

Using Results to Communicate & Address Risk: Mitigation



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Using Results to Communicate and Address Risk

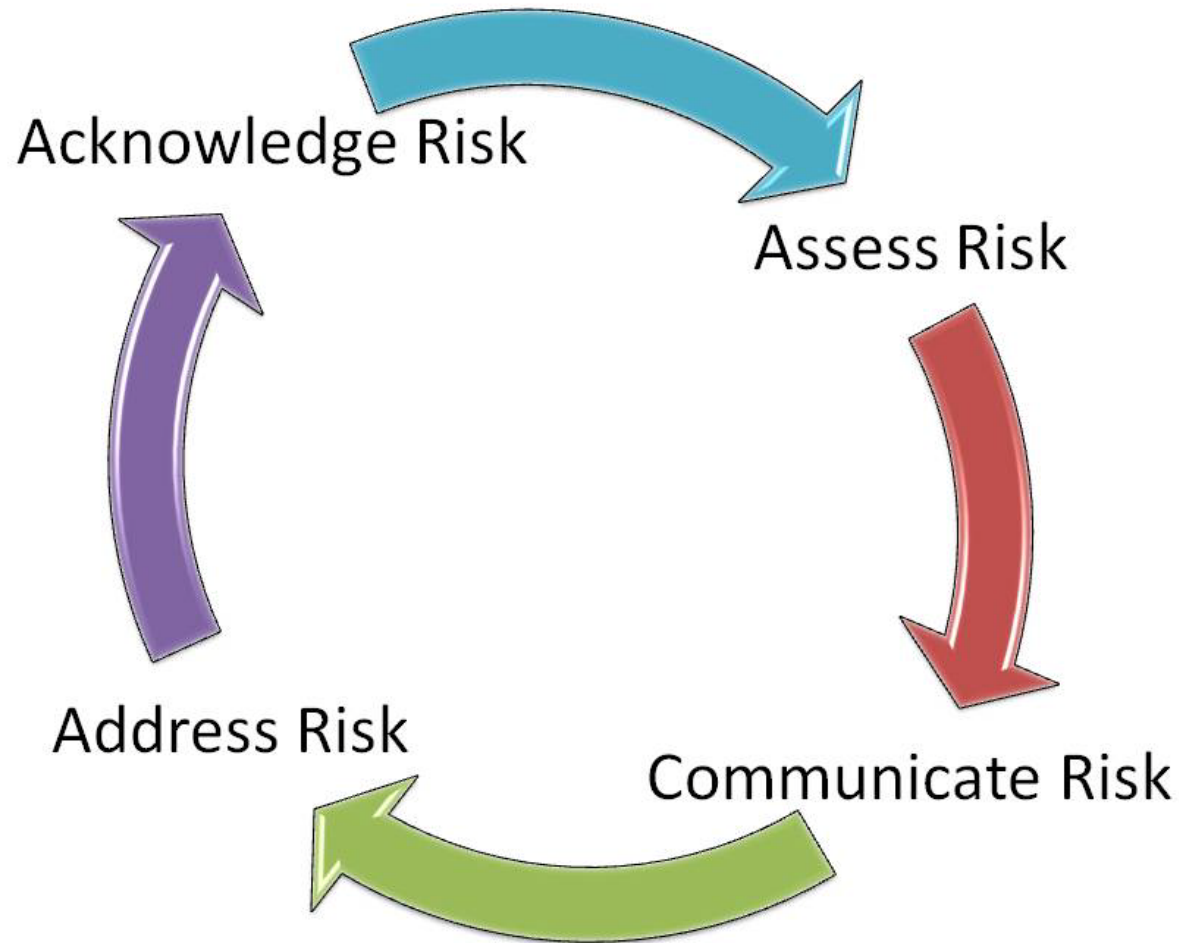
MITIGATION

Mitigation

- “The lessening or limitation of the adverse impacts of hazards and related disasters.” (UNISDR)
- Includes activities that eliminate or reduce the impacts of a disaster.



