



# **Damage & Risk Assessment for Post Crisis Recovery of Cultural Heritage**

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# **IMPACT OF DISASTERS AND CONFLICTS ON CULTURAL HERITAGE**

# DAMAGE TO HANUMAN DHOKA PALACE MUSEUM COMPLEX, KATHMANDU



# NEPAL EARTHQUAKE, 2015



The main Square of Bungamati Village before and after Earthquake



**HOW TO ENSURE CONTINUATION OF SOCIAL AND RELIGIOUS PRACTICES ASSOCIATED WITH TRADITIONAL SPACES?**



# HOW TO ENSURE CONTINUATION OF SOCIAL AND RELIGIOUS PRACTICES AND RECOVERY OF ASSOCIATED SPACES?





Swayambhu World Heritage Monument Zone,  
Kathmandu Valley, Nepal



# ASSESSING THE DAMAGE

- Heritage Buildings & Areas
- Movable Heritage
- Intangible Heritage
- Natural Heritage

# CRUCIAL QUESTIONS

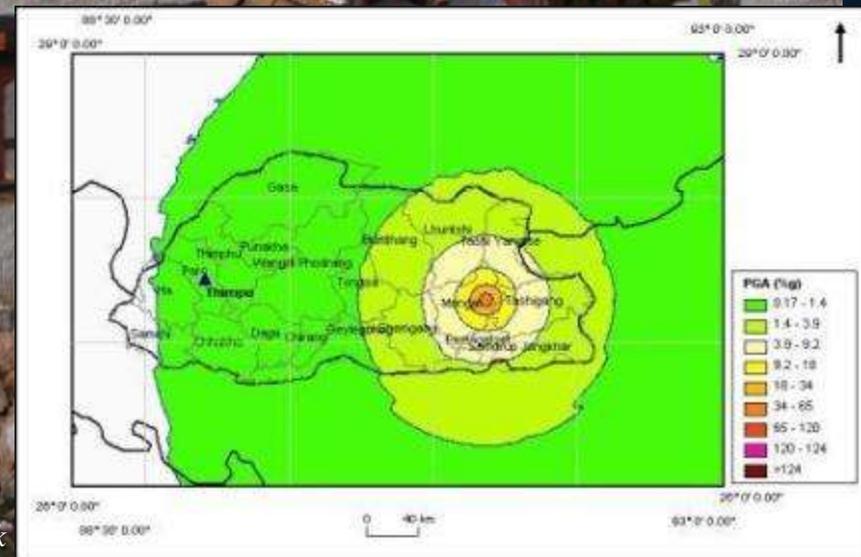
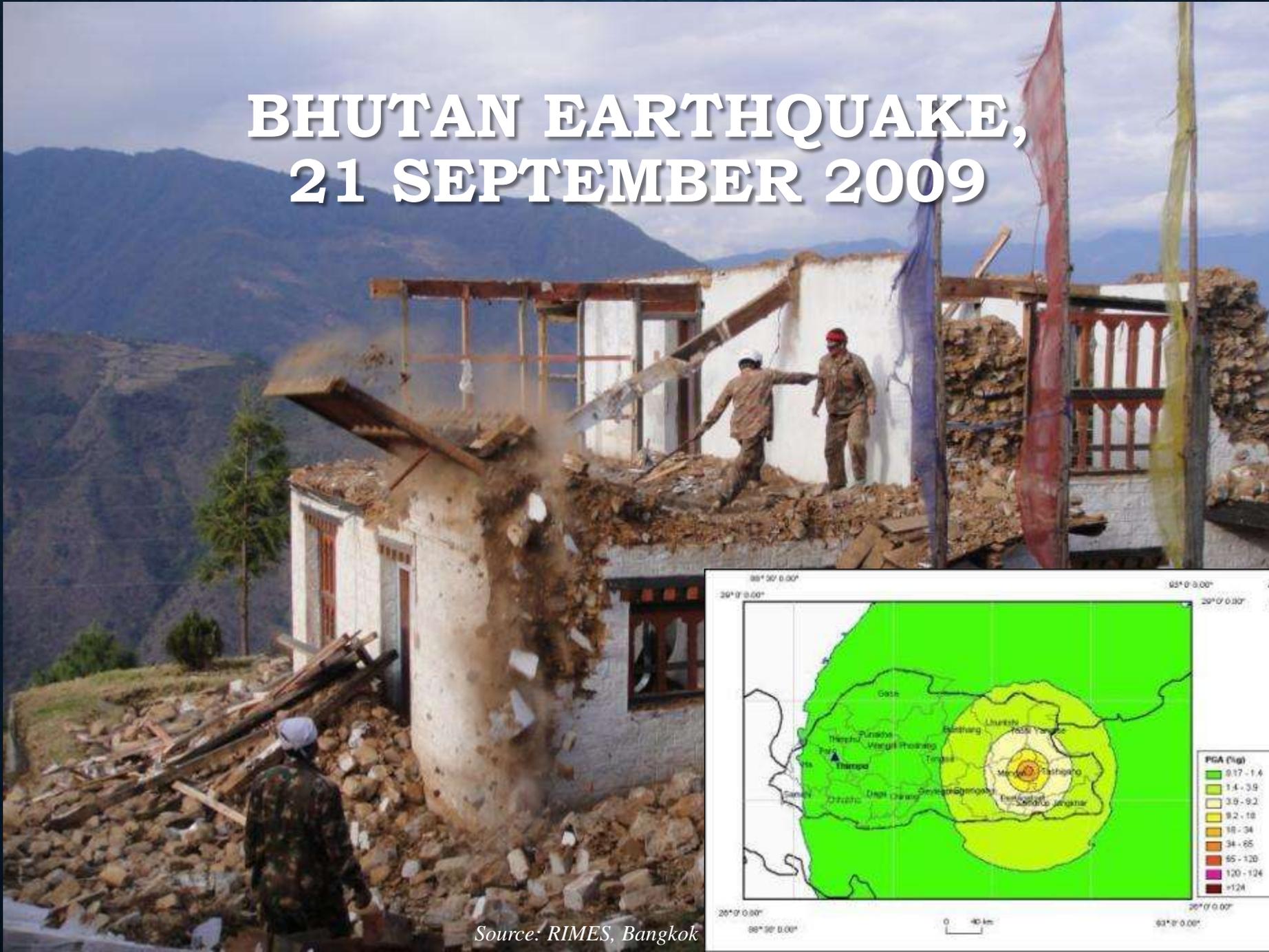
- Why should we do damage & risk assessment?
- How should we do damage & risk assessment?
- When should we do damage & risk assessment?
- Who should do damage & risk assessment?

