

BETHLEHEM VULNERABILITY ASSESSMENT

April 8, 2014





Understanding Vulnerability





Vulnerability

- The degree to which a system is susceptible to (sensitive), and unable to cope with (adaptive capacity), adverse effects of climate change (including climate variability and extremes)
- Three core elements:
 - Exposure;
 - Sensitivity; and
 - Adaptive capacity



Sources: CDC

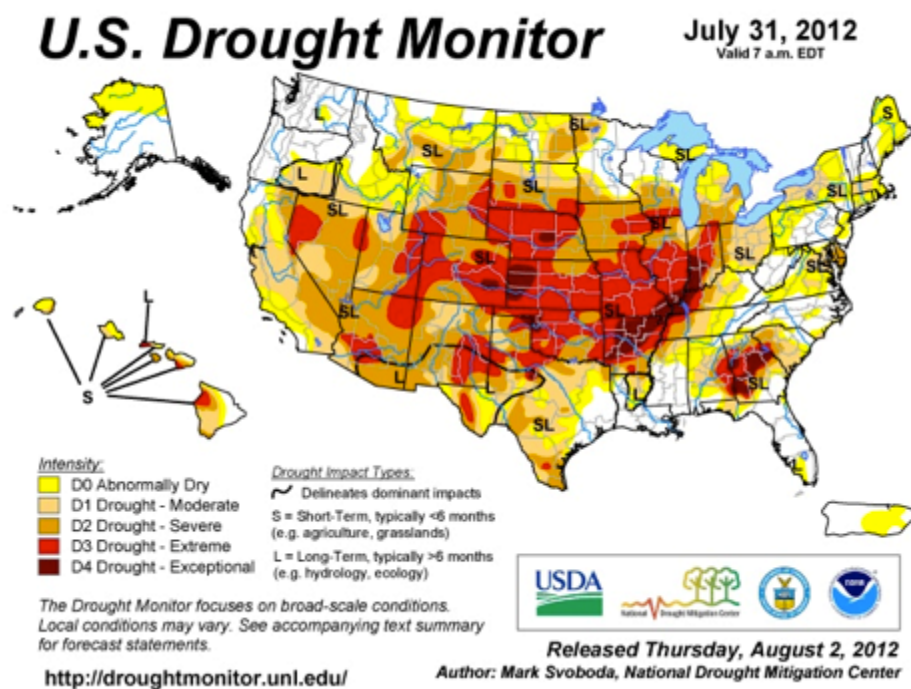
Why is a Vulnerability Assessment Important?



- Provides insight into the areas of your community that need attention
- Helps prioritize actions
- Provides opportunity for multi-department and multi-jurisdictional collaboration
- Structure for tracking progress



Exposure



Source: National Integrated Drought Information System

- Exposure is a determination of whether the system as a whole or its parts will experience a specific changing climate condition.
- It is often an inventory of the “assets” —people, property, systems, and functions—that could be lost, injured, or damaged due to an impact of climate change.



Sensitivity



Source: *Breakingnews.com*

The degree to which a built, natural, or human system is directly or indirectly affected by changes in climate conditions or specific climate change impacts. If a system is likely to be affected as a result of climate change, it should be considered sensitive to climate change

