest density of pine)	3	3	1
Medium (pines interspersed with development)	2		
Low (barrier islands)	1		
<b>Earthquake Consideration Risk Area</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
Entire County	1	1	1
<b>Tornado Consideration Risk Area</b>	<b>Risk Score</b>	<b>Highest</b>	<b>Lowest</b>
Entire County	1	1	1
<i>Natural Hazard Risk Potential Scores</i>		<b>19</b>	<b>5</b>

# Hazard Analysis



# Local Risk Consideration Areas

**Develop a list of resources for use in defining risk consideration areas for each local hazard.**



# Identify Areas at Risk

For Each Location:

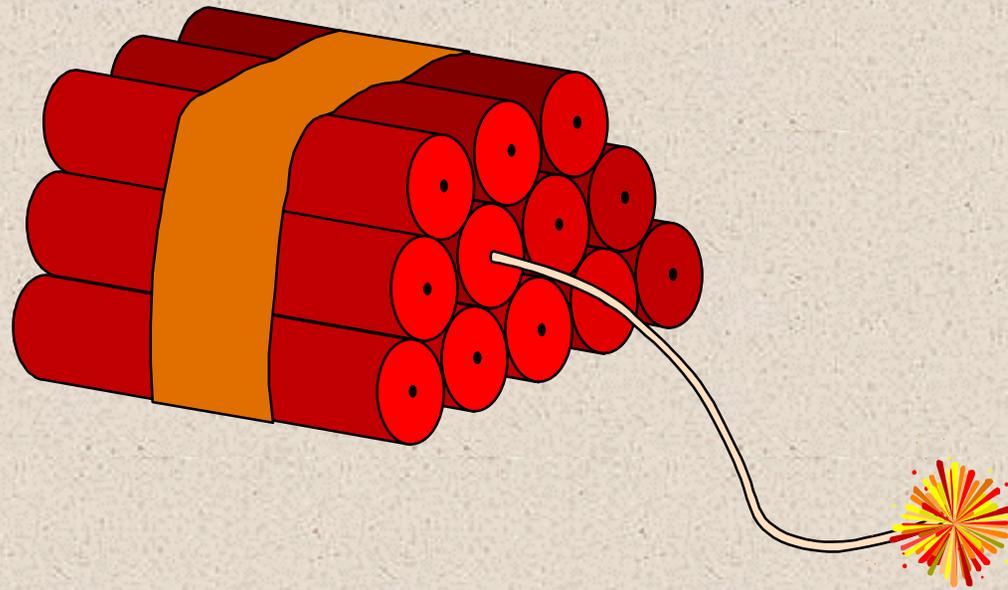
HAZARD

RESOURCE  
INFO

AGENCY

CONTACT

# Vulnerabilities



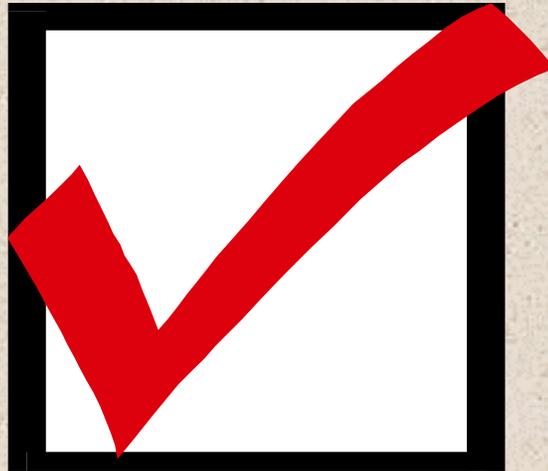
# Vulnerability Assessment Methodology



## Vulnerability Categories

- Critical Facilities
- Societal Considerations
- Economic Considerations
- Environmental Considerations
- Policy Considerations

# Vulnerability Exercise



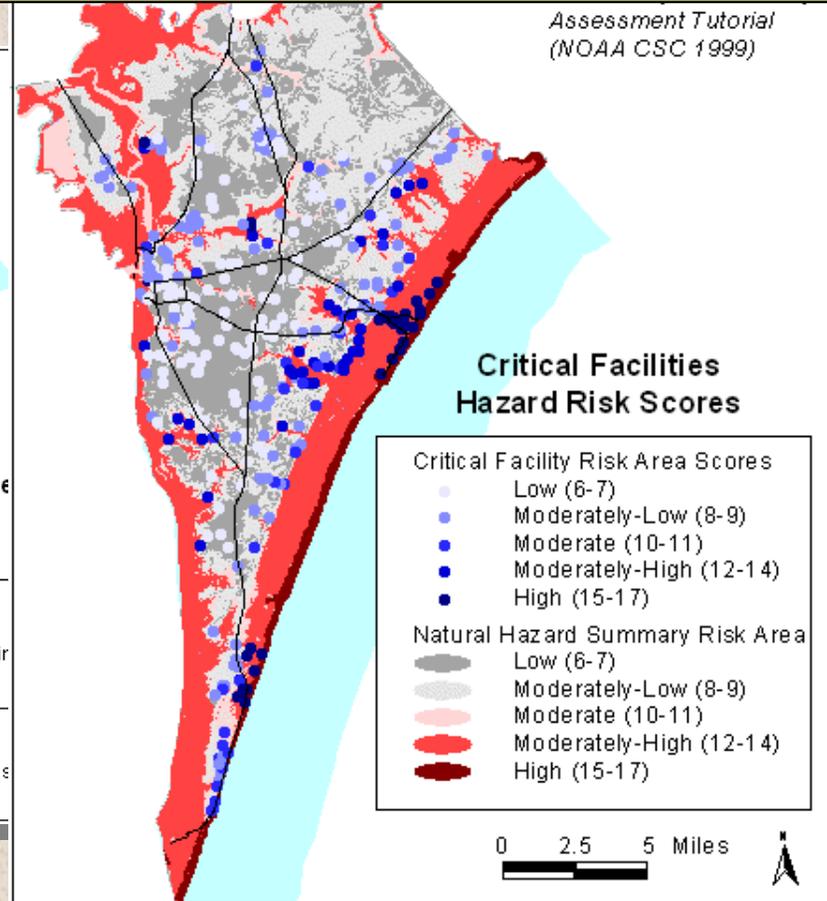
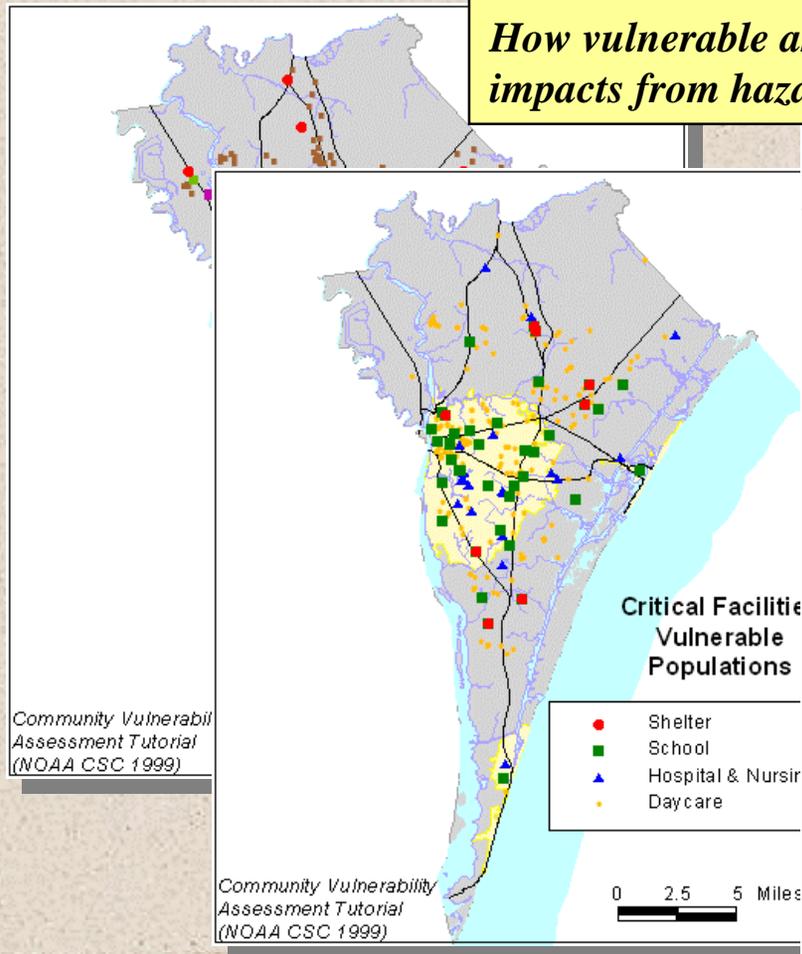
# Critical Facilities



# Step 3-Critical Facilities Analysis

*What are your critical facilities and where are they located?*

*How vulnerable are they to physical and operational impacts from hazards?*



# Step 3 - Critical Facilities Analysis

*What are your critical facilities and where are they located?*

*How vulnerable are they to physical and operational impacts from hazards?*

*Input*

Police  
Fire/EMS  
Hospitals  
Shelters  
Utilities  
Communication  
Government Facilities  
Roads and Bridges  
Schools

*Critical Facilities  
Analysis*

A systematic assessment of the vulnerability of critical lifelines or key resources to various hazard impacts. Can be used to identify and prioritize mitigation projects.

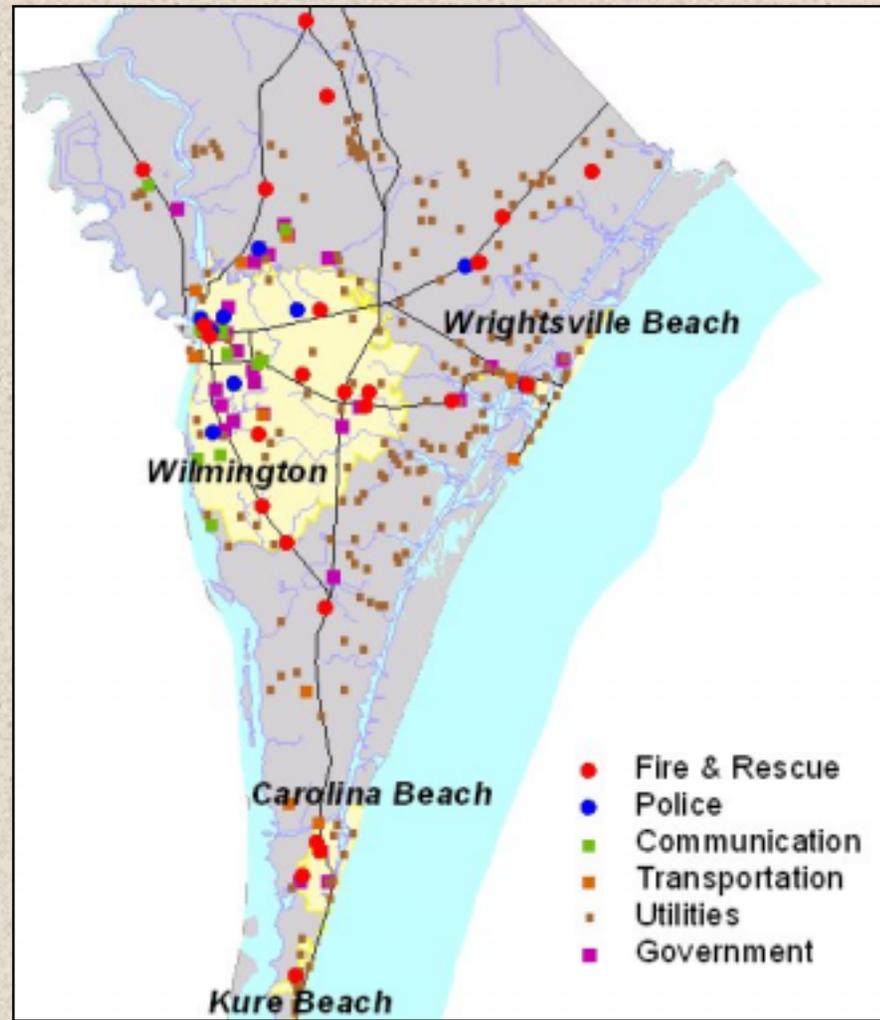
*Output*

# Critical Facilities Analysis

**Step 3a:** Identify critical facilities categories.

## EXAMPLES

Shelters  
Schools  
Medical  
Fire/EMS  
Police  
Utilities  
Communication  
Transportation  
Government Facilities  
Roads and Bridges

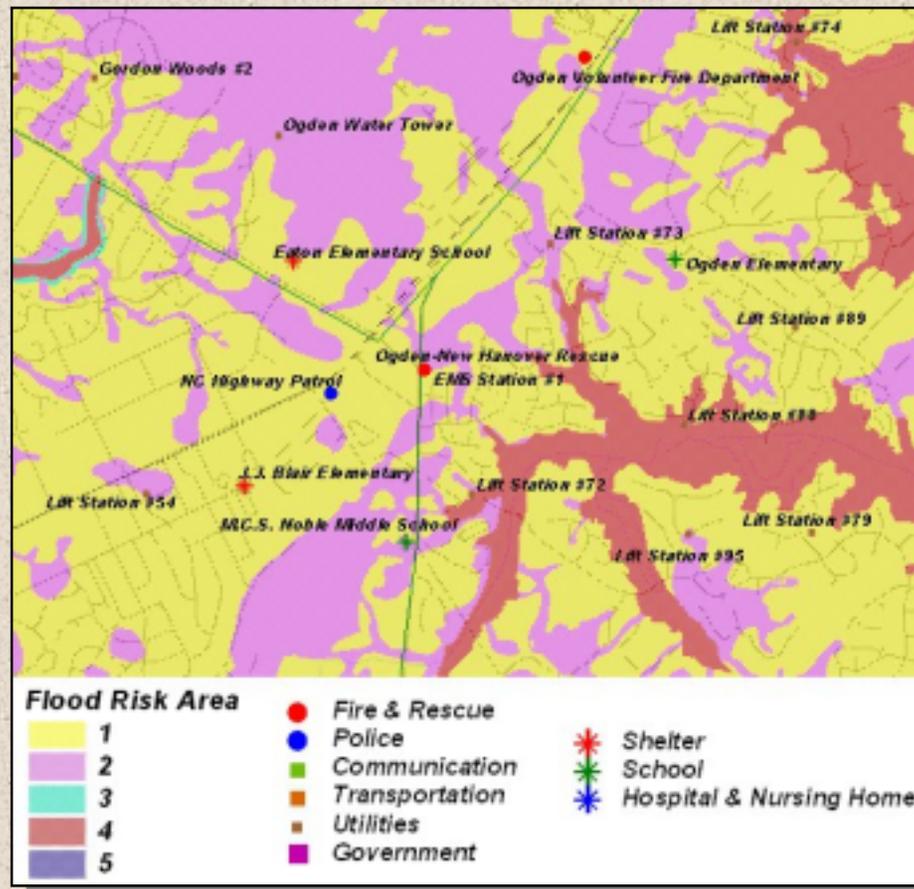


# Critical Facilities Analysis

**Step 3b:** Complete a critical facilities inventory.

## EXAMPLES

- Facility Name
- Address
- Owner/Operator
- Contact
- Phone
- Alternate Contact
- Alternate Phone
- Latitude
- Longitude



COUNT	SUMMARY SCORE
5	15
34	14
26	13
8	12
12	11
26	10
40	9
105	8
101	7
47	6

# Critical Facilities Analysis

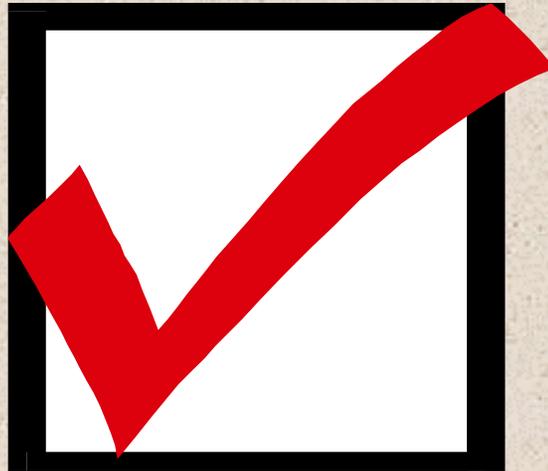
## Example

### Step 3c:

Conduct vulnerability assessment on all critical facilities.