# RISKS TO HISTORIC BUILDINGS / MONUMENTS DURING EMERGENCY RESPONSE



Destruction of Cultural Heritage more by demolition than by Earthquake during Emergency response

# BHUTAN EARTHQUAKE, 21 SEPTEMBER 2009



Source: RIMES, Bangkok

# Figure of damages

	<b>Lhakhang (Temple)</b>	<b>Dzong (Fortress)</b>	<b>House</b>	<b>Government Institutions</b>
<b>Beyond Repairs</b>	37	0	446	13
<b>Major Repairs</b>	95	2	1017	31
<b>Partial Repairs</b>	100	3	1750	59
<b>Minor Repairs</b>	52	2	1382	56
<b>Total</b>	284	7	4595	159



# DAMAGE ASSESSMENT FOR HERITAGE BUILDINGS

- The criteria/principles for damage assessment of engineered structures in brick and concrete can not be applied to historic and vernacular structures.



# SURVEY OF HERITAGE BUILDINGS FOLLOWING PADANG EARTHQUAKE, INDONESIA IN SEPTEMBER 2009

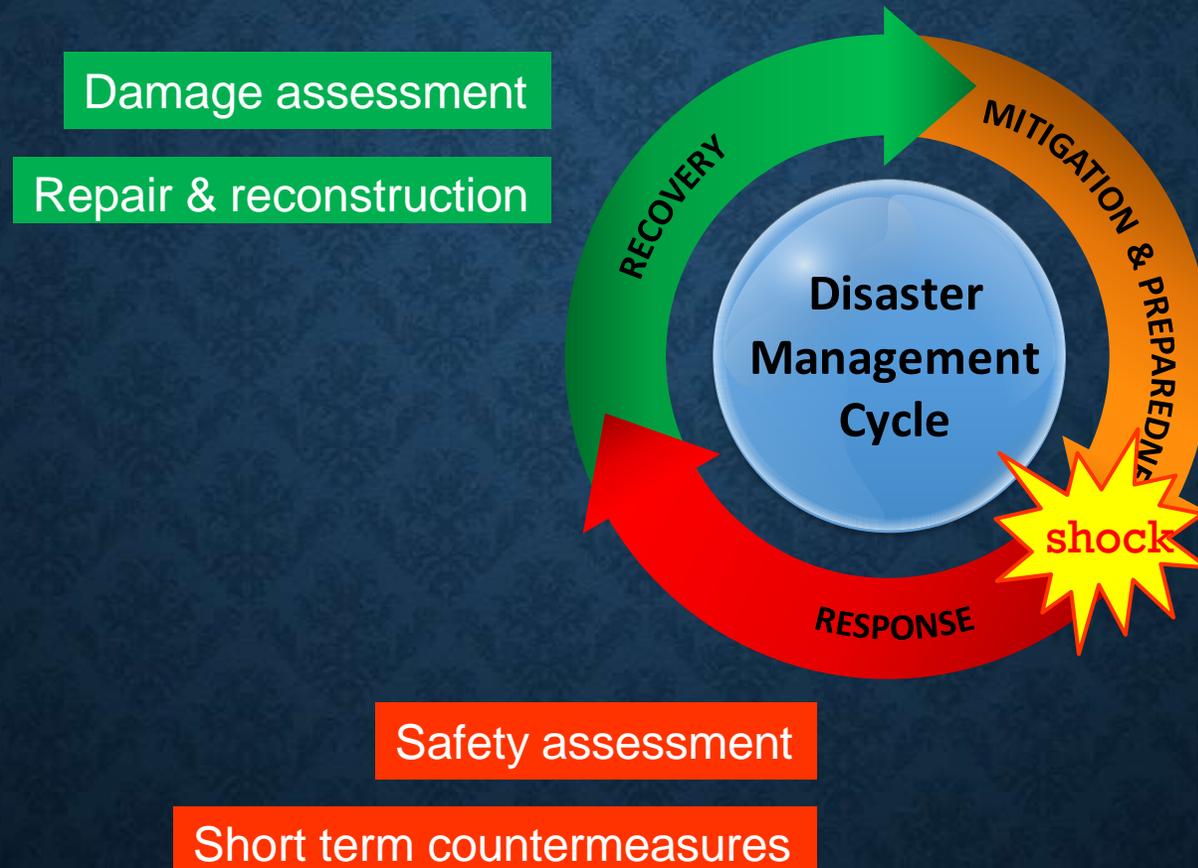




Photo during the mission

Photo by BP3





## *Preliminary concepts*

**Post-event safety inspection** is a technical activity performed after the event (earthquake, flood, fire, etc) to classify buildings according to their possible use in the short term

**Post-event damage assessment** is a technical activity performed after the event (earthquake, flood, fire, etc) to classify buildings according to their damage (physical, economic, ...)

The assessment/inspection usually involves a building-by-building survey

The objectives of the safety assessment are the **same across countries**

The objectives of the damage assessment **can be different from country to country**, and some countries do not perform it systematically (only on a case-by-case situation)



**Damage assessment records the extent of damage, what can be replaced, restored, or salvaged, and time required for the execution.**

Read more:

<http://www.businessdictionary.com/definition/damage-assessment.html#ixzz29QSwufl>