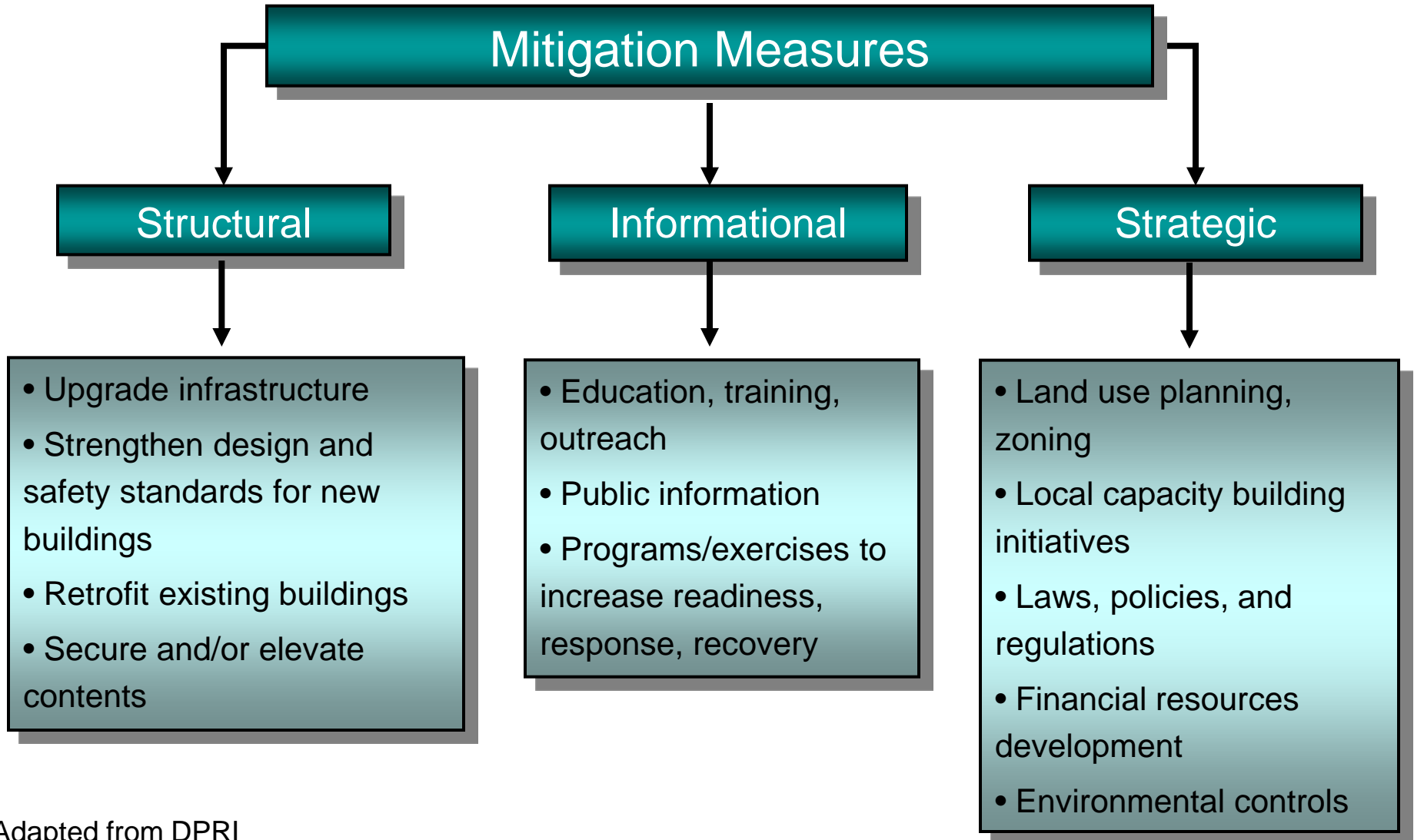
Disaster Risk Reduction Process



Steps to Address Risk

1. Review and assess current mitigation strategies;
2. Identify potential mitigation projects;
3. Establish criteria for project prioritization;
4. Identify benefits;
5. Determine costs;
6. Prioritize according to established criteria; and
7. Develop detailed mitigation project specifications for priority projects.

Mitigation Measures



Mitigation Measures

- Structural
 - Engineering measures can help reduce the likelihood or impact of a disaster event
 - Wind-resistant shutters
 - Stronger transportation containers
 - Fire sprinkler systems
 - Fire retardant materials
 - Dykes
 - Others?

Mitigation Measures

- Information
 - Studies and reports
 - Labeling of hazardous materials
 - Presentations to lawmakers, civic groups, professional societies, and corporate management.
 - Using the media to help inform the public
 - Others?