Facility Name:	Surge	Wind	Flood	Erosion	Wildfire	Earthquake	Total
Critical Facility Category:							
(1) Hazard Category Priority Score							N/A
(2) Risk Consideration Area Score							
(3) Damage History Score							
No history = 0							
Minor Damage = 2							
Moderate Damage = 4							
Significant or Repetitive Damage = 6							
(4) Structural Vulnerability Score							
Exceeds codes - incorporates hazard-specific protections = 0							
Meets applicable codes = 1							
Does not meet applicable codes = 2							
Known deficiencies for hazard = 3							
(5) Operational Vulnerability Score							
No effect = 0							
Minimal effect = 1							
Significant effect = 2							
Life threatening impact = 3							
<b>Facility Vulnerability Score</b> (Add items 1 through 5)							
<b>Vulnerability Determination</b> (low, moderate, high)							

# Critical Facility Exercise



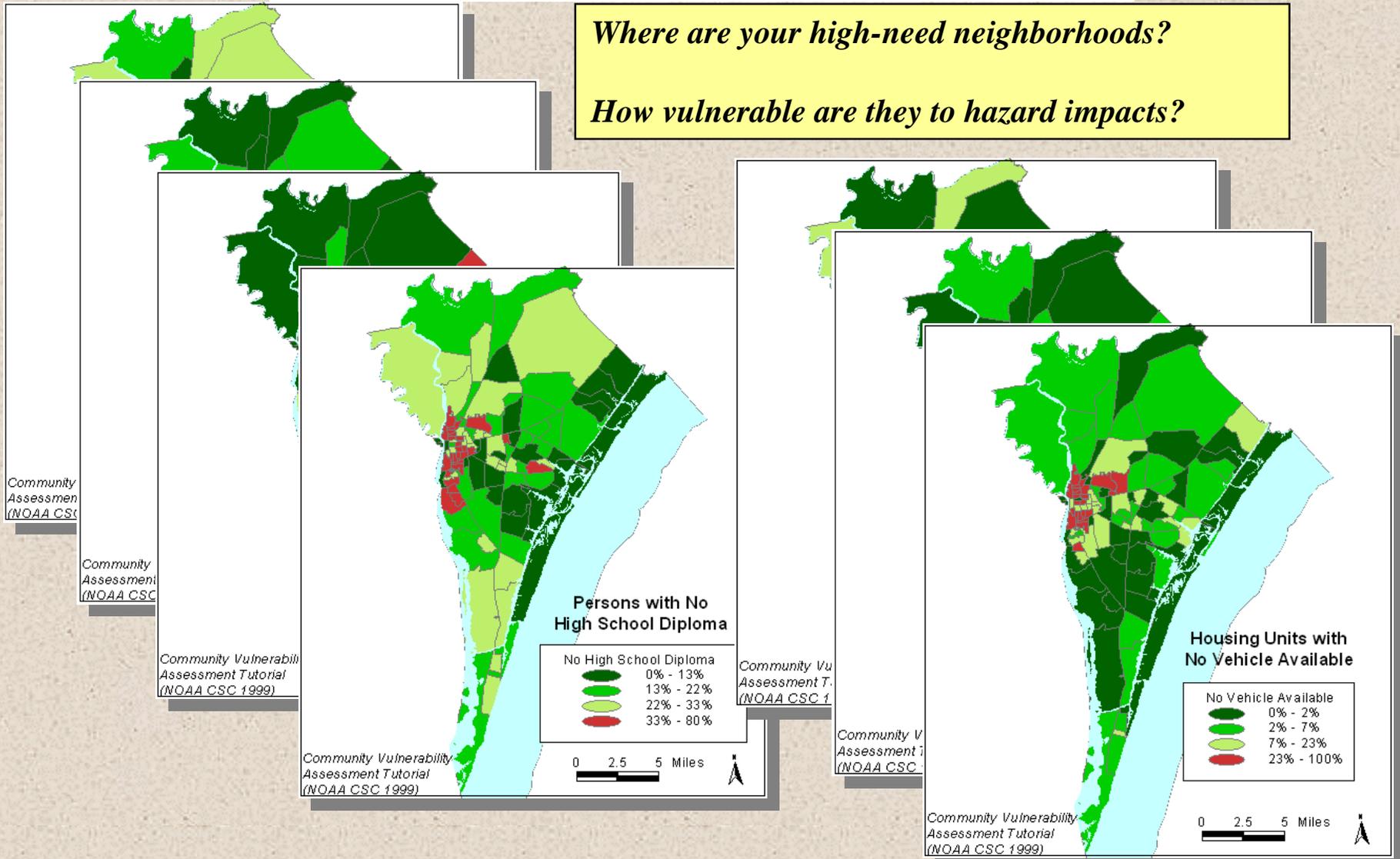
# Societal Analysis



# Step 4-Societal Analysis

*Where are your high-need neighborhoods?*

*How vulnerable are they to hazard impacts?*



# Step 4 - Societal Analysis

*Where are your high-need neighborhoods?*

*How vulnerable are they to hazard impacts?*

*Input*

Poverty  
Age  
Minority Population  
No Vehicles  
Female Households  
Rental Households  
Public Assistance

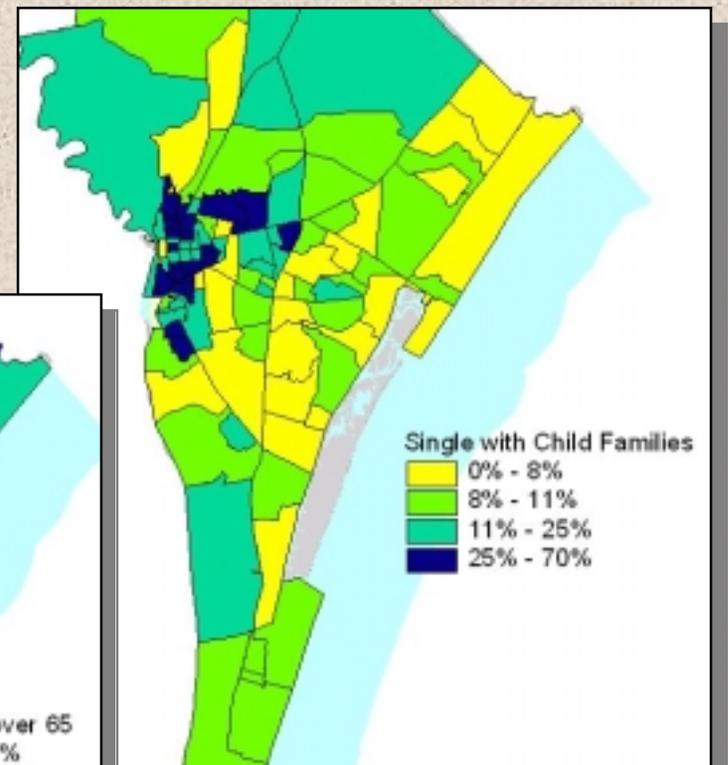
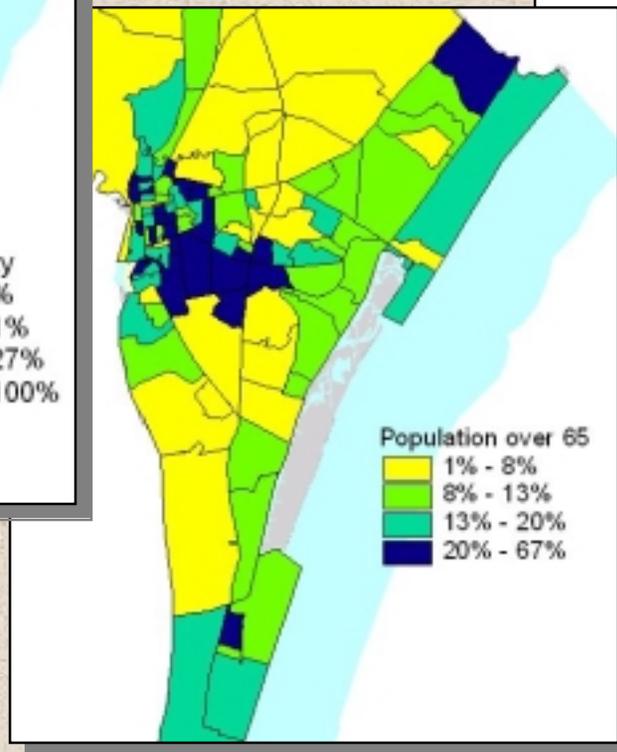
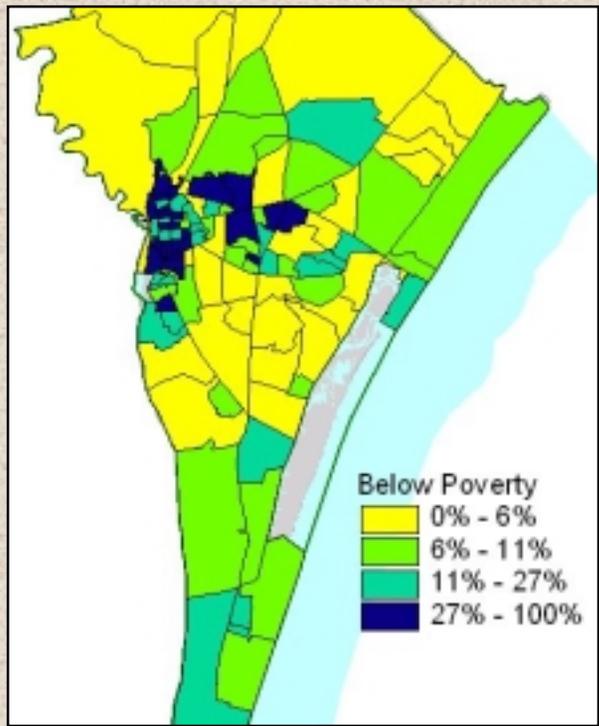
*Societal Analysis*

Geographically defined areas of high risk coupled with minimal personal resources for hazard recovery. Can be used to develop mitigation strategies and target high-need locations.

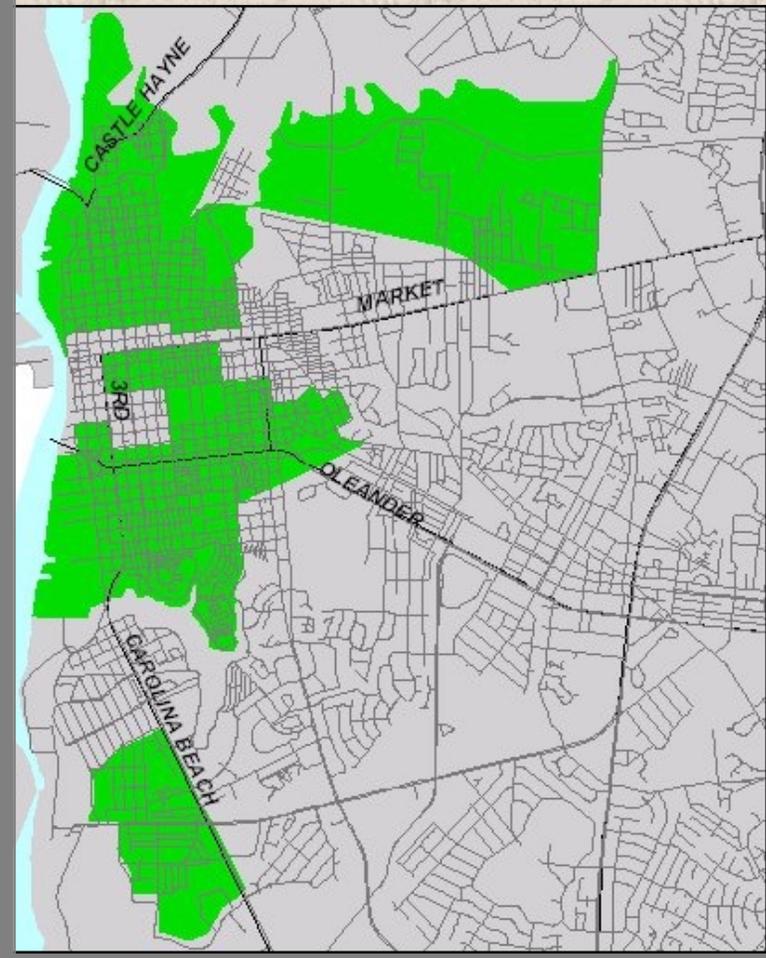
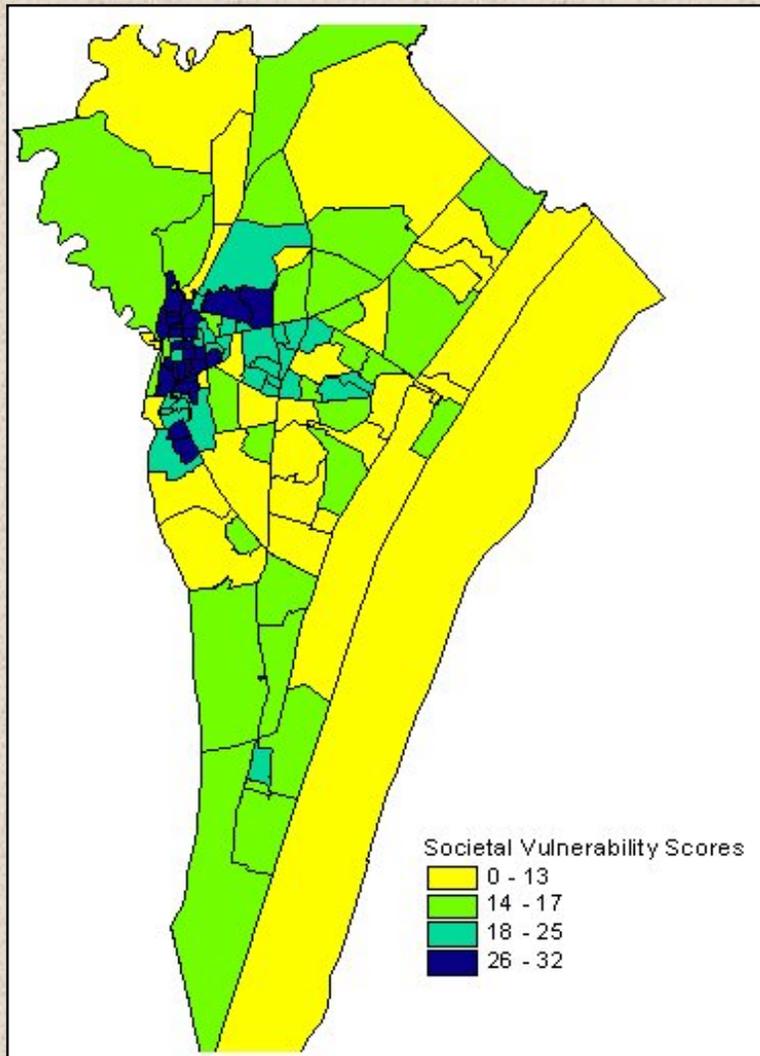
*Output*