Given the (historical, social, economic, etc) importance of cultural heritage and historical constructions, the damage assessment can be performed in two stages with different but interconnected objectives:

- **Stage I** – Preliminary damage assessment immediately following the event: the available time for the damage assessment is limited; only general data about the extent of the physical damage can be collected
- **Stage II** – Detailed damage assessment *some time* after the event: the available time for the damage assessment is larger; detailed data about the physical damage can be collected in order to decide on the repair/reconstruction/restoration solution

- Stage I – Preliminary damage assessment immediately following the event: the available time for the damage assessment is limited; only general data about the extent of the physical damage can be collected



Emergency stabilization measures?



If yes, try to integrate them in



- Stage II – Detailed damage assessment some time after the event: the available time for the damage assessment is larger; detailed data about the physical damage can be collected in order to decide on the **repair/reconstruction/restoration solution**

From Assessing Damages to Assessing Risks

The Concept of Risk

**FROM PRESENT TO FUTURE**

# WHY UNDERTAKE RISK ASSESSMENT

- For making an informed judgment on nature of risks to the cultural heritage site during pre-disaster, emergency and post-disaster phase.
- For assessing the level /extent of risk.
- For prioritizing actions for risk mitigation.
- Risk Assessment helps in setting up the Goals of your Disaster Risk Management Plan
- Risk Assessment is not one time but a periodic process

# RISK ASSESSMENT BASED ON SITUATION ANALYSIS

- What are the potential hazards?
- What are physical, social, economic, institutional and attitudinal vulnerabilities?
- What is exposed to risks?
- Who are exposed to risks?
- What can be potential short and long term risks?

