

Understanding and Assessing Disaster Risk



Dr. Heather Bell

Pacific Disaster Center

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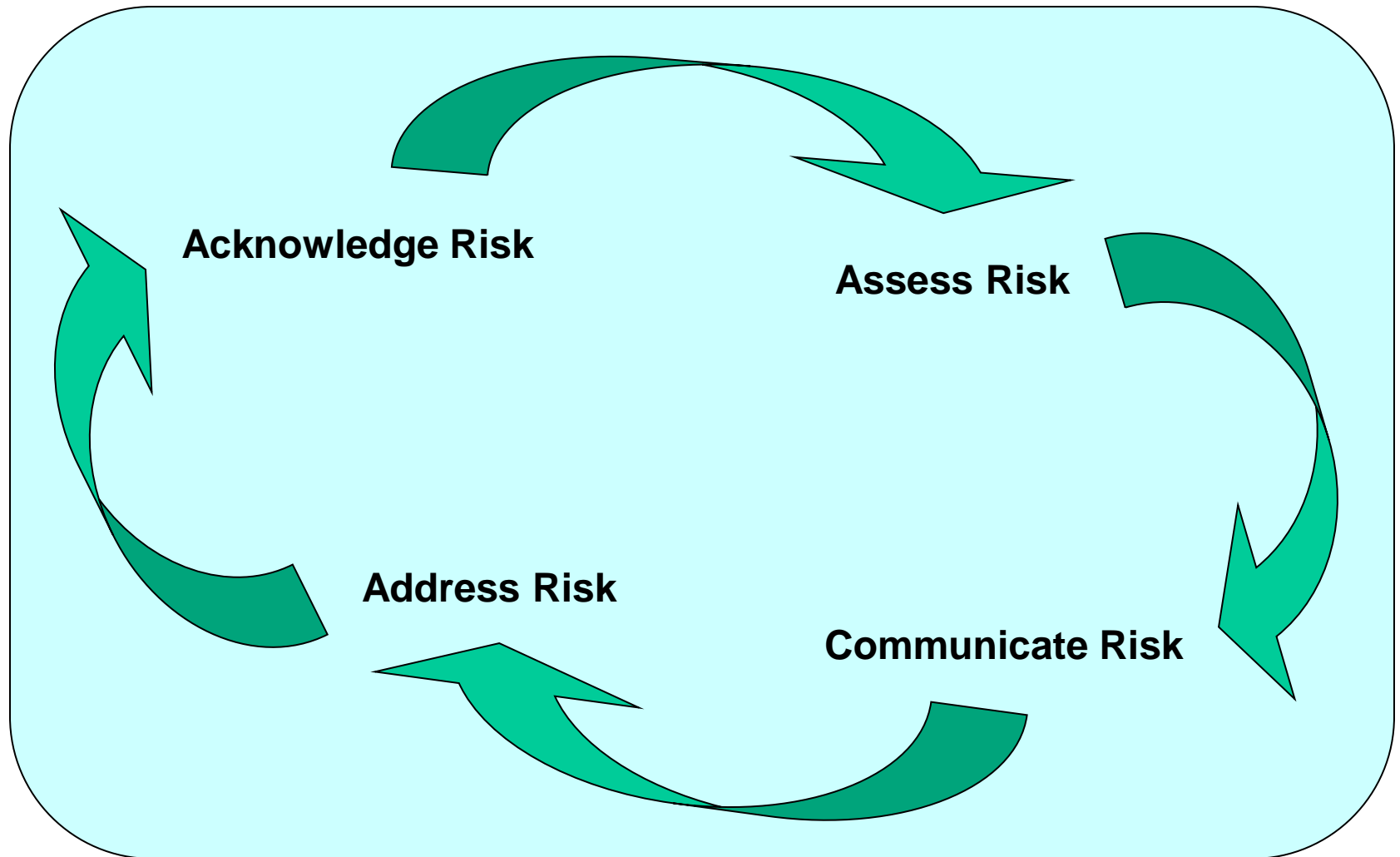