# Societal Analysis

**Step 4a:** Identify areas of high need.

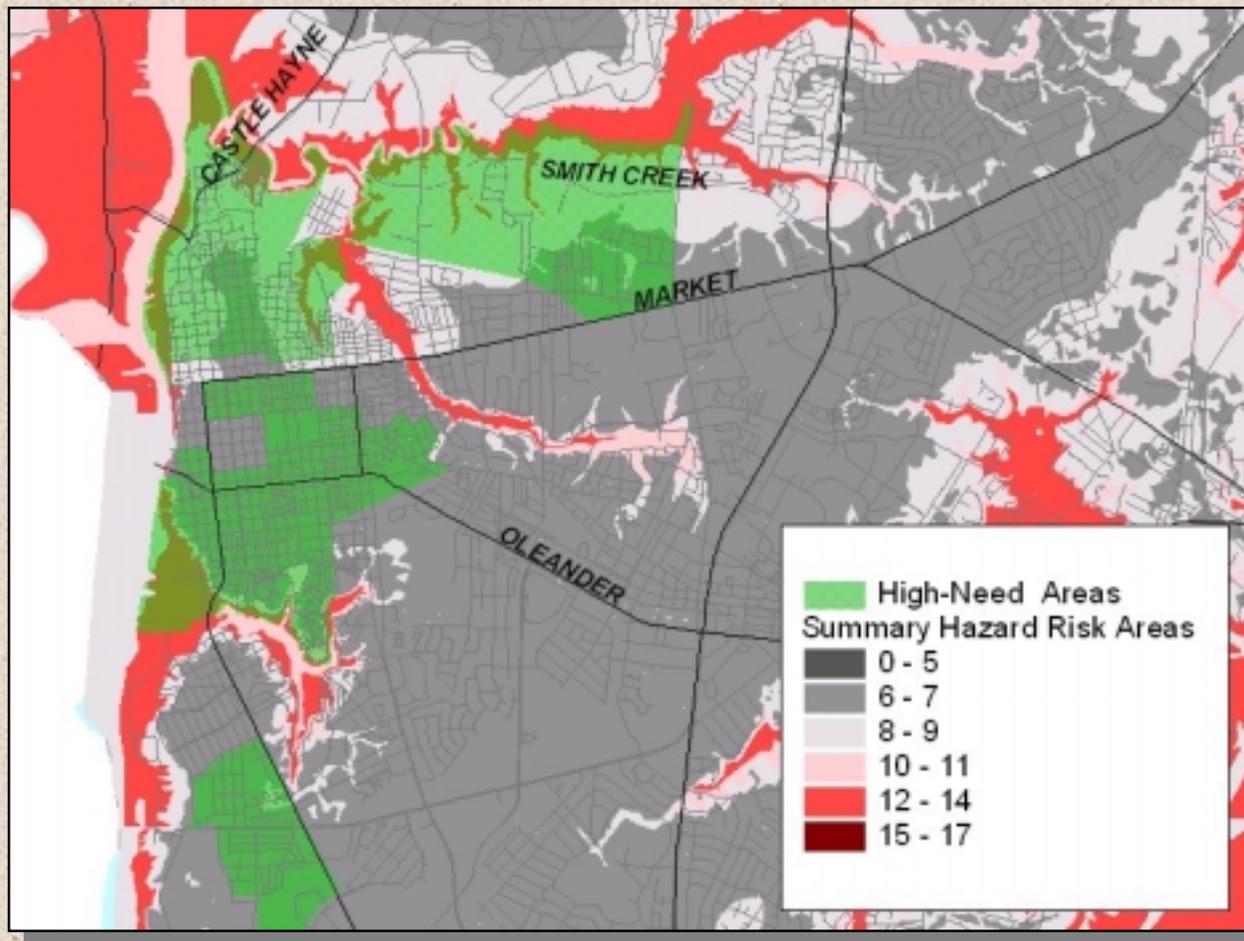


# Societal Analysis



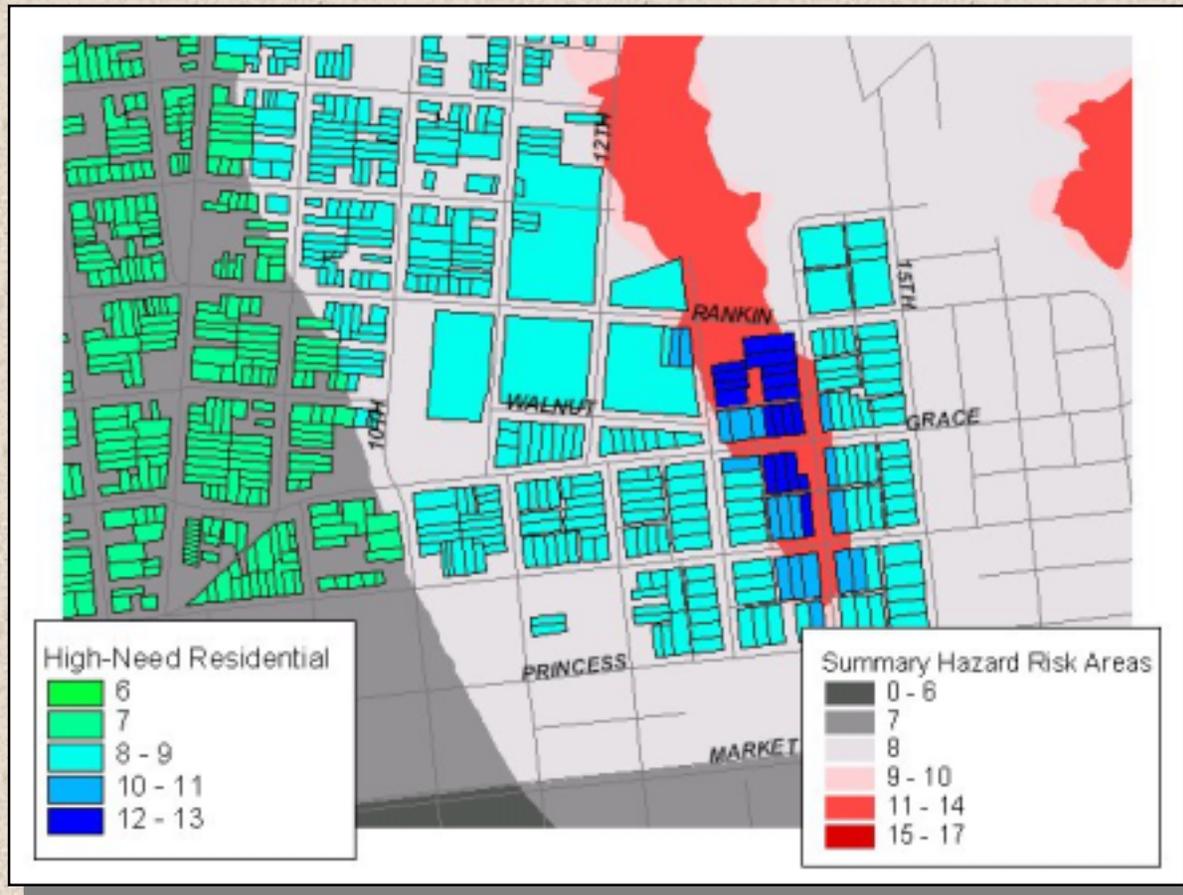
# Societal Analysis

**Step 4b:** Identify intersections of high-need areas and high-risk areas.



# Societal Analysis

**Step 4c:** Conduct a general inventory of high-need/high risk locations.

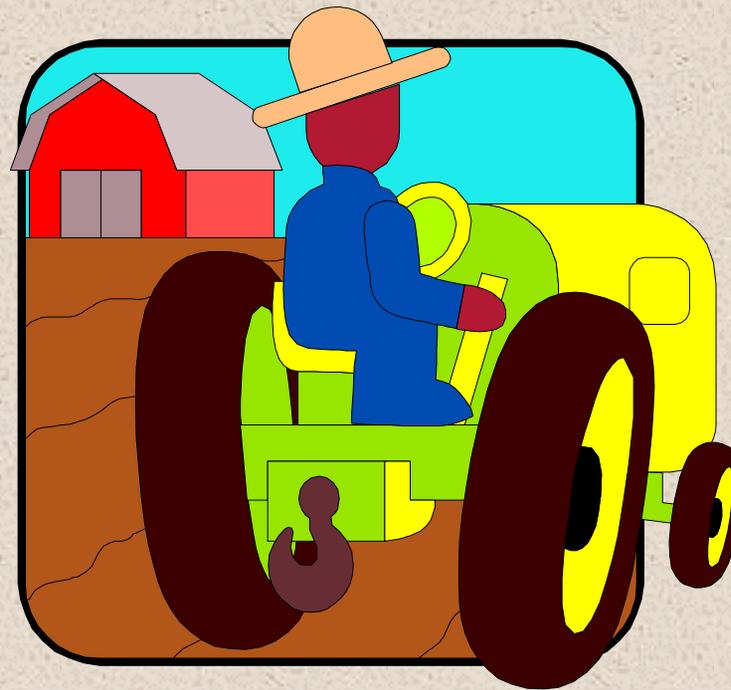


UNITS	SUMMARY SCORE
12	13
7	12
14	11
5	10
5	9
1338	8
<b>1374</b>	<b>8 - 13</b>
2795	7
2962	6
<b>5757</b>	<b>6 - 7</b>

# Societal Vulnerability Exercise



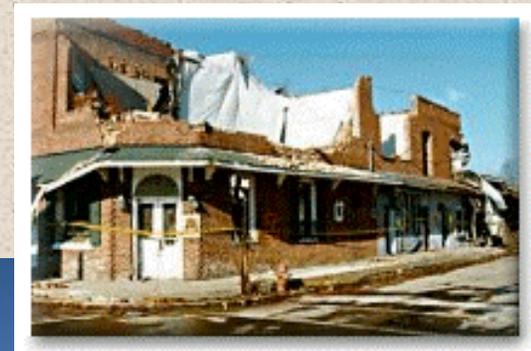
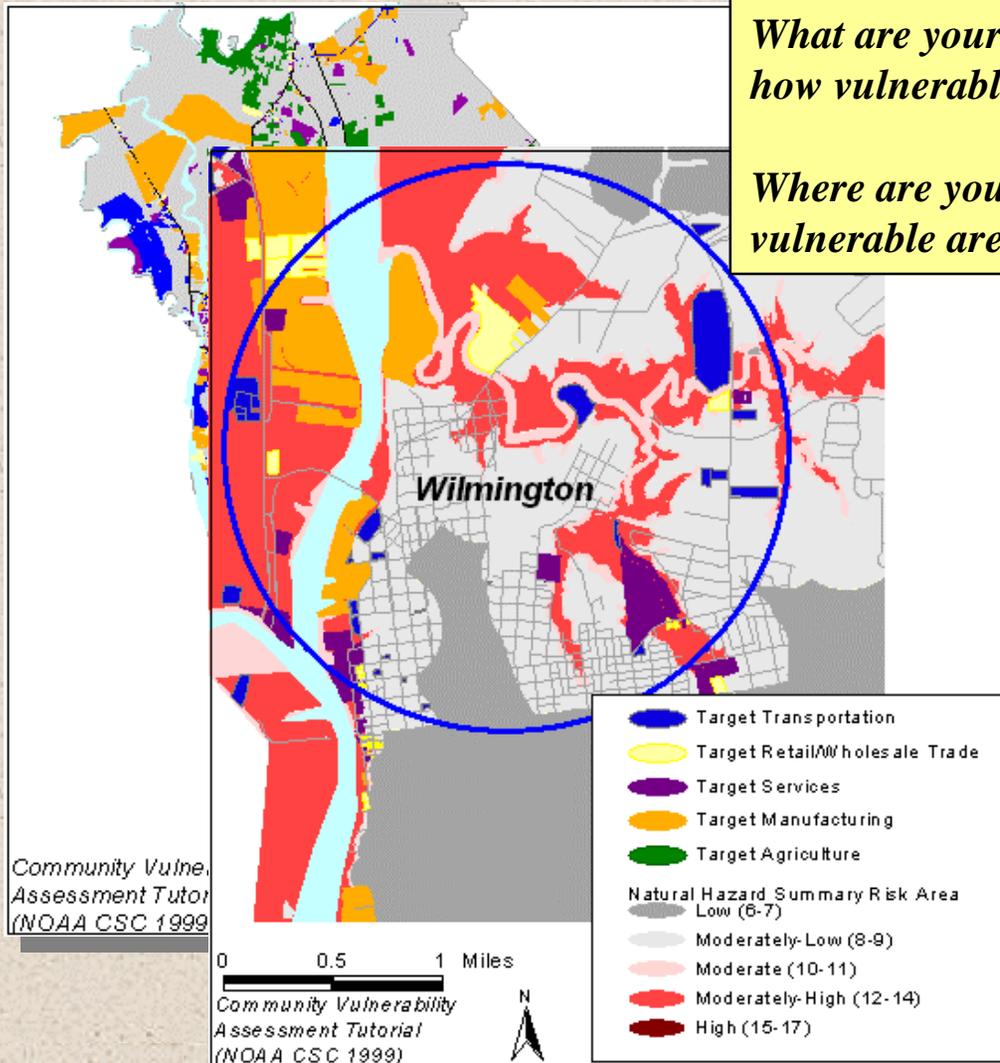
# Economic Analysis



# Step 5-Economic Analysis

*What are your primary economic sectors and how vulnerable are they to hazards?*

*Where are your largest employers and how vulnerable are they to hazard impacts?*