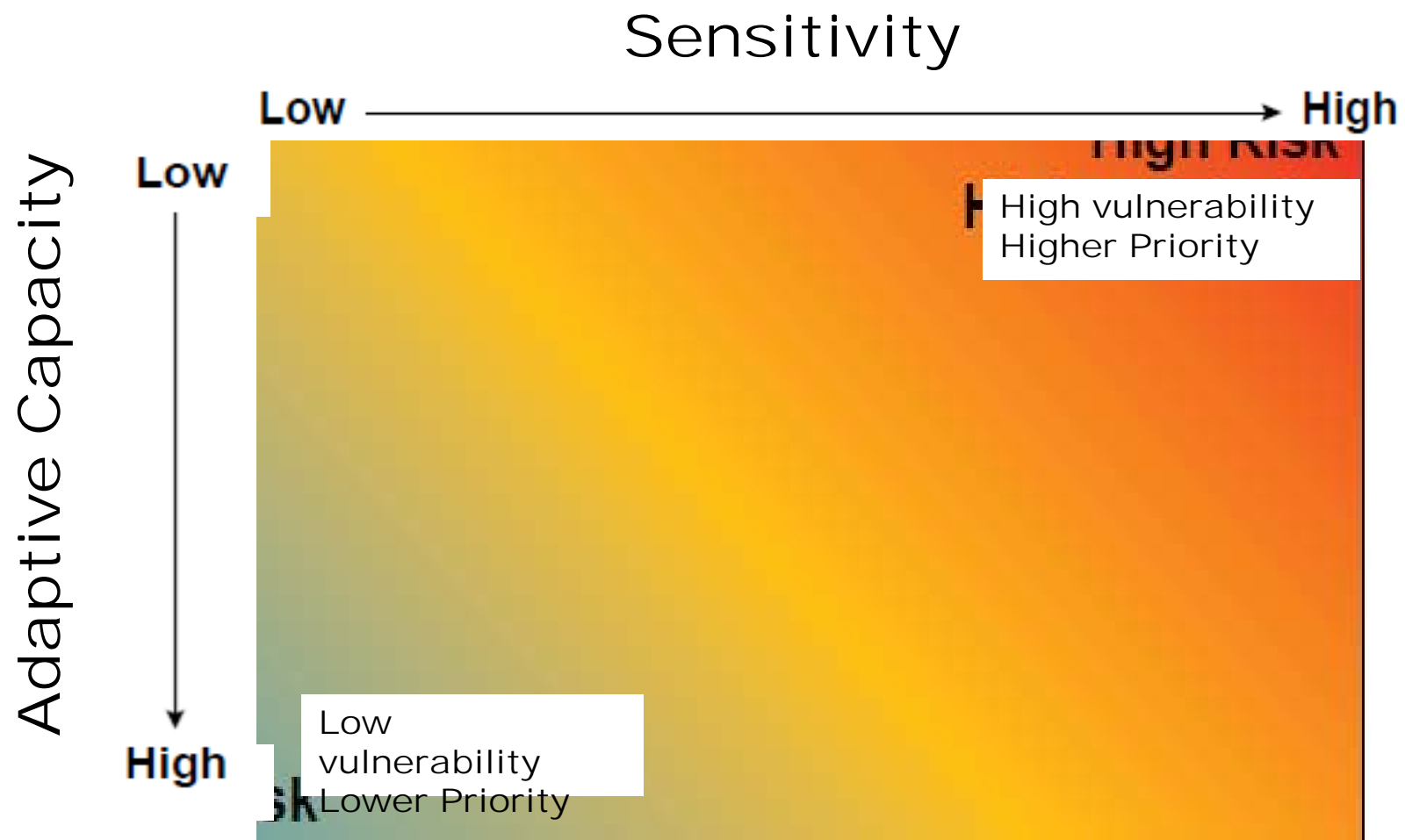
Adaptive Capacity

The ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with consequences.





Vulnerability





Identify Systems

Definition: A system is a combination of related parts organized into a complex whole. Urban environments are comprised of interconnected social, infrastructure, and natural systems that provide essential functions and services.

Examples:

Natural/Environmental

Social

Economic

Infrastructure

Built Environment

Albany Adaptation Plan included:

Natural Systems

Social Systems

Infrastructure Systems



Identify Sectors

Definition: a *component* of an integrated system such as an economy or a society.

Examples:

Agriculture/food
Air
Ecosystems
Cultural resources
Emergency preparedness
Energy
Buildings
Public health
Transportation
Urban development/land use
Water resources
Wildlife

Albany Adaptation Plan included:

Air quality
Critical facilities
Energy
Natural habitat
Property
Public health
Sewer infrastructure
Transportation
Urban forest
Water distribution