Mitigation Measures

- Codes and Ordinances
 - Laws are a primary tool for mitigation
 - Codes and regulations are mechanisms for implementing these laws
 - Building and zoning codes
 - Plumbing and electrical codes
 - Public health ordinances
 - Fire and life safety codes
 - Hazardous materials regulations
 - Dam inspection regulations
 - Traffic Codes

Cost to Benefit Example

Cost-Benefit of FEMA mitigation grants between 1993- 2004

Every \$1 spent saves tax payers \$4

Hazard	Cost (\$M)	Benefit (\$M)	Benefit-Cost Ratio
Earthquake	\$ 947	\$ 1,392	1.5
Wind	\$ 374	\$ 1,468	3.9
Flood	\$ 2,217	\$ 11,189	5.0
Total	\$ 3,538	\$ 14,049	4.0

Identifying Mitigation Actions

- Is Exposure or Vulnerability reduced by the mitigation action?
 - Number of people affected
 - Area affected by hazard
 - Number of properties affected by hazard
 - Property damage (\$)
 - Loss of use/function
 - Loss of life
 - Injury

Identifying Mitigation Actions

Conduct a high-level review of potential *Benefits* for each Mitigation Action: _____

<u>Benefits</u>
Risk reduction (short- or long-term)
If other community goals are achieved, explain
If easy to implement, explain
If funding is available, explain
If politically/socially acceptable, explain

Identifying Mitigation Actions

Conduct a high-level review of potential Costs for each Mitigation Action: _____

<u>Costs*</u>
Construction cost (amount in \$)
Programming cost (amount in \$, # of people needed to administer)
Time needed to implement
If unfair to a certain social group, explain
If there is public/political opposition, explain
If there are any adverse effects on the environment, explain

*If precise costs are not available, use costs based on experience, professional estimate, or judgment.