# Step 5 - Economic Analysis

*What are your primary economic sectors and how vulnerable are they to hazards?*

*Where are your largest employers and how vulnerable are they to hazard impacts?*

*Input*

Agriculture  
Mining  
Construction  
Manufacturing  
Transportation  
Wholesale and Retail  
Services  
Finance, Insurance  
Real Estate

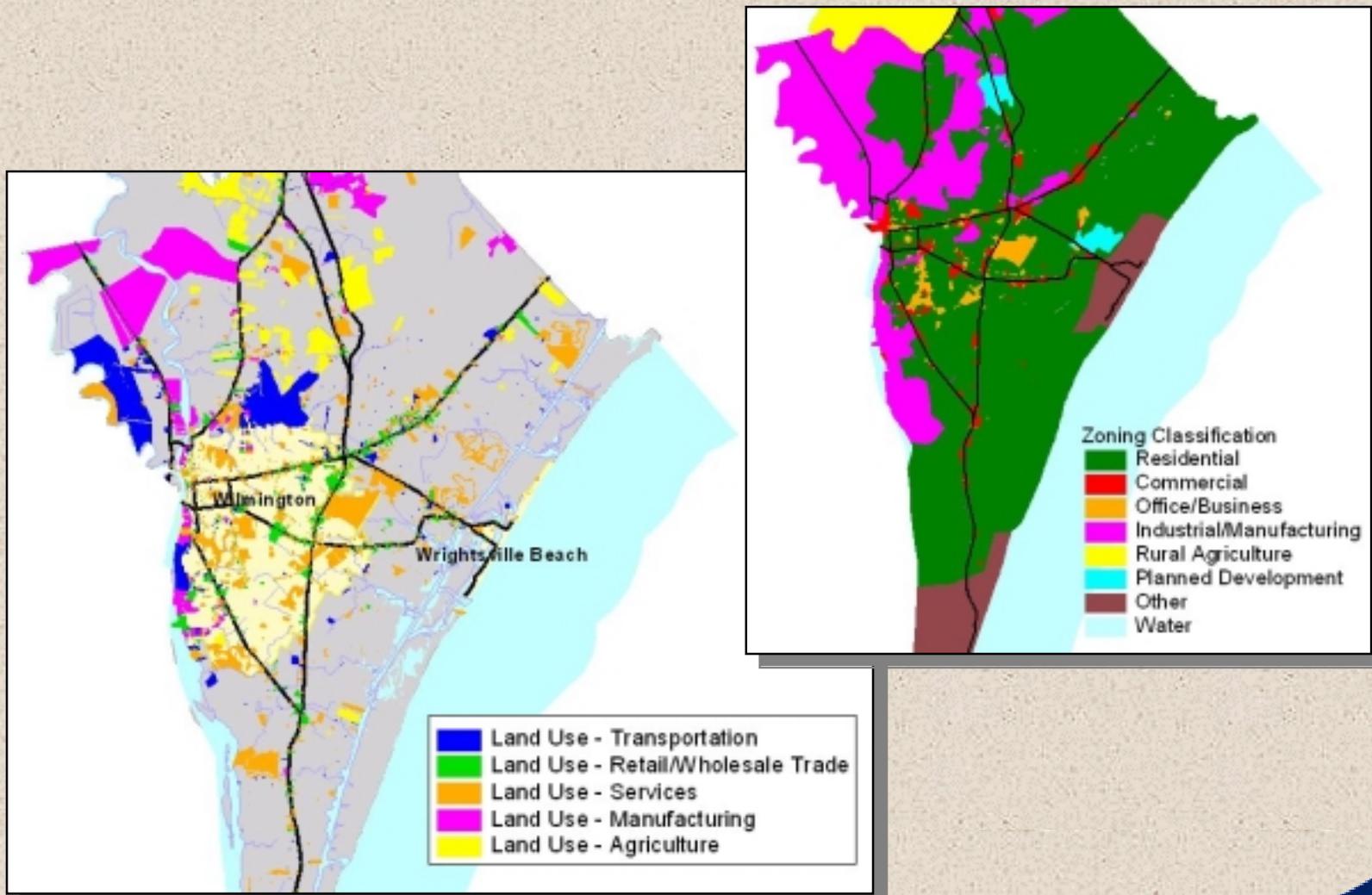
*Economic  
Analysis*

Geographically defined areas of high risk coupled with potential impacts on vulnerable sectors of the economy. Can be used to develop mitigation strategies and target high impact economic sectors.

*Output*

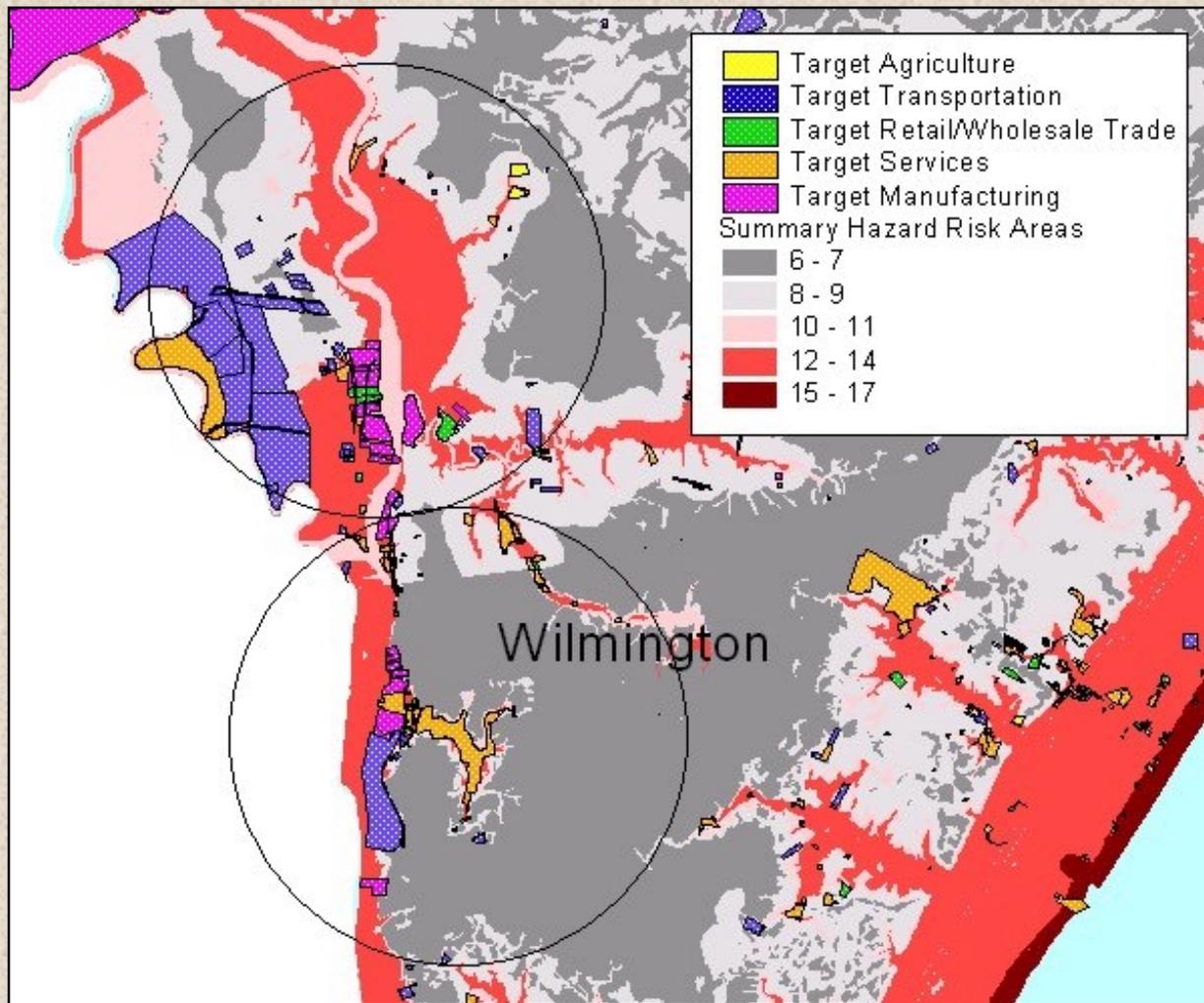
# Economic Analysis

**Step 5a:** Identify primary economic sectors and locate economic centers.



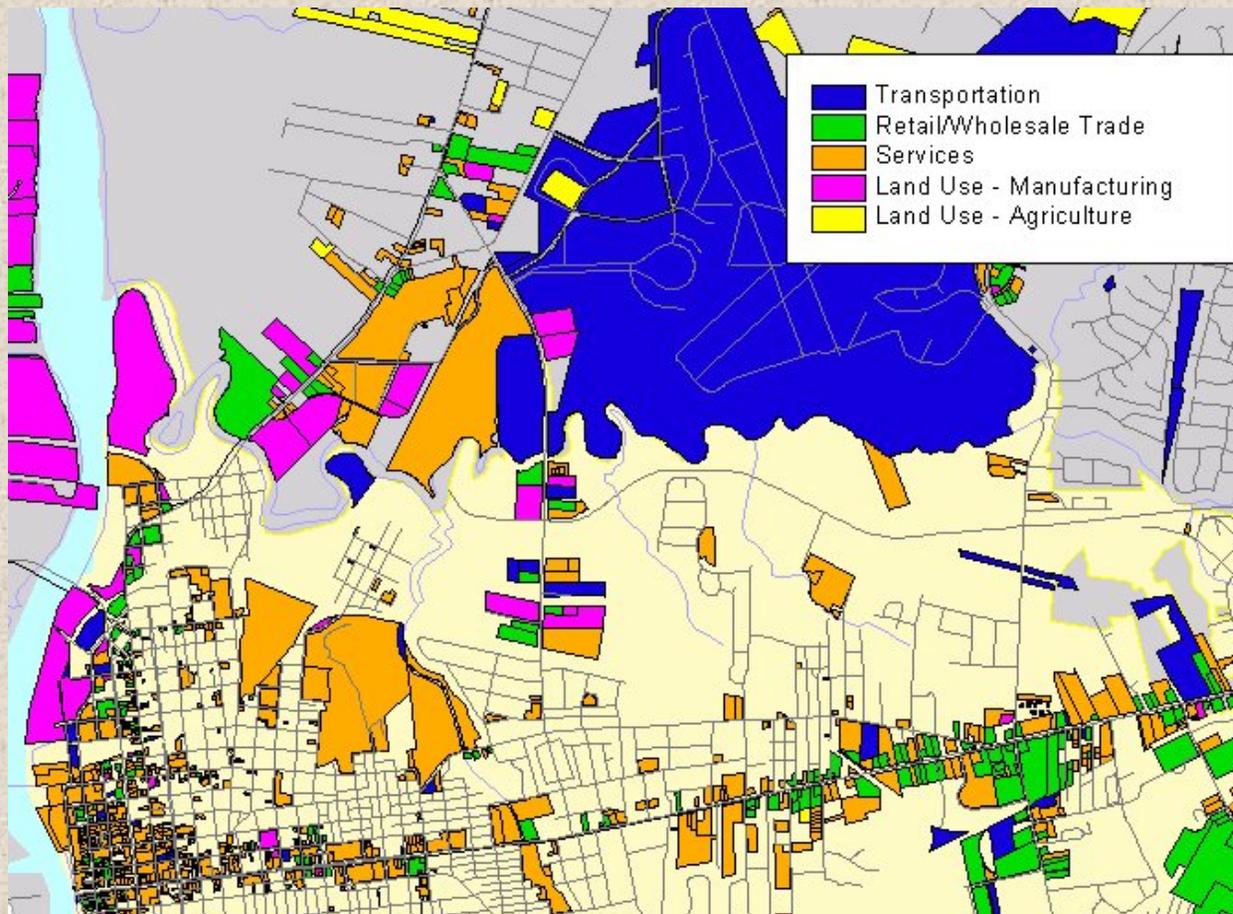
# Economic Analysis

**Step 5b:** Identify intersections of economic centers and high-risk areas.



# Economic Analysis

**Step 5c:** Conduct general inventory of high-risk economic centers.



COUNT	SUMMARY SCORE
6	17
39	16
71	15
349	14
193	13
73	12
157	11
152	10

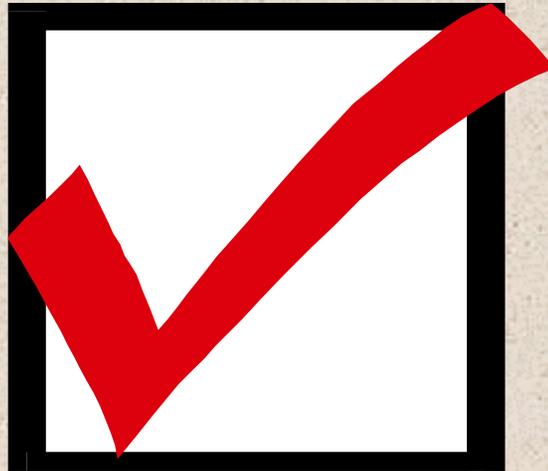
# Economic Analysis

**Step 5d:** Identify large employers and their intersections with hazard risk areas.

SIC	INDUSTRY	100-499 Employees	>500 Employees
----	TOTAL	79	6
15--	CONSTRUCTION	2	0
20--	MANUFACTURING	13	3
40--	TRANSPORTATION AND PUBLIC UTILITIES	3	1
50--	WHOLESALE TRADE	1	0
52--	RETAIL TRADE	25	0
60--	FINANCE, INSURANCE, AND REAL ESTATE	4	0
70--	SERVICES	31	2