Asia-Pacific
Economic Cooperation

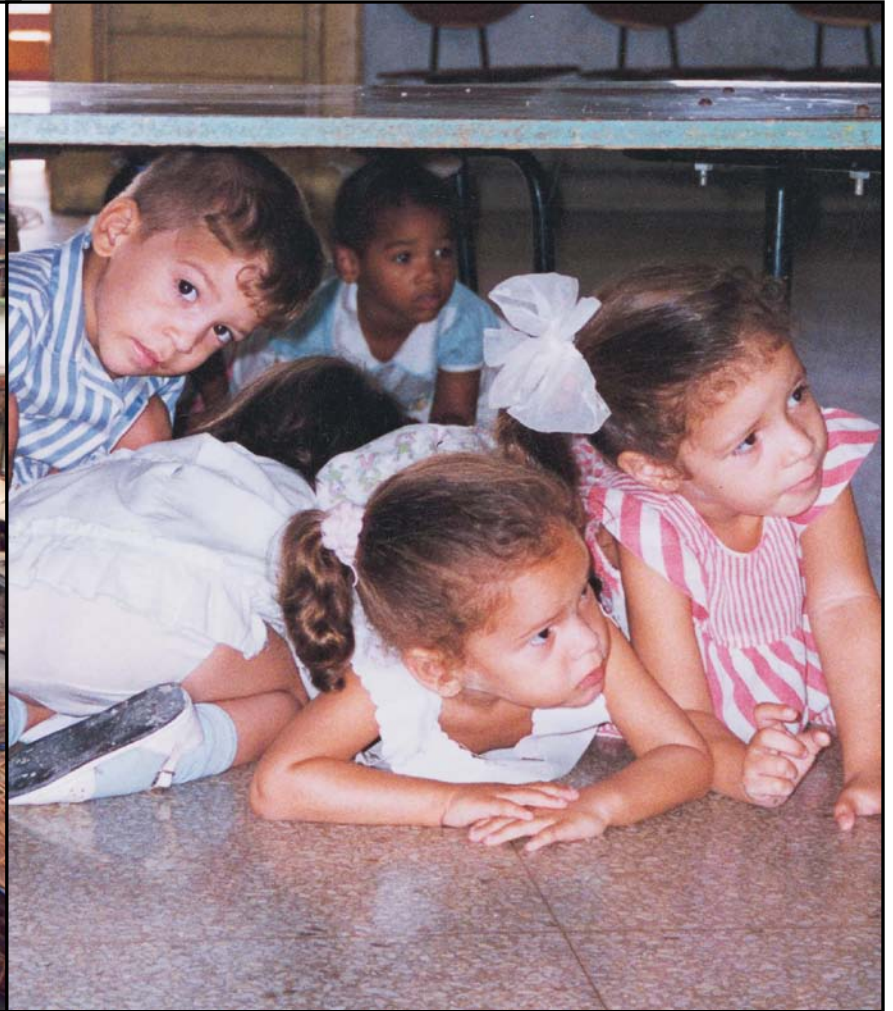


USAID
FROM THE AMERICAN PEOPLE

An Approach to DRR



What's It All About?