Measuring Mitigation Success

Marikina City Example

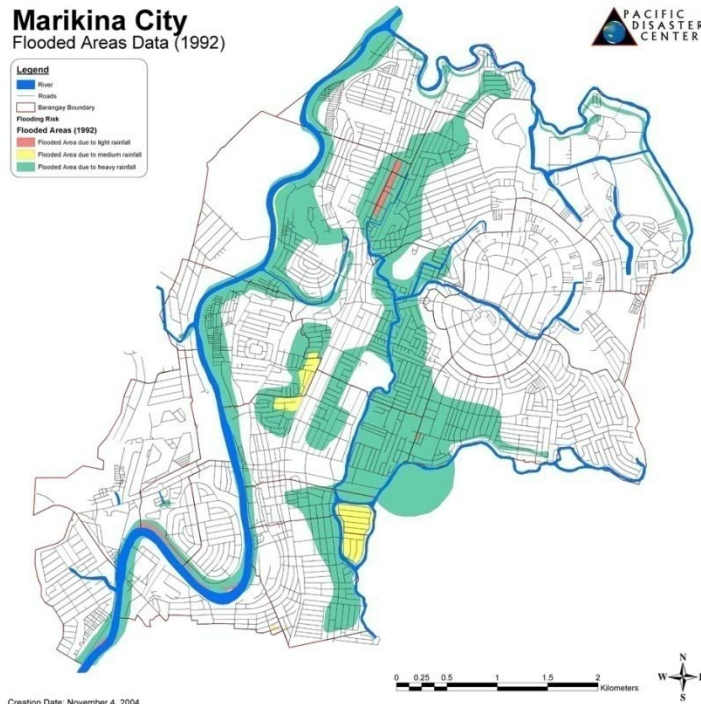
1992 Flood Areas

10446 residences impacted
450 businesses impacted

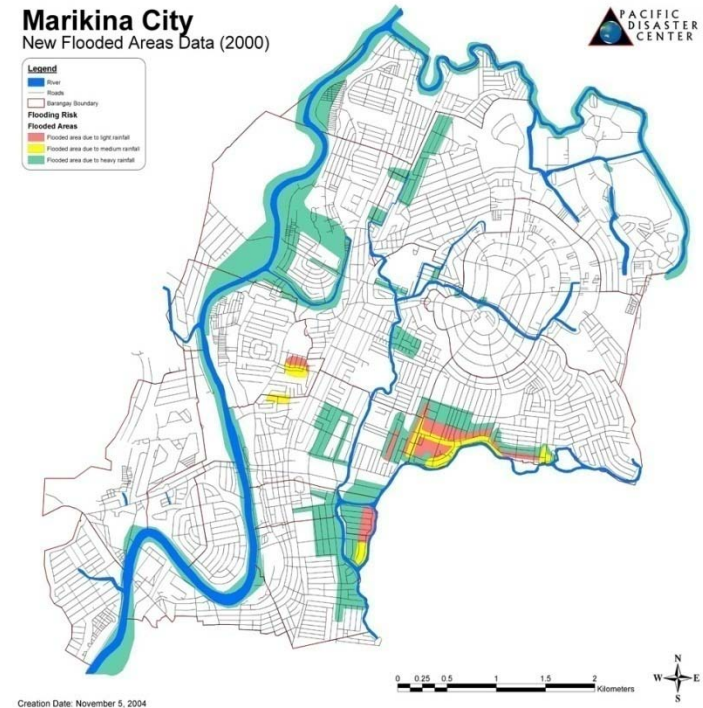
2004 Flood Areas

Reduced to 4877 residences (54%)
Reduced to 289 businesses (36%)

Marikina City
Flooded Areas Data (1992)



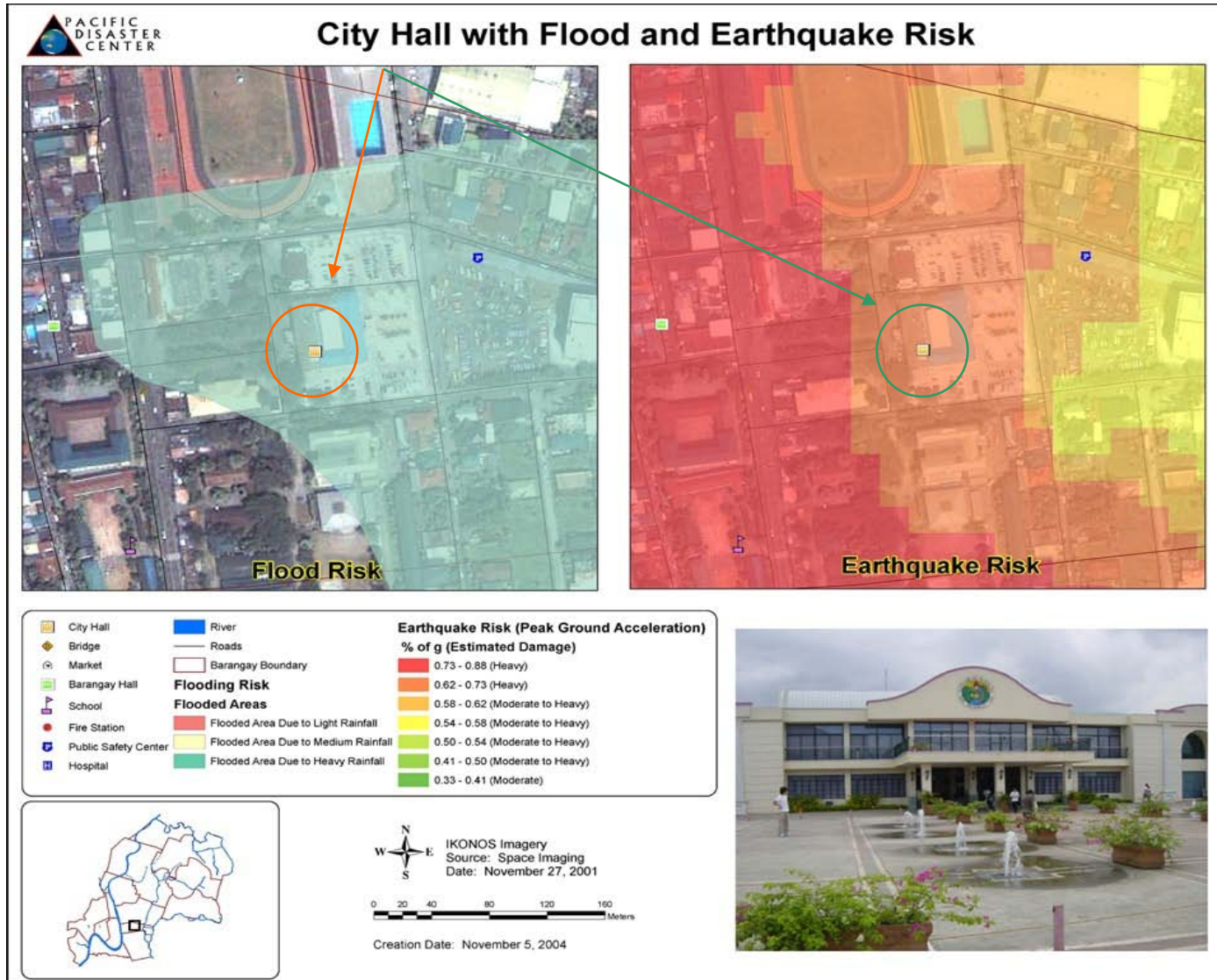
Marikina City
New Flooded Areas Data (2000)