**Step 5e:** Conduct vulnerability analysis on structures of large employers as critical facilities.

# Economic Vulnerability Exercise



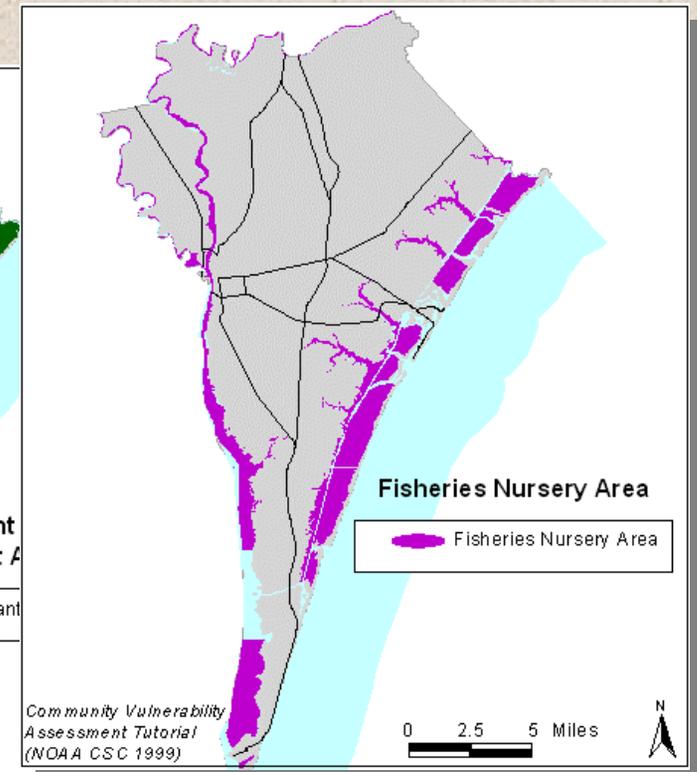
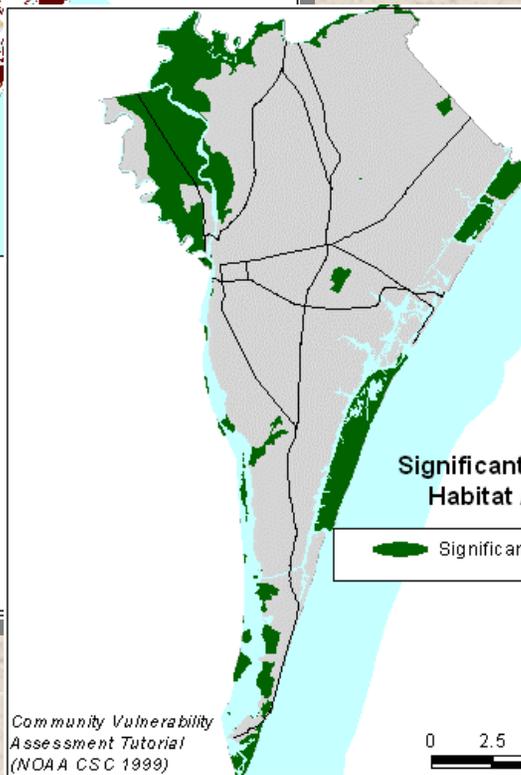
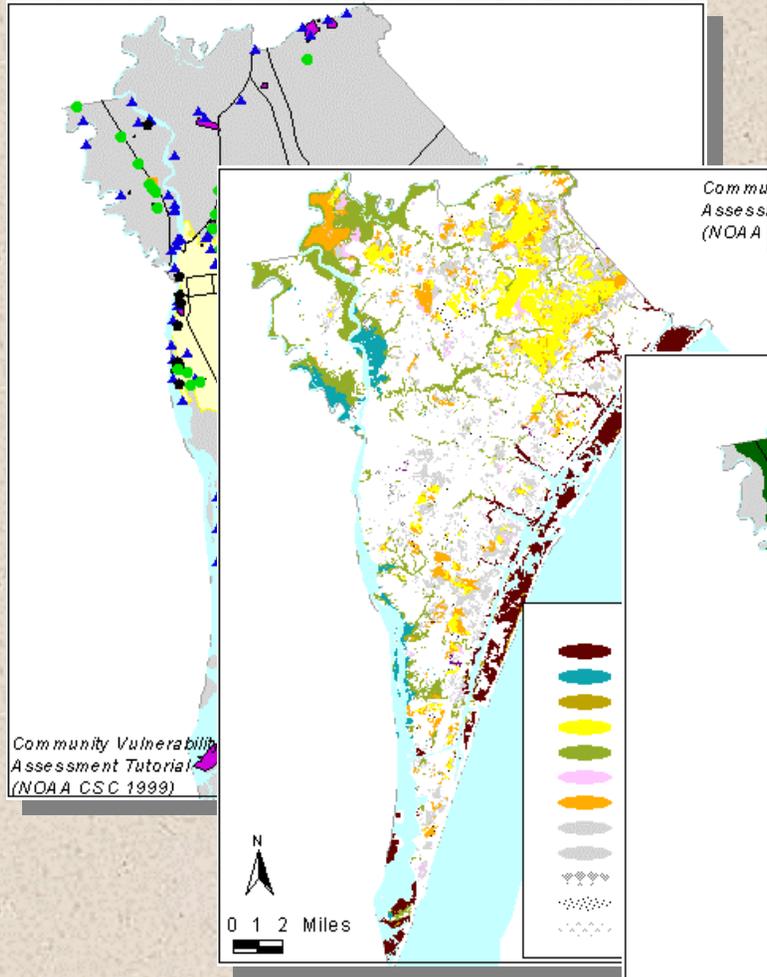
# Environmental Analysis



# Step 6-Environmental Analysis

*Where are your hazardous materials located and how vulnerable are they to natural hazards?*

*How vulnerable are critical natural resources to secondary hazard impacts?*



# Step 6 - Environmental Analysis

*Where are your hazardous materials located and how vulnerable are they to natural hazards?*

*How vulnerable are critical natural resources to secondary hazard impacts?*

## *Input*

Hazardous Materials  
Toxic Release Sites  
Oil Facilities  
Ports  
Marinas  
Discharge Sites

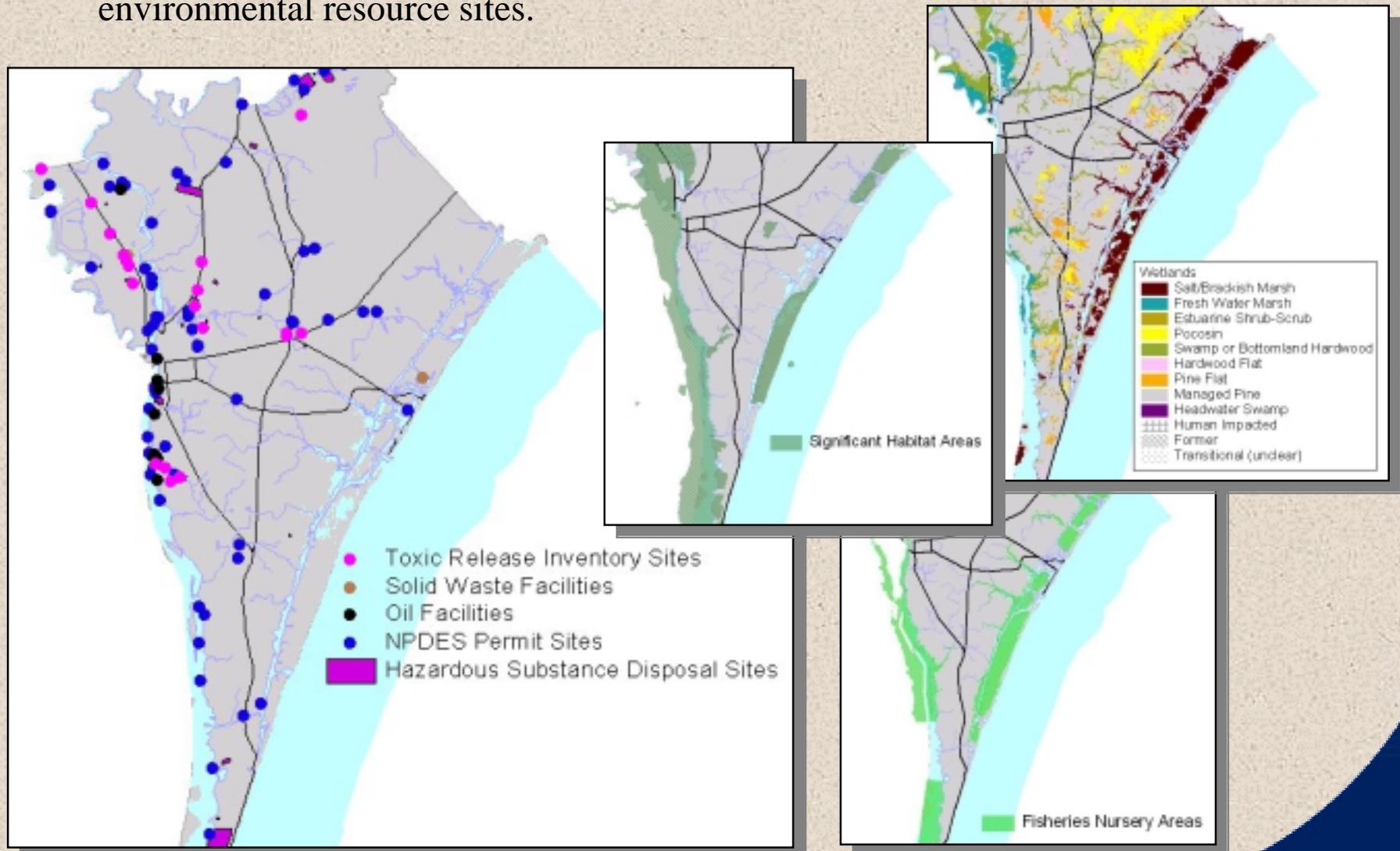
## *Environmental Analysis*

Geographically defined areas of high risk coupled with potential of secondary environmental impacts. Can be used to target mitigation projects that will protect sensitive natural resources.

## *Output*

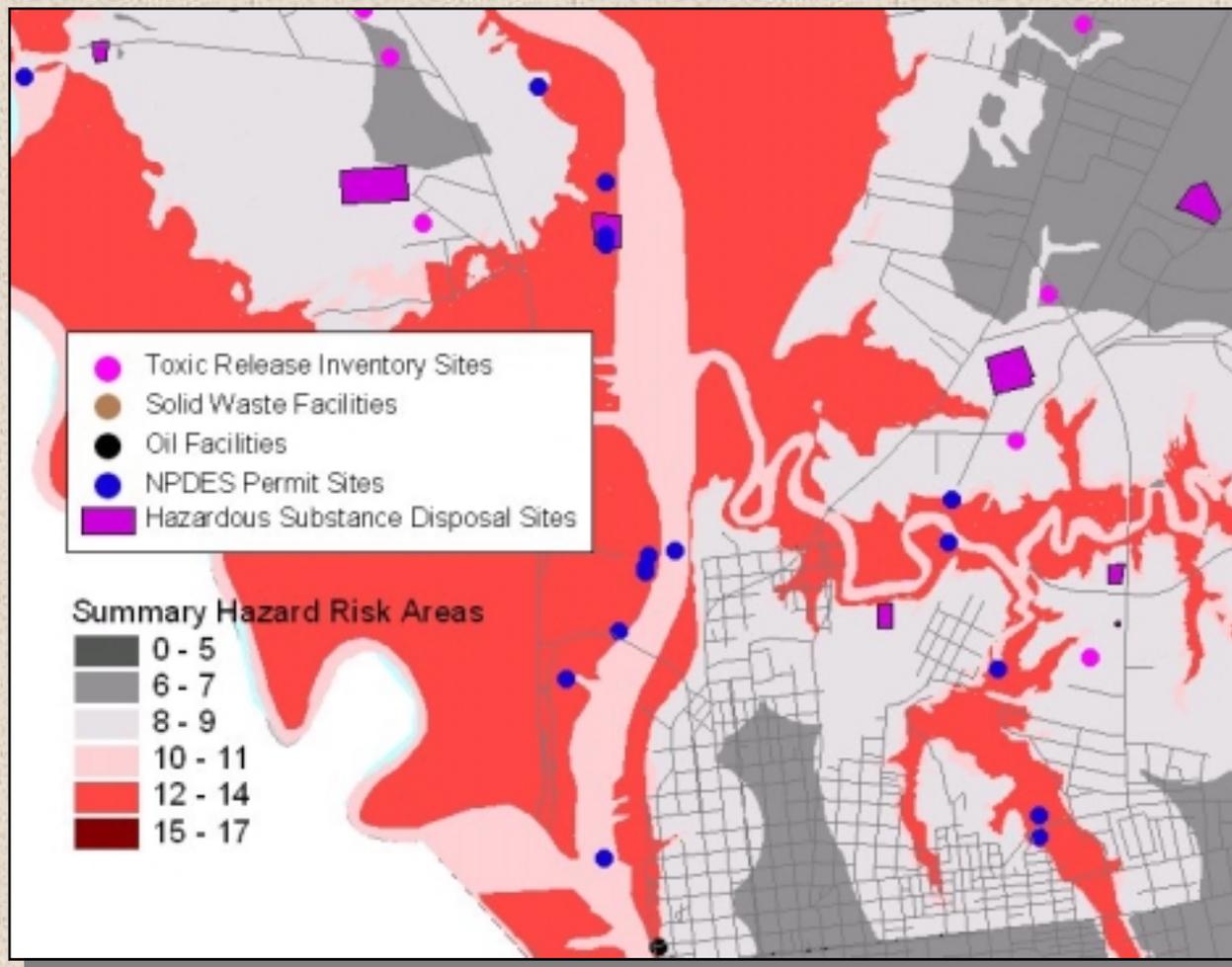
# Environmental Analysis

**Step 6a:** Identify secondary hazard risk consideration sites and key environmental resource sites.



# Environmental Analysis

**Step 6b:** Identify intersections of secondary risk sites, environmentally sensitive areas, and natural hazard risk consideration areas.