Understanding Disaster*

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

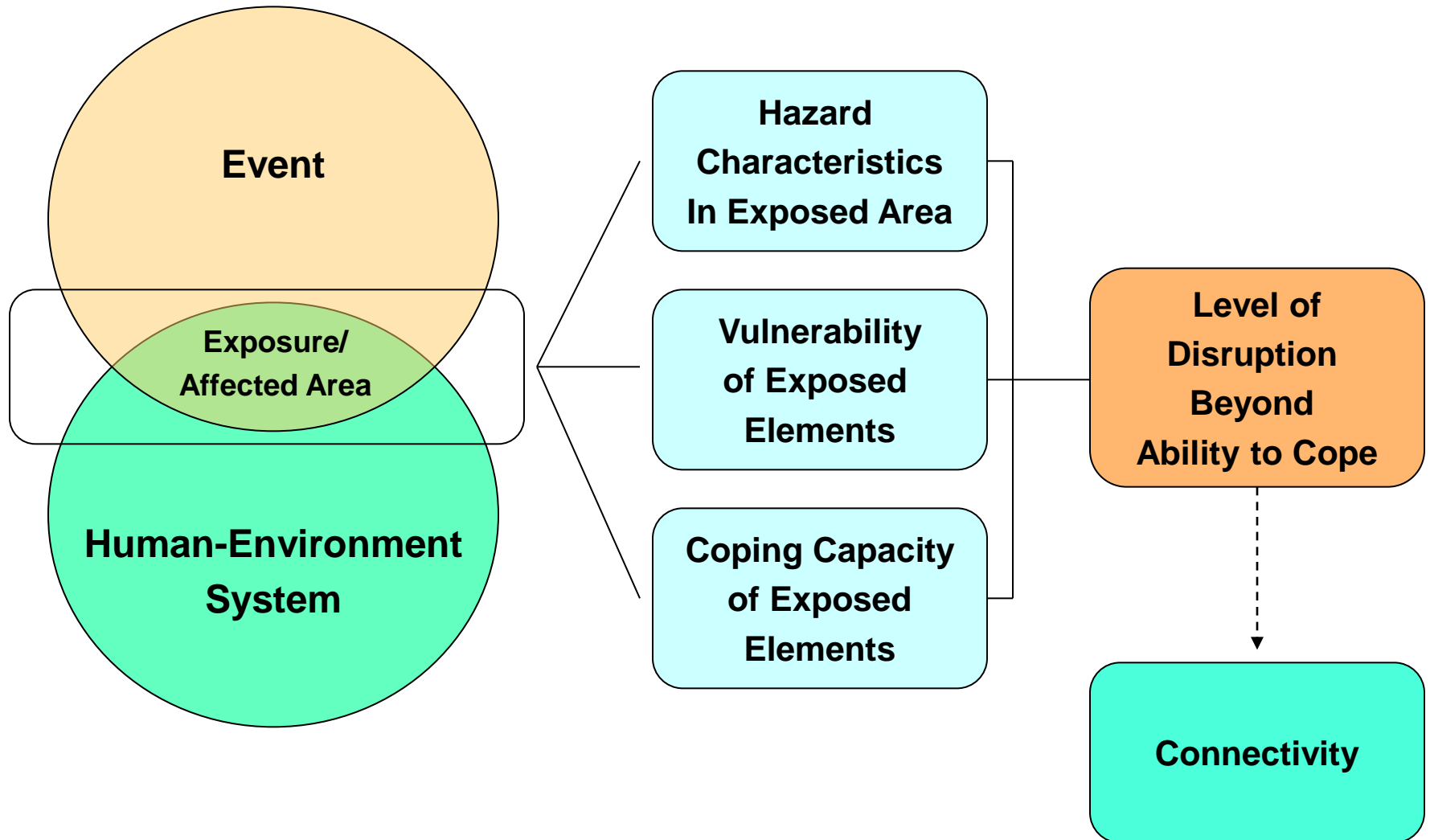
Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

Understanding Disaster Risk*

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.

Components of Disaster



What Is a Risk Assessment?*

A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. This series of activities is sometimes known as a risk analysis process.

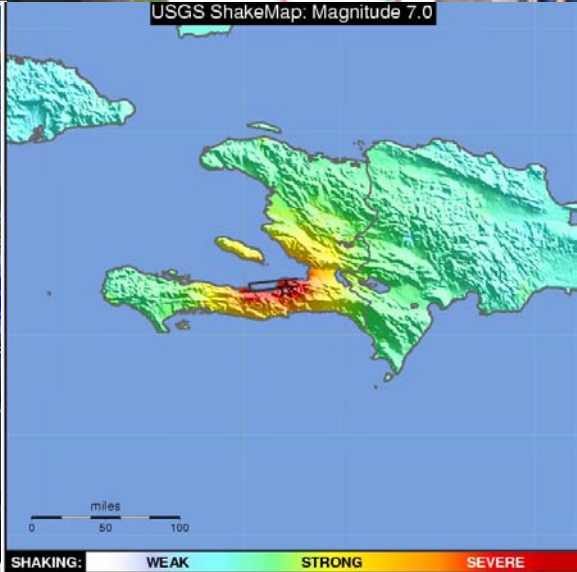
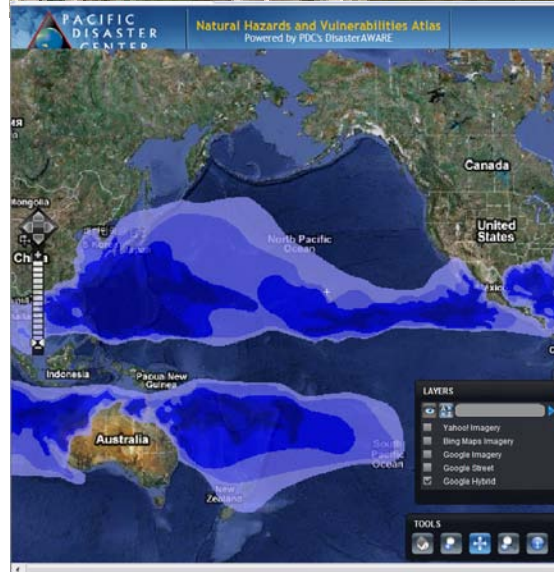
Many Types of Risk Assessment