Sample Vulnerability Assessment by Sector



Table 2.1 Primary Vulnerabilities by Sector

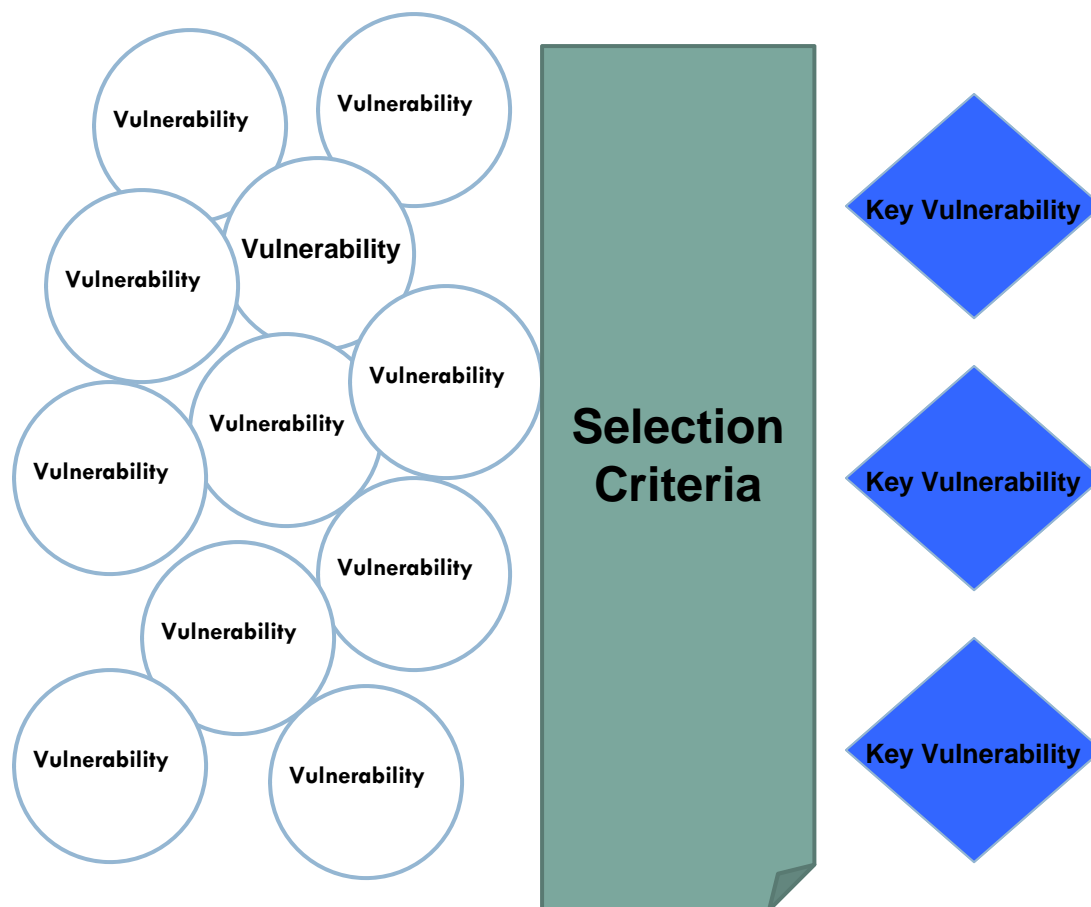
Ecosystems and Critical Species
<ul style="list-style-type: none"> ➤ Bay ecosystems, which provide habitat for many endangered and threatened species, are extremely vulnerable to inundation that is expected to result in habitat shift. These shifts could cause the loss of irreplaceable habitats for critical species in many areas. ➤ Upland areas are vulnerable to erosion, and subtidal ecosystems are threatened by erosion of upland areas when it results in degraded water quality.
Contaminated Sites
<ul style="list-style-type: none"> ➤ Hazardous waste sites are highly vulnerable to flooding and inundation as storage tanks in the area could be opened or moved, or motors and pumps could be impaired thus releasing contamination into flood waters or area soils.
Stormwater Management
<ul style="list-style-type: none"> ➤ In all scenarios, storm sewers are highly vulnerable to flooding and inundation in the Bay due to higher sea levels, a condition that would result in localized flooding in very low-lying inland areas.
Wastewater
<ul style="list-style-type: none"> ➤ Sanitary sewers in low-lying locations will be vulnerable to floodwater inflow which could exceed their capacity, potentially resulting in discharge of wastewater to the Bay. ➤ The entire wastewater collection system in the planning area will be vulnerable to inundation impacts.
Potable Water
<ul style="list-style-type: none"> ➤ Above-ground water distribution components such as valves, meters, and service points will be vulnerable to flooding and inundation.
Energy Facilities
<ul style="list-style-type: none"> ➤ Above-ground electricity transmission and distribution in limited areas will be vulnerable to erosion, particularly after 2050 and during major storm events. Erosion could undermine infrastructure, causing outages or safety issues. ➤ Above-ground electricity transmission and distribution will be moderately vulnerable to flooding and inundation, particularly in the 2100 timeframe when more components are likely to be exposed to regularly-occurring flood events.

Source: Sea Level Rise Adaptation Strategy for San Diego Bay



Identifying Key Vulnerabilities

- Decision criteria can help determine which vulnerabilities to initially prioritize
- Criteria derived from the Intergovernmental Panel on Climate Change
- Qualitative and Quantitative



Key Vulnerability Selection Criteria



- Magnitude of Impact
- Timing of Impact
- Persistence and Reversibility of Impact
- Likelihood of Impact
- Potential for Adaptation Actions
- Importance of Vulnerable Populations
- Distributional Aspects of Impacts and Vulnerabilities