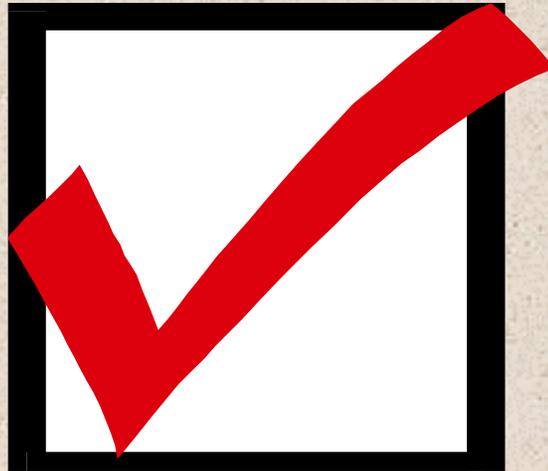


# Environmental Analysis

**Step 6c:** Conduct vulnerability analysis on priority secondary risk sites as critical facilities.

FACILITY TYPE	COUNT	RISK_SUM	ENVIRONMENTAL SENSITIVITY
NPDES Permit Site	2	14	3
NPDES Permit Site	9	14	2
NPDES Permit Site	6	14	1
Solid Waste Facility	1	14	1
NPDES Permit Site	1	14	0
<b>Total</b>	<b>19</b>	<b>14</b>	
NPDES Permit Site	1	13	3
Hazardous Substance Disposal Site	3	13	3
NPDES Permit Site	3	13	2
Oil Facility	1	13	2
NPDES Permit Site	3	13	1
Hazardous Substance Disposal Site	1	13	1
Oil Facility	1	13	1
NPDES Permit Site	1	13	0
Oil Facility	1	13	0
<b>Total</b>	<b>15</b>	<b>13</b>	

# Environmental Vulnerability Exercise

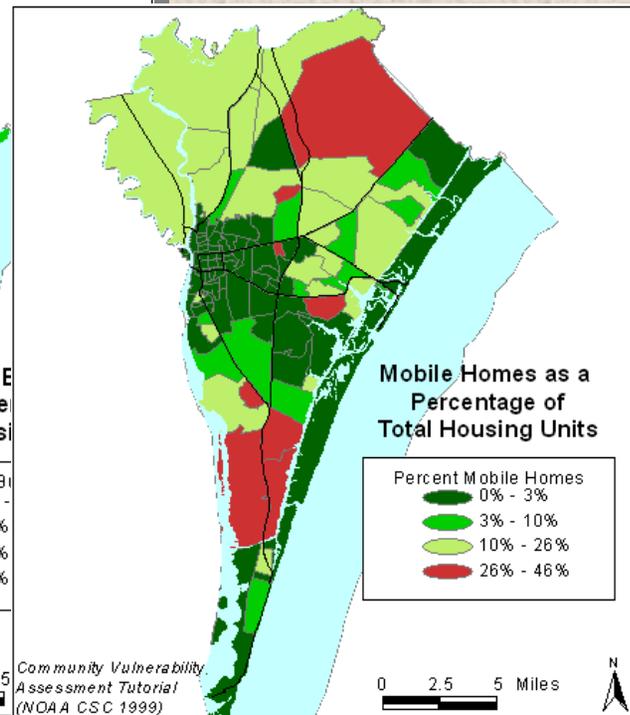
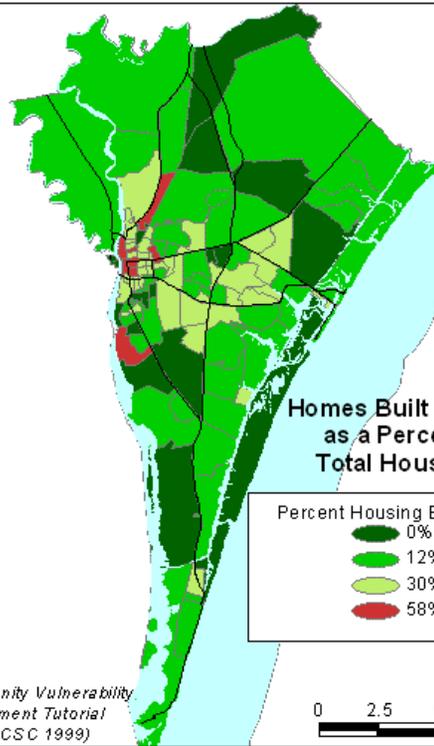
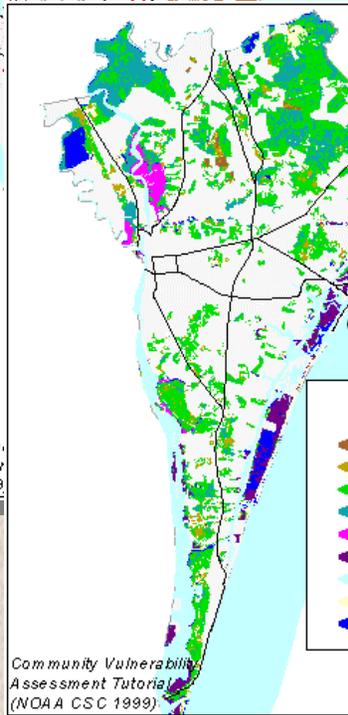
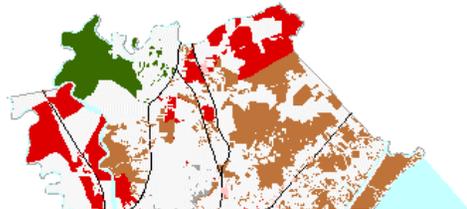


# Policy/Mitigation Opportunities



# Step 7-Mitigation Opportunities Analysis

*Where are your best opportunities for mitigation policy changes to have significant impacts on future hazard vulnerability?*



# Step 7 - Mitigation Opportunities Analysis

*Where are your best opportunities for mitigation policy changes to have significant impacts on future hazard vulnerability?*

*Input*

Policy Status  
Undeveloped Land  
Population Projections  
Land Cover Change  
Zoning

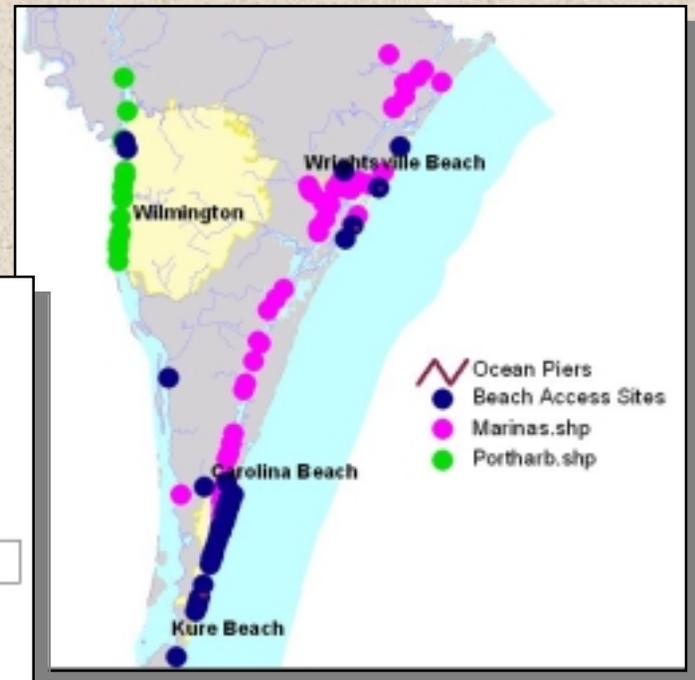
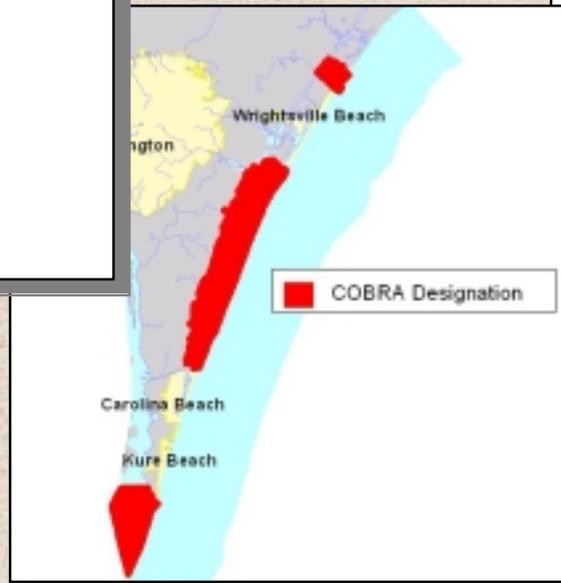
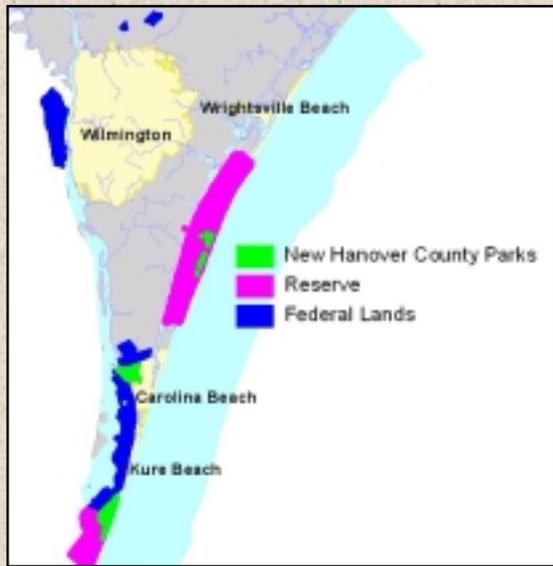
*Mitigation Opportunities*

A systematic assessment of existing and potential land uses focused on high-hazard areas. Can be used to evaluate future impacts of proposed hazard mitigation strategies.

*Output*

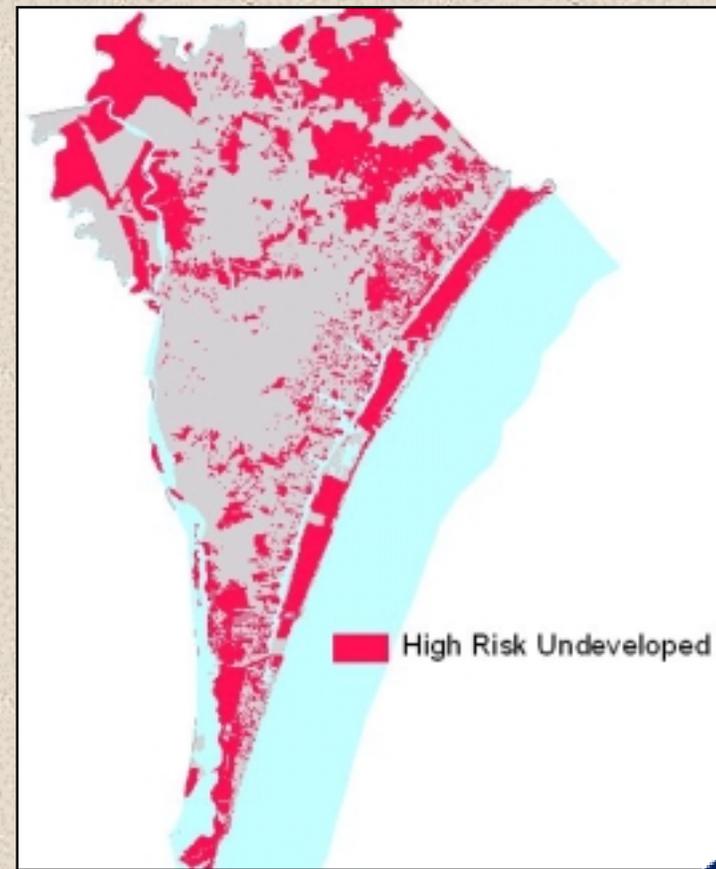
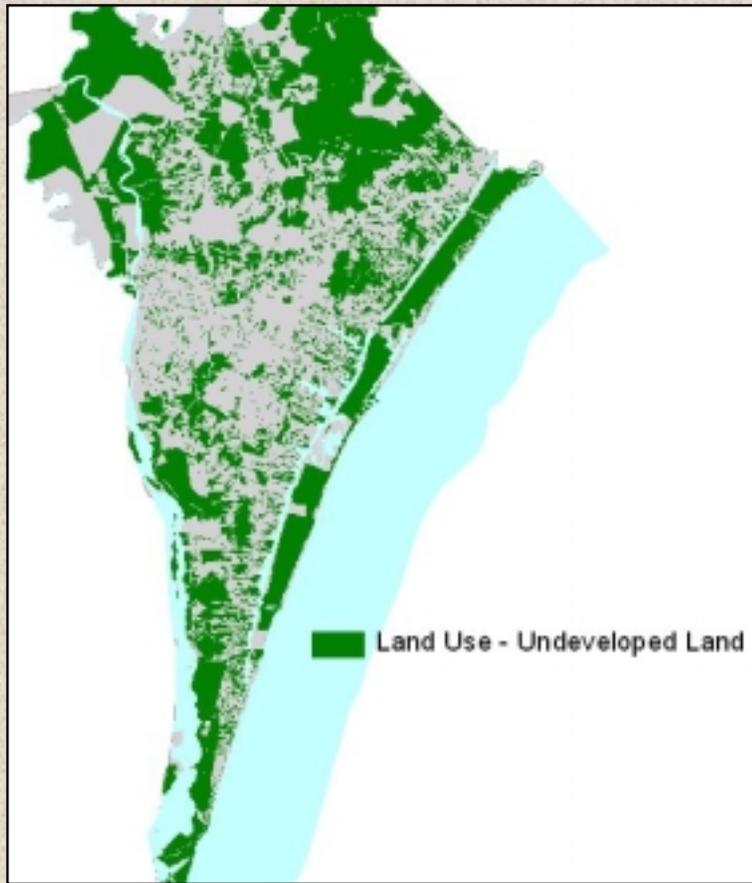
# Mitigation Opportunities Analysis