- Qualitative or Quantitative
- Simple or Complex
- Multi-Hazard or Single-Hazard
- Performed for Communities, Sectors, Systems or Objects
- Should support larger DRR and DM goals
- Generally, Should Know Something About:
 - The Frequency and Intensity of Relevant Hazards
 - The Assets and Resources of Interest that May be Exposed
 - Characteristics that Make those Elements More Susceptible to Impact and Less Able to Cope

Describing the Components of Disaster: Hazard

Hazard

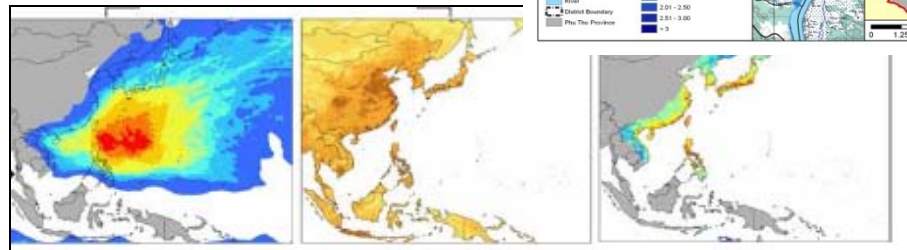
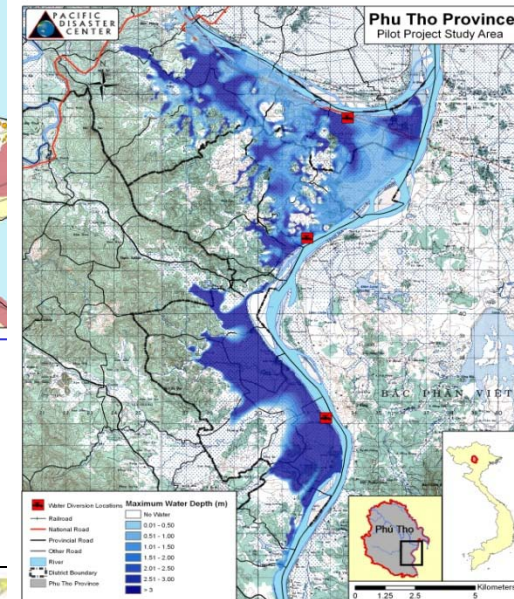
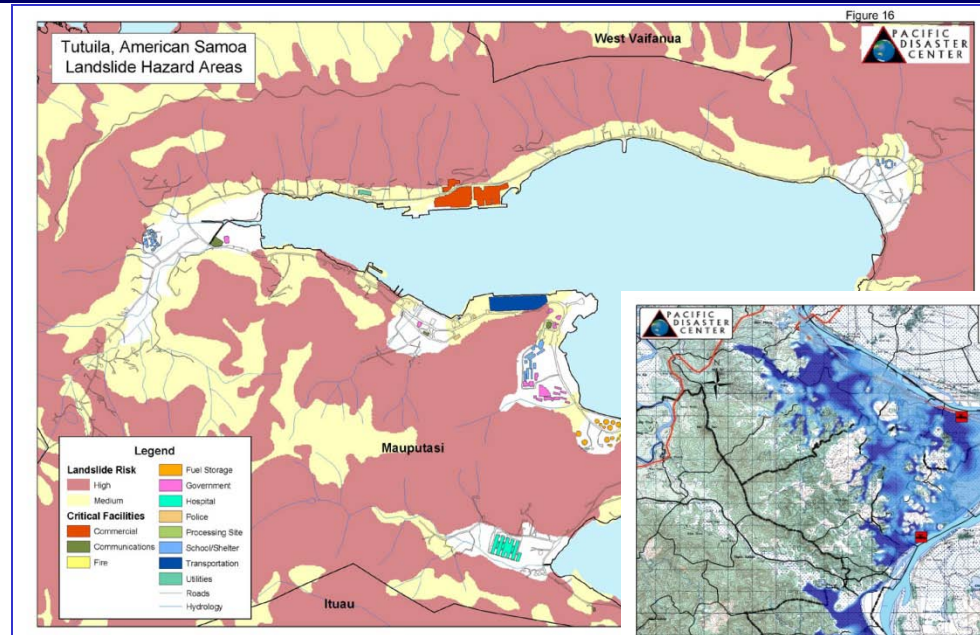
A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage



Describing the Components of Disaster: Exposure

Exposure

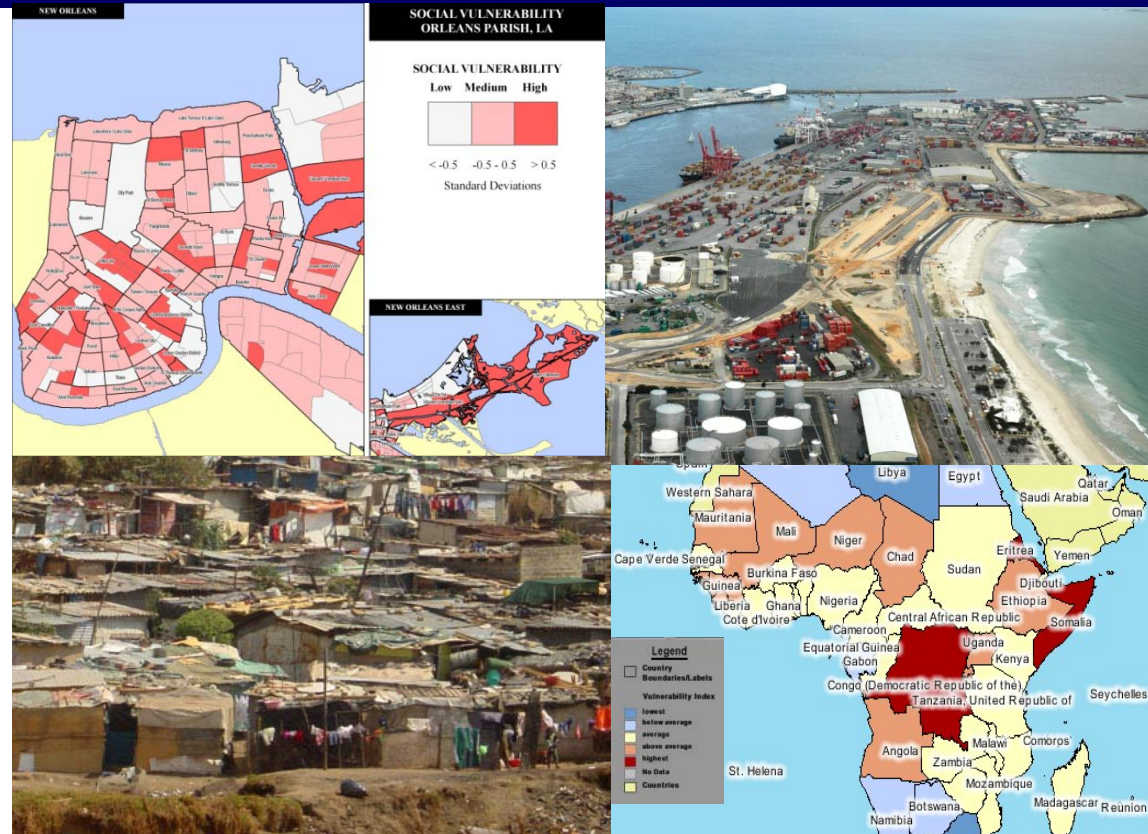
People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses



Describing the Components of Disaster: Vulnerability

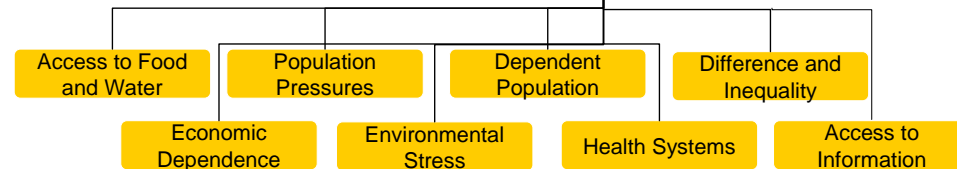
Vulnerability

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard



e.g. from PDC project

Vulnerability



Describing the Components of Disaster: Coping Capacity

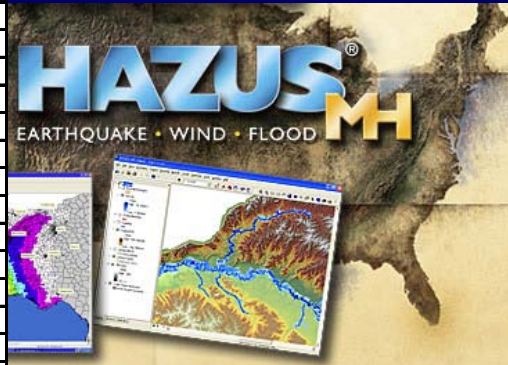
Coping Capacity

The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters

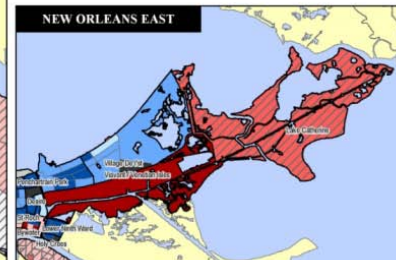
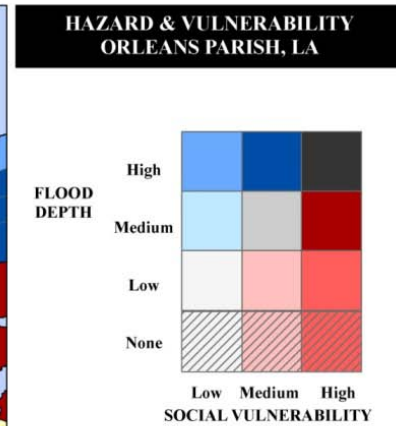
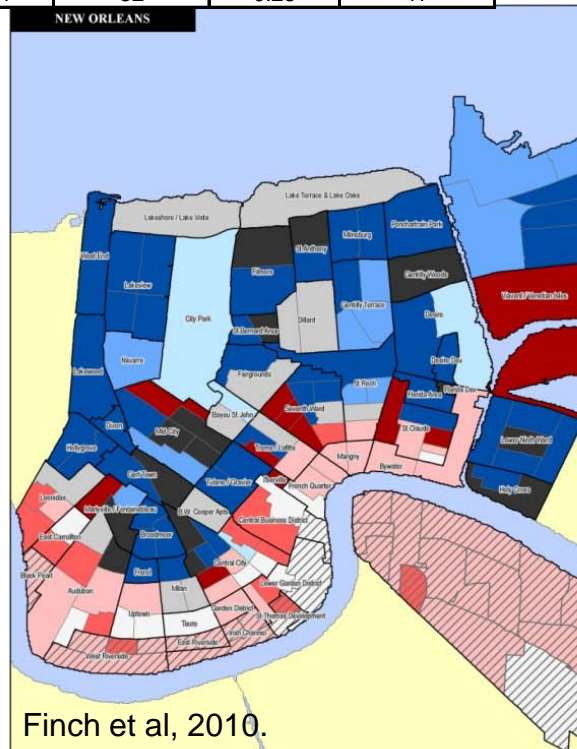


Tools and Methods to Capture and Combine Components

Top 10	Capacity		Governance		Infrastructure		Economic Strength	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
Country	(Range 0-1)	(Rank x of 53)	(Range 0-1)	(Rank x of 53)	(Range 0-1)	(Rank x of 53)	(Range 0-1)	(Rank x of 53)
Mauritius	0.90	1	0.93	3	0.89	1	0.89	2
Cape Verde	0.76	2	0.94	1	0.78	2	0.56	7
Botswana	0.73	3	0.93	3	0.26	10	0.99	1
Seychelles	0.71	4	0.78	6	0.71	3	0.65	6
South Africa	0.61	5	0.83	5	0.51	6	0.49	8
Tunisia	0.55	6	0.64	8	0.36	7	0.66	5
Namibia	0.48	7	0.84	4	0.19	20	0.43	10
Sao Tome and Principe	0.46	8	0.57	13	0.70	4	0.11	32
Equatorial Guinea	0.39	9	0.15	45	0.24	13	0.80	3
Morocco	0.38	11	0.56	14	0.27	9	0.31	16
Ghana	0.38	11	0.72	7	0.14	32	0.28	17



- GIS
- Models
- Indices
- Narrative
- VCA Toolbox



Finch et al, 2010.

Considerations

- Like Maps, Estimations and Interpretations of Reality
- Practical Tools to Help Us Do Our Jobs More Effectively
- Address a Limited Number of Factors
- What You Include Depends on Purpose and Goals
- ...but Keep in Mind What's Missing

Risk Assessment Road Map

Purpose, Goals, and Objectives of Risk Assessment

Scale

Participation

**Characterize
Risk**

Definitions
Conceptualization
Key Components
and Categories

Analyze Risk

Methods
Data Requirements
and Collection
Execution

**Communicate
Risk**

Representation
Reporting
Dissemination

**Acknowledge
and Address
Risk**

Policy
Planning
Mitigation
Mainstreaming
Etc.