Marikina City flood mitigation success prompts Mayor to set a goal to eliminate residential flooding by 2015

Identify & Evaluate Mitigation Actions

Example: City Hall



Identify & Evaluate Mitigation Actions

Example: City Hall

- Relationship to hazard areas
- Type of service provided
- Value to the community
- Revenue generation
- Number of employees
- Potential impacts on services, revenue, wages due to functional downtime
- Storage of hazardous materials

Identify & Evaluate Mitigation Actions

Example: City Hall

- Provides income for 2000 employees, 800 permanent jobs, additional temporary jobs.
- Houses the Mayor's office, finance, business and treasury, police force, medical emergency group, settlement office, fees and permits collection departments, radio station, communications base, training center, computer facility managing city records, motor pool, warehouse with materials and supplies, vital statistics, and engineering equipment.
- Provides settlement services affecting 130,000 people, medical and dental services, and collects tax revenues of over 1 billion Pesos per year, and fees and permits of over 35 million Pesos per year.

Identify & Evaluate Mitigation Actions

Example: City Hall

What Mitigation Options and Costs for City Hall?

- What are mitigation options to reduce known vulnerabilities to specific hazards?
- What are the costs for mitigation for City Hall?

Benefit-Cost Analysis for Mitigation Options

- Physical assets can be valued.
- Revenue generation can be valued.
- Services rendered to the community can be valued.
- Avoided hazard impacts can be valued.

STAPLEE Evaluation Criteria

CRITERIA	CONSIDERATIONS	
Social	<ul style="list-style-type: none"> • Community acceptance • Effect on segment of population 	
Technical	<ul style="list-style-type: none"> • Technical feasibility • Long-term solution 	<ul style="list-style-type: none"> • Secondary impacts
Administrative	<ul style="list-style-type: none"> • Staffing • Funding allocated 	<ul style="list-style-type: none"> • Maintenance / operations
Political	<ul style="list-style-type: none"> • Political support • Local champion 	<ul style="list-style-type: none"> • Public support
Legal	<ul style="list-style-type: none"> • State authority • Existing local authority 	<ul style="list-style-type: none"> • Potential legal challenge
Economic	<ul style="list-style-type: none"> • Benefit of action • Cost of action 	<ul style="list-style-type: none"> • Contributes to economic goals • Outside funding required
Environmental	<ul style="list-style-type: none"> • Effect on land / water • Effect on endangered species • Effect on HAZMAT / waste sites 	<ul style="list-style-type: none"> • Consistent with community environmental goals • Consistent with National laws

Evaluation and Prioritization

Goal: _____

Objective: _____

STAPLEE Criteria	S (Social)		T (Technical)			A (Administrative)			P (Political)			L (Legal)			E (Economic)				E (Environmental)				
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws
Considerations → for Alternative Actions ↓																							

Evaluation and Prioritization

Goal: Minimize losses to existing and future structures within hazard areas.

EXAMPLE

Objective: Reduce potential damages to the manufactured home park in the floodplain.

STAPLEE Criteria	S (Social)		T (Technical)			A (Administrative)			P (Political)			L (Legal)			E (Economic)				E (Environmental)				
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws
Considerations → for Alternative Actions ↓																							
1. Acquire flood-prone structures	-	-	+	+	+	-	-	-	-	-	+	+	+	+	+	-	-	-	+	+	+	+	+
2. Construct a berm around park	+	+	-	-	-	-	-	-	+	+	-	+	+	+	-	+	+	-	-	+	+	+	+
3. Elevate structures	+	+	-	+	-	-	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+

Mitigation

QUESTIONS?

Acknowledgements

Using Results to Communicate and Address Risk: Mitigation

- **Contributing Authors**
 - Sharon Mielbrecht, Pacific Disaster Center
 - Erin Hughey, PhD, Pacific Disaster Center
 - 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.
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