**Step 7a:** Identify public resource areas for possible hazard mitigation.



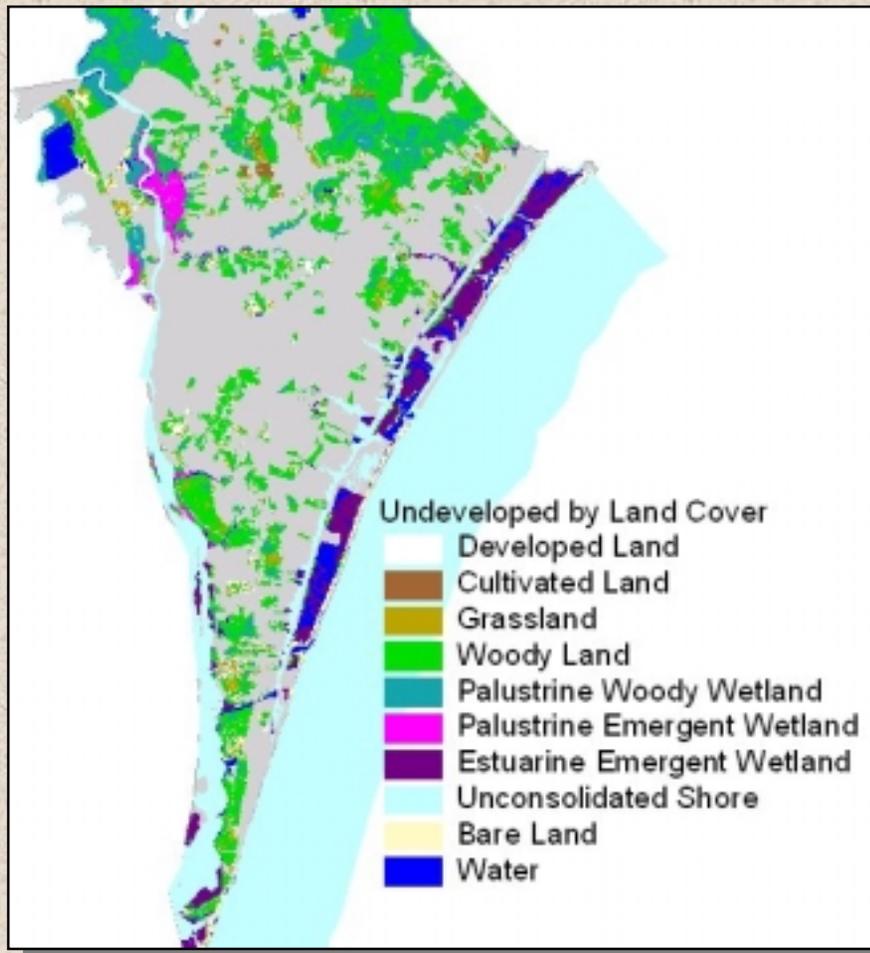
# Mitigation Opportunities Analysis

**Step 7b:** Identify areas of undeveloped land and their intersection with high-risk areas.



# Mitigation Opportunities Analysis

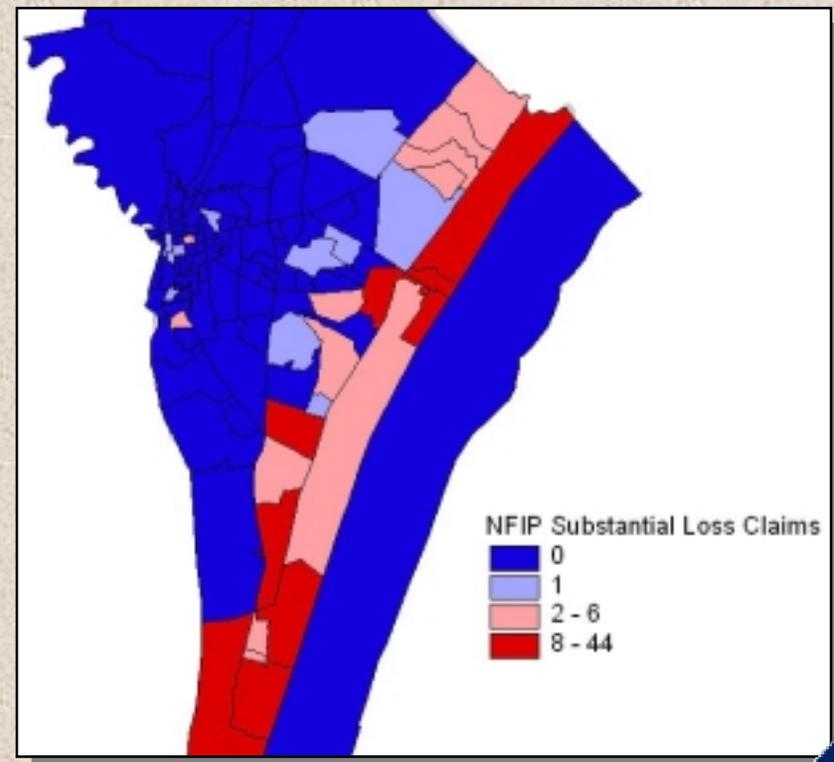
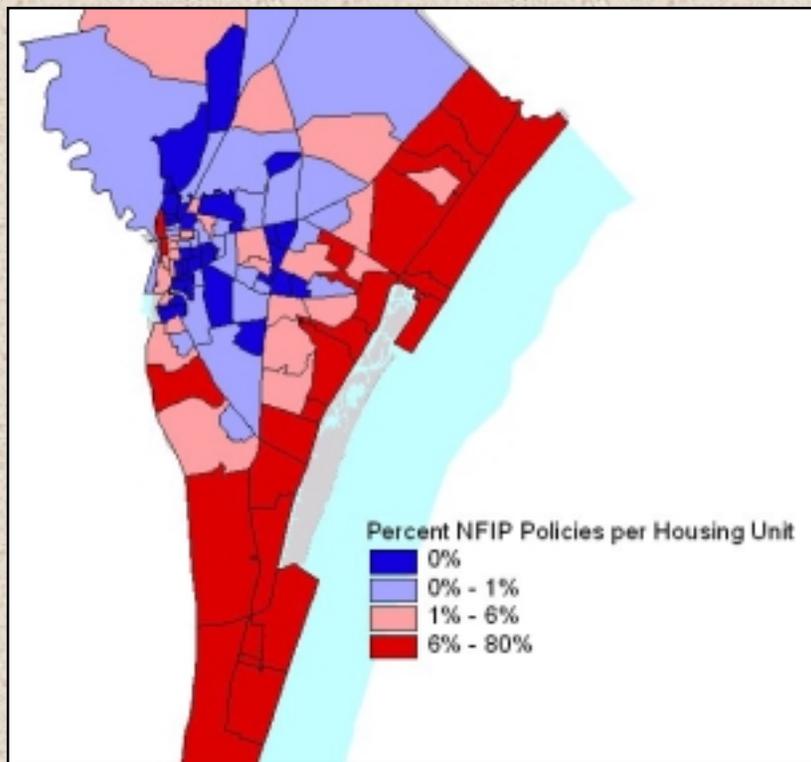
**Step 7c:** Inventory high-risk undeveloped land.



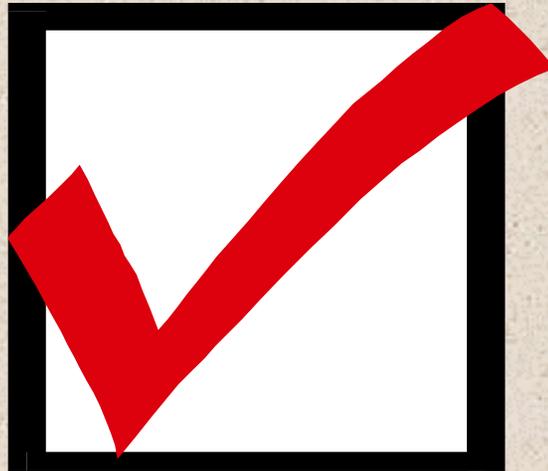
RISK_SUM	ACRES
17	216.76
16	404.67
15	126.27
14	10255.73
13	7295.54
12	566.02
11	1686.59
10	5915.90
9	3427.10
8	23251.86
<b>TOTAL</b>	<b>53146.44</b>

# Mitigation Opportunities Analysis

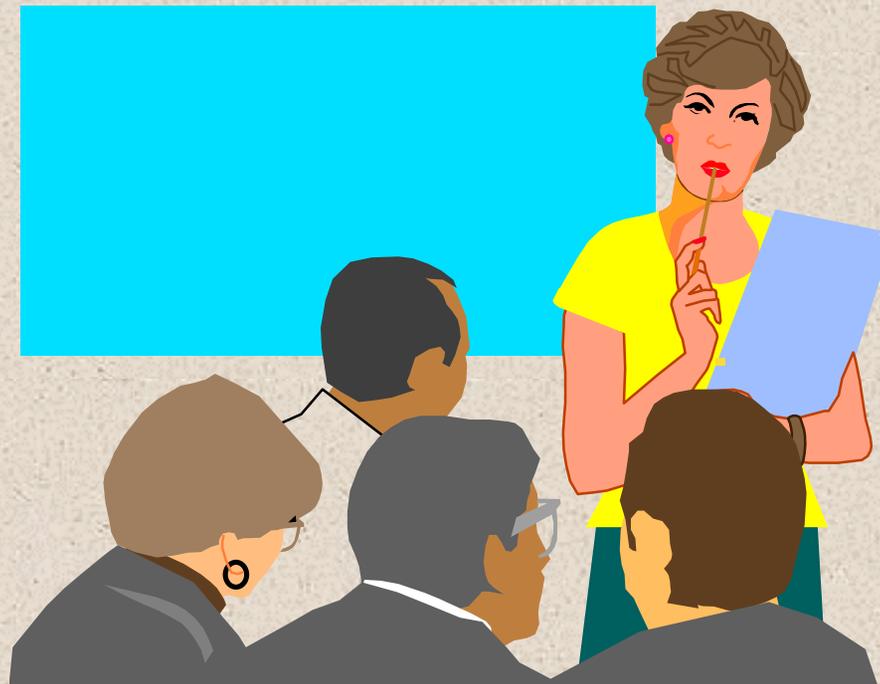
**Step 7d:** Assess the status of your existing flood insurance program participation.



# Policy Vulnerability Exercise



# Hazard Mitigation Planning for Dummies



# The **Dummy** Menu

- **Why Bother?**
- **Benefits...That's why!**
- **A Winning Recipe ...**  
**The Planning Process**
- **The Menu: Ingredients for Success**

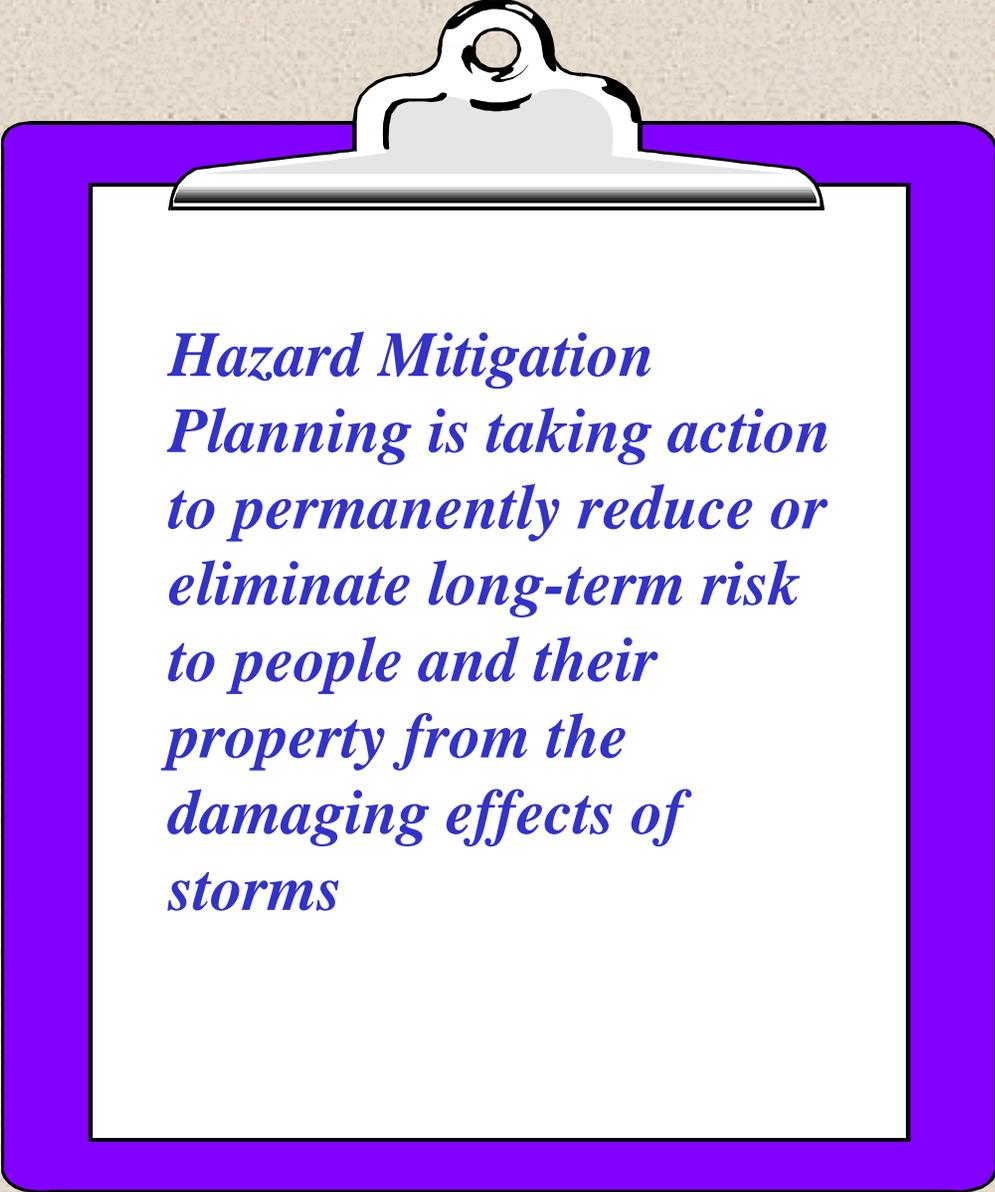


# Secret to Success

*Hazard mitigation planning must be closely coordinated with a community's overall planning and development efforts intended to provide its citizens a safe, healthy and prosperous place to live and work.*



# Hazard Mitigation Defined



*Hazard Mitigation  
Planning is taking action  
to permanently reduce or  
eliminate long-term risk  
to people and their  
property from the  
damaging effects of  
storms*

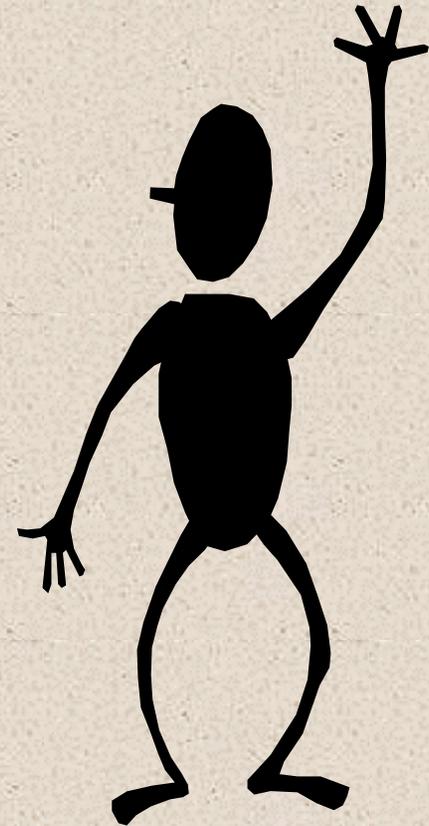
# Benefits

- **Lessens vulnerabilities to disasters**
- **Creates an effective planning tool**
- **Supports post-disaster decision-making**
- **Speeds the return to normalcy**
- **Facilitates receipts of federal & state funding**
- **Educates & informs community**
- **Provides a forum for addressing issues**



# So, what do I get out of it?

- **IDs steps a community can take to lessen impacts from disaster**
- **IDs timeframe for strategy implementation**
- **IDs resources for mitigation actions**
- **Prioritizes mitigation measures**
- **IDs who is responsible**



# If Nothing Else...

*An on-going process will be established “institutionalizing” hazard mitigation as a routine part of the daily decision-making for the entire community*

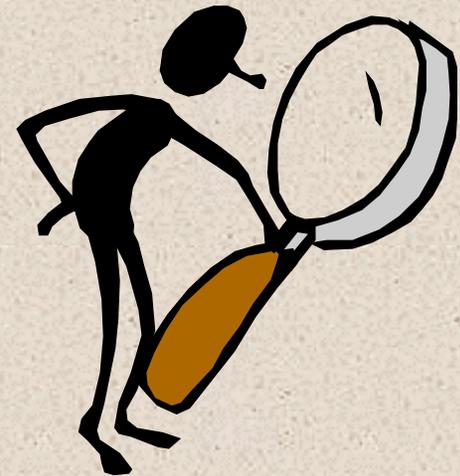


# The Process

**A. What is at risk?**

**B. What actions can be taken?**

**C. How are these actions going to be taken?**



# Community Rating System

*If the components of CRS are addressed through the hazard mitigation planning process as many as 300 points could be earned*