Standardization/Interoperability

Decisions and Considerations

Purpose, Goals, and Objectives of Risk Assessment

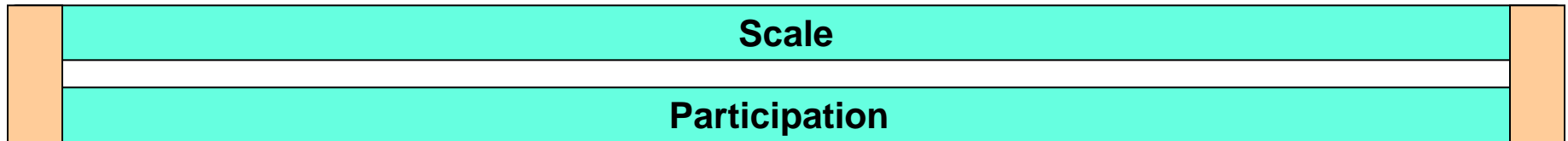
- What do you want out of a risk assessment?

Standardization/Interoperability

- What standards are required to ensure effective sharing of information?

Decisions and Considerations

- Who would you like to be involved in framing and conducting the assessment?



- At what scale will key risk information categories be characterized?
- At what resolution would you like risk information be collected, aggregated, analyzed, reported, and disseminated?

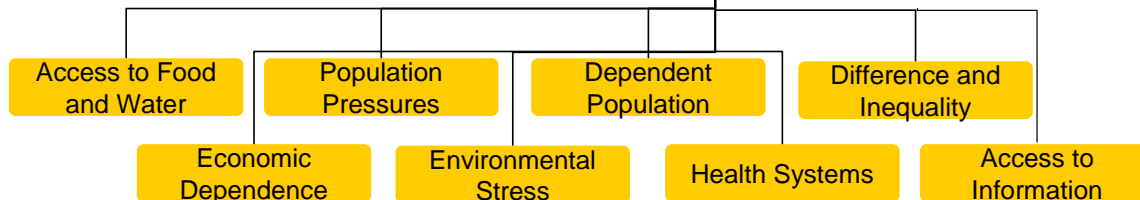
Decisions and Considerations

**Characterize
Risk**

**Definitions
Conceptualization
Key Components
and Categories**

- What Are the Components of Risk and How Do They Broadly Relate?
- How Would You Define Risk and its Components?
- What Information Would You Like to Include in an Assessment?
- What Information Do You Think Is Critical to Include?

RISK = Hazard + Vulnerability - Capacity



e.g. from a PDC Project

Decisions and Considerations

- What data related to your key information categories is currently available?
- At what scale is the data available?
- How often is the data updated?
- How will information categories and/or components be measured?
- How will information categories and/or components be combined?