# STEP 1. -- Organize

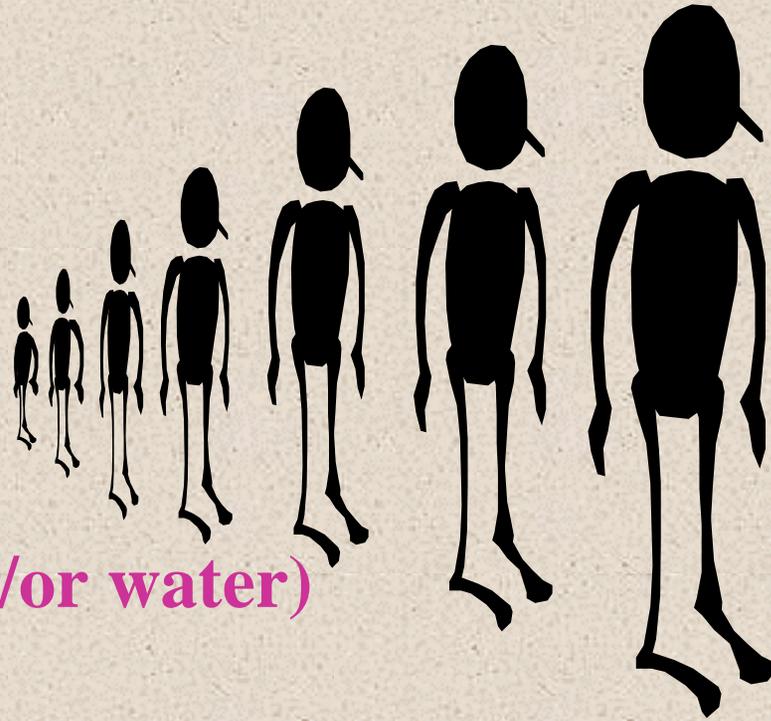


## *Establish Local Hazard Mitigation Committee*

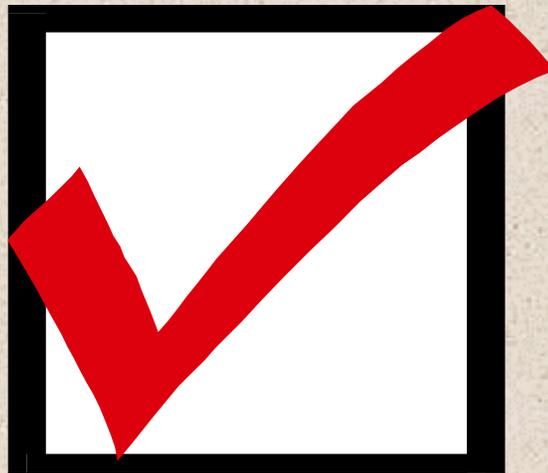
- Responsibility of Committee - identify hazards, incorporate public input, prioritize mitigation actions, implement & revise strategy
- Responsibility of POC - manage data retrieval, schedule meetings, oversee drafting

# Who?

- **Planner**
- **EMA**
- **Fire & Police**
- **Engineers (sewer &/or water)**
- **Building Official**
- **Department of Public Works**
- **Mayor**
- **NFIP Coordinator**



# Mitigation Planning Exercise



# Please fill in the blanks with a name

**Planner** \_\_\_\_\_

**EMA** \_\_\_\_\_

**Fire/Police** \_\_\_\_\_

**Engineer** \_\_\_\_\_

**Building Official** \_\_\_\_\_

**Department of Public Works** \_\_\_\_\_

**Mayor/City Council** \_\_\_\_\_

**NFIP Coordinator** \_\_\_\_\_

**Others** \_\_\_\_\_

# Please fill in the blanks with a name

**Public Safety** \_\_\_\_\_

**Economic Development** \_\_\_\_\_

**Environmental Issues** \_\_\_\_\_

**Public Infrastructure** \_\_\_\_\_

**Public Utilities** \_\_\_\_\_

**Transportation Providers** \_\_\_\_\_

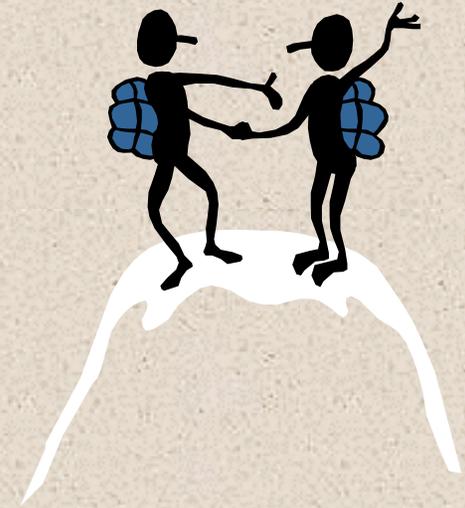
**Military Bases** \_\_\_\_\_

**Land Trusts/Nature Conservancies** \_\_\_\_\_

**Opposition** \_\_\_\_\_

**Others** \_\_\_\_\_

## STEP 2. Set Goals



**A. Write mission statement**

**B. Review existing actions/policies**

**C. Establish completion schedule**

# STEP 3. - Involve Public



*Sets the stage for public understanding & support  
upon completion of the strategy*

- Increases awareness of safety & economic benefits
- Recognition of mitigation programs/efforts
- Realization of “difficult choices” to be made
- Promote need for hazard mitigation committee
- Build support for public acceptance & understanding



# Key Characteristics of Public Information Program

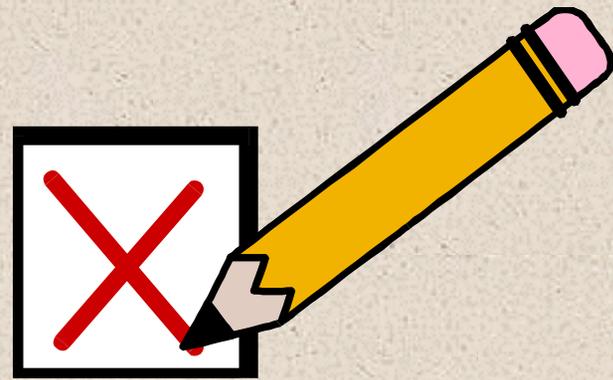
- **Begins at the start of the planning process**
- **Establishes credibility through objectivity**
- **Endorses access to planning process**
- **Use terminology understood by public**
- **Distributes info applicable to community's needs**
- **takes advantage of “windows of opportunity”**

# Techniques to Obtain Input



- **Surveys & questionnaires**
- **Public workshops**
- **Door-to-door interviews**
- **Dedicated telephone line**
- **Interactive homepage on the internet**

# What to Request



- **Recognition of hazards**
- **Baseline data on existing mitigation efforts**
- **Opinion on effectiveness of existing mitigation techniques**
- **Priorities of concerns**
- **Level of preparedness of businesses**
- **Most useful types of education materials**

# Sources for Public Input

- **Print Media**

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- **Radio**

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- **Cable TV**

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- **Web**

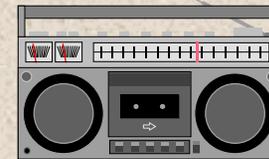
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- **Other**

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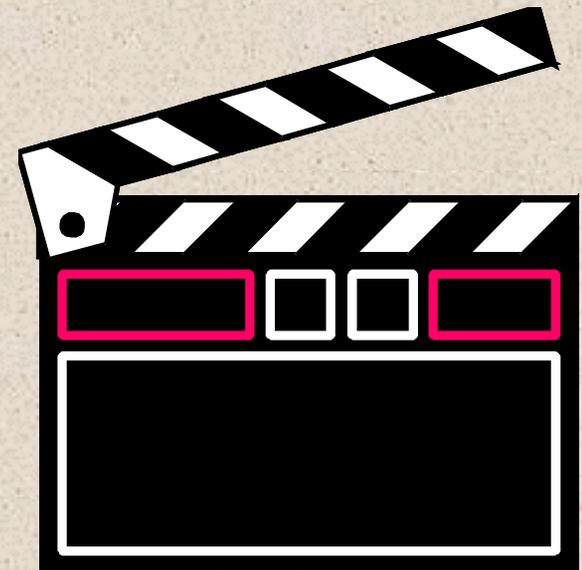


# STEP 4. Draft the Action Plan

## Local Mitigation Strategy

### *INTRODUCTION*

- What is hazard mitigation?
  - Description of the community
  - Goals & objectives
  - Mitigation benefits



# Local Hazard Mitigation Strategy

## *HAZARD RISK & VULNERABILITY*

- risk & vulnerability
- planning process
- maps
- capability assessment
- comp. plan amendments
- coordinate with neighboring municipalities



# Local Hazard Mitigation Strategy

## *MITIGATION ACTIONS*

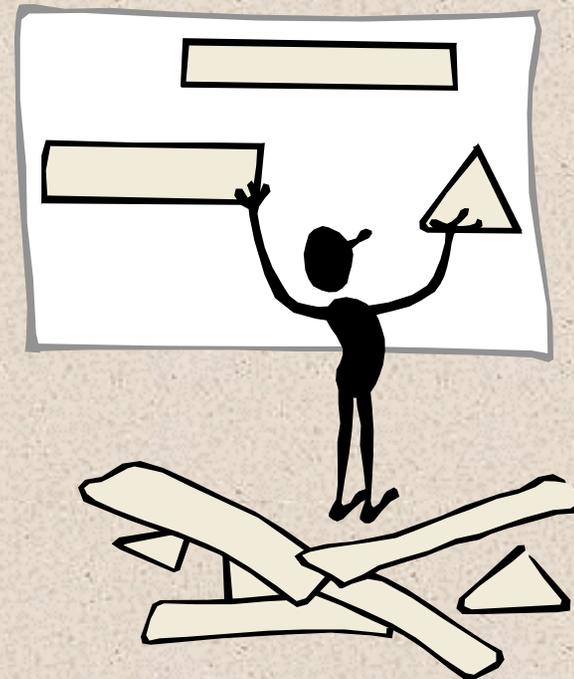
Action Plan

What?

When?

How?

Who?



## *IMPLEMENTATION*

## *EVALUATION*

## *REVISION*

# Planning Process

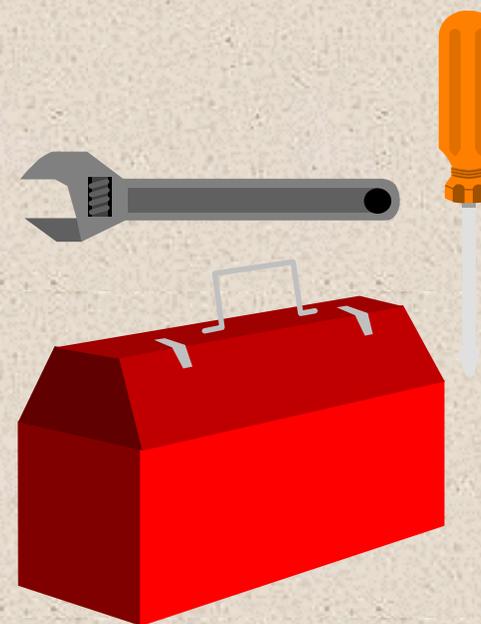
- **Recognize the limitations on the planning process**
- **Establish a schedule for strategy development**
- **Address state and local requirements**
- **Achieve regulatory compliance**



# Step 5. Mitigation Initiatives

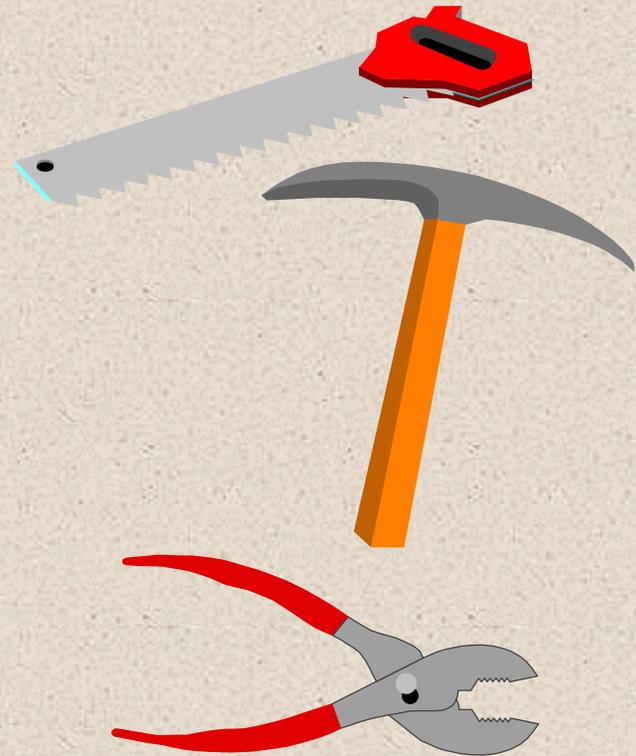
## *Types of Mitigation Initiatives*

- **Educational Programs**
  - public information
  - specialized training
  
- **Plans & Policies**
  - land development
  - post-disaster redevelopment
  - capital improvement plans
  - operations & maintenance plans
  - emergency operations plans
  - economic incentives



# More Mitigation Initiatives

- **Regulations and Codes**
  - building codes
  - redevelopment regulations
  - coastal setbacks
- **Structural Alternatives**
  - protective devices
  - structural retrofit
  - demolition & removal
  - relocation



# How to Select a Sound Mitigation Measure

## *Technical Merit*

- capability to avoid repetitive damage
- effectiveness in damage reduction

## *Cost Effectiveness*

- development & operating costs
- avoid damage costs
- overall cost effectiveness

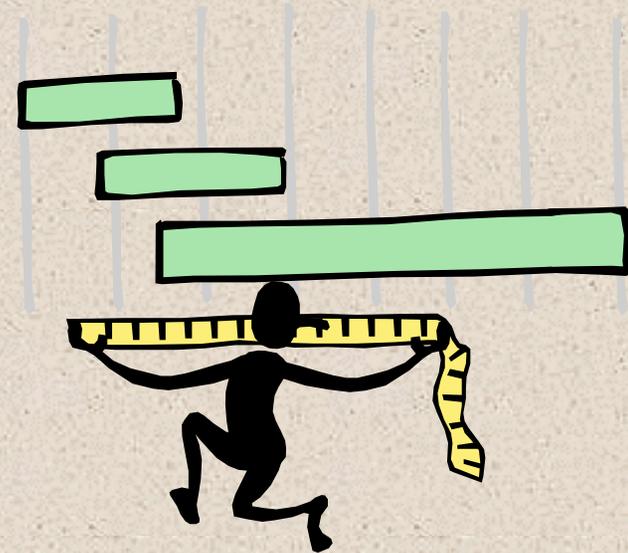
## *Acceptability*

- public acceptance
- environmental impact
- permitting restrictions



# Prioritization of Mitigation Initiatives

- **Existing programs should be implemented immediately - continue to support (FMAP, HMGP, CTC)**
- **Immediate threat to safety & welfare of community**
- **Ready for implementation when federal/state funding becomes available**



# Step 6. Implementation

- **Adopt strategy--legal and administrative stature**
- **Schedule implementation strategy**
- **Revise plan as needed (after hazard events)**



# Critical Ingredients for Successful Implementation of Strategy

- **Appropriate adoption and promulgation**
- **Enforcement and implementation authority & resources assigned**
- **Local government agency support**
- **Public and private sector acceptance**
- **Adequate funding**
- **Regulatory consistency (streamlining...)**