Analyze Risk

Methods

**Data Requirements
and Collection
Execution**

Environmental Stress

% Forest Change

Freshwater Stress

Agricultural Density

e.g. from a PDC Project

Decisions and Considerations

Communicate Risk

Representation Reporting Dissemination

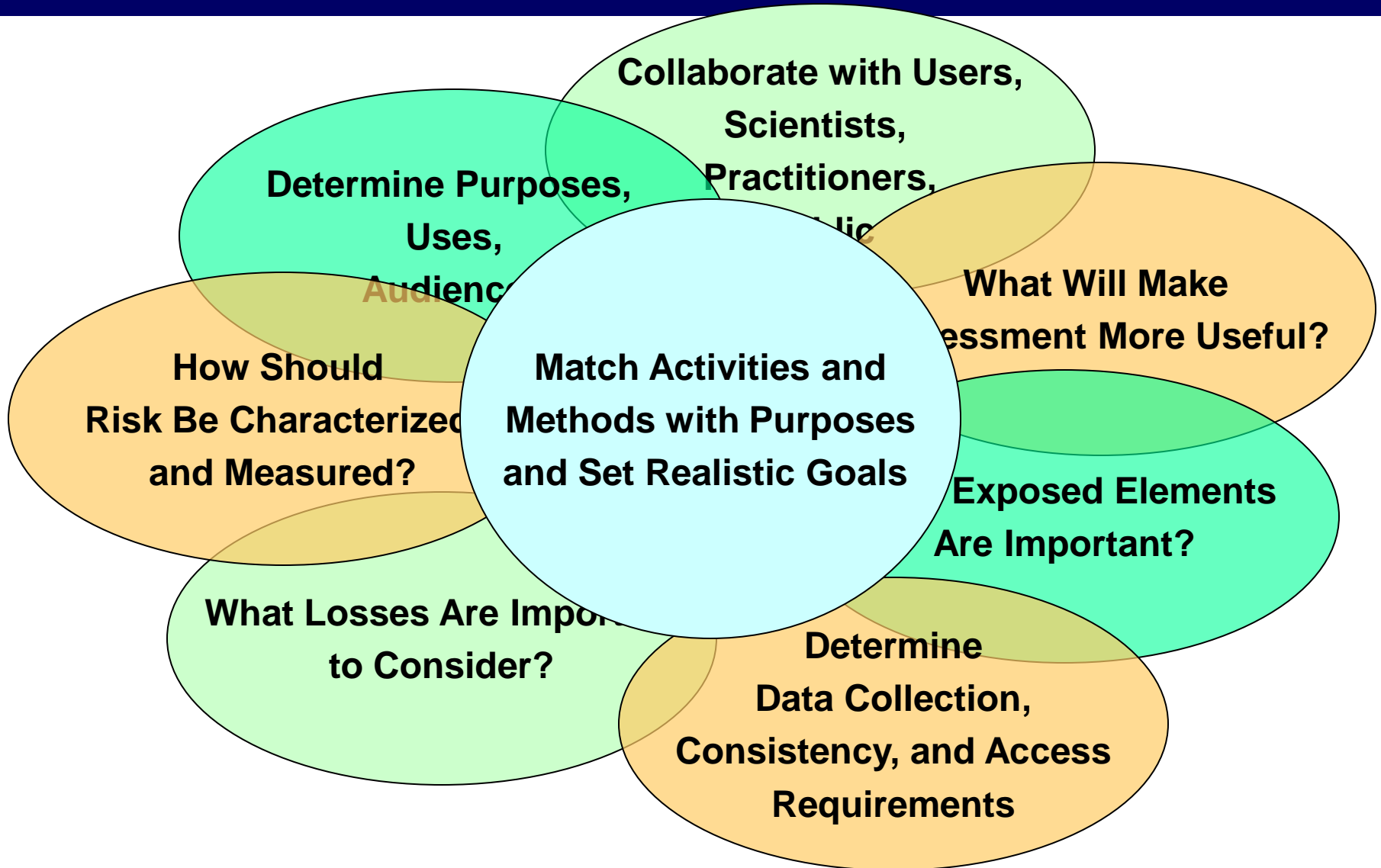
- To Whom Should Risk Be Reported and Disseminated?
- How Should Risk Be Represented?
- In What Forms Should Risk Be Reported and Disseminated?

- How Do We Translate Assessment into Action?
- Where Are Priorities for Action?
- In What Ways Can Actions Be Targeted Thematically?
- Which Representation and Dissemination Strategies Help to Achieve Action and Acknowledgement?

Acknowledge and Address Risk

Policy Planning Mitigation Mainstreaming

Operationalizing RVA



Common Information Types

Hazard Data	Loss/Impact Data	Systems, Asset and Resource Data	
<ul style="list-style-type: none"> • Location • Hazard Type • Magnitude or Intensity • Frequency • Probability • Extent • Duration • Speed of onset • Seasonal or Diurnal Patterns 	<ul style="list-style-type: none"> • Location • Number Dead • Number Missing • Number Evacuated • Number Affected • Agricultural Losses • Economic Losses • Sectoral Losses • Societal Disruptions 	<ul style="list-style-type: none"> • Land Use/Land Cover • Topography • Geology and Soils • Hydrography • Population • Demographic and Socio-economic Characteristics • Governance and Policy • Health Systems 	<ul style="list-style-type: none"> • Transportation Systems • Communications Systems • Education Systems • Environmental Systems • Water Supply • Food Supply • Economics and Commerce • Energy • Security

QUESTIONS?

Acknowledgements

Understanding and Assessing Disaster Risk

- **Contributing Authors**

- Heather Bell, PhD, Pacific Disaster Center

- **Published Source Materials**

- Pacific Disaster Center. 2010. Course materials developed for the Ministry of Agriculture and Rural Development (MARD) Natural Disaster Risk Management Project: Education and Training Program. Hanoi, Vietnam, March-May 2010.
- United Nations International Strategy for Disaster Reduction (UNISDR). 2009. UNISDR Terminology on Disaster Risk Reduction.
- Bell, H.M. 2010. Sessions presented at Humanitarian Assistance and Disaster Relief Geospatial Intelligence (HADR GEOINT) Workshop. Kihei, HI, March 2010.
- Bell, H.M. 2010. Risk and Vulnerability Assessment: An Overview, presentation at the Northern Bahamas Disaster Conference, Freeport, Bahamas, September 2010.
- Bell, H.M. 2009. Framing the Assessment of Risk and Vulnerability: Key Challenges and Questions, presentation at the ASEAN Risk Assessment and Early Warning Visioning Workshops, Jakarta, Indonesia, August, 2009.