# CONDITION ASSESSMENT



# RISK ASSESSMENT

## AGENTS

DISASSOCIATION

DISINTEGRATION

LIGHT

TEMPERATURE

HUMIDITY

PEOPLE

DAMPNESS

DUST/POLLUTANTS

VIBRATION

## UNDERLYING CAUSES

INADEQUATE DISPLAY

IMPROPER MAINTENANCE/  
MONITORING

IMPROPER DISPLAY

VANDALISM

WEATHERING

INAPPROPRIATE  
LOCATION

SECURITY

IMPROPER TREATMENT

## HAZARDS

WATER

FIRE

COOKING

THEFT&VANDALISM

BIOLOGICAL

LIGHT

SPECIAL EVENTS

POLLUTANTS

VIBRATION

## VULNERABILITY FACTORS

CORROSION

DAMPNESS

ELECTRICAL

COOKING

MAINTENANCE

BIOLOGICAL FACTORS

IMPROPER LOCATION

CHEMICALS

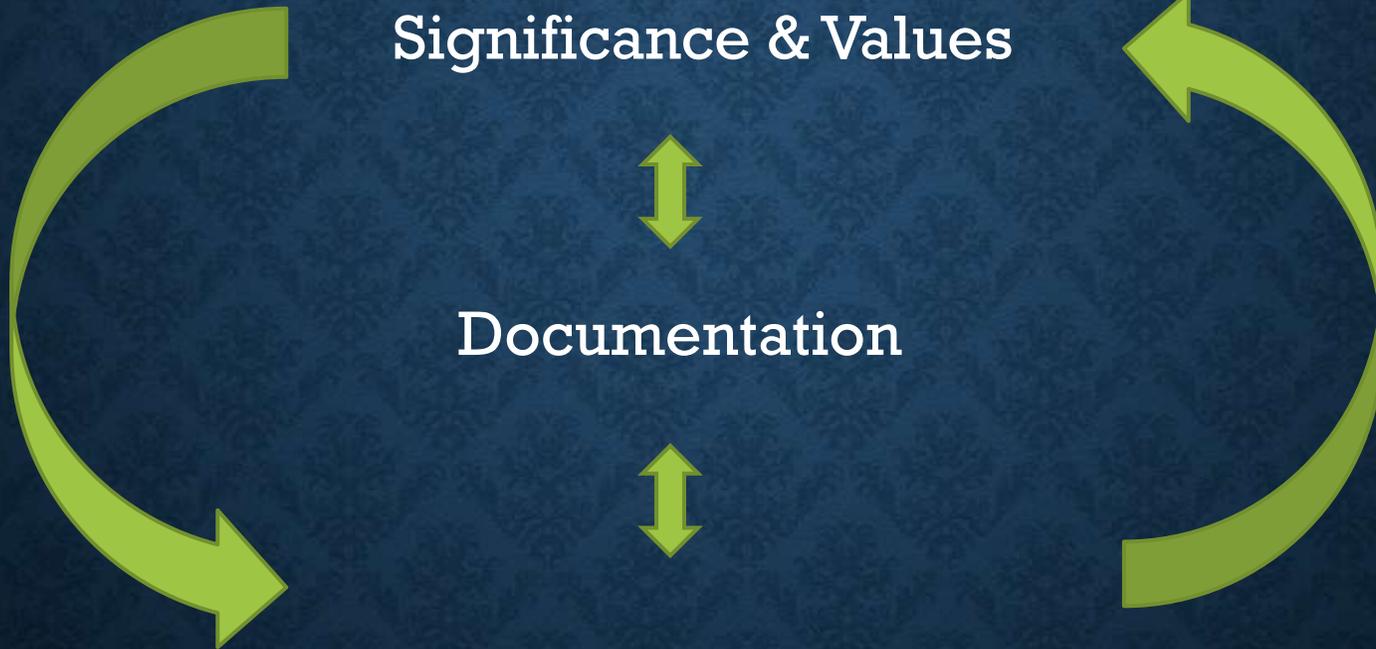
Assessment of Heritage  
Significance & Values



Documentation



Damage and Risk Assessment



# What do we need to carry out a damage & risk assessment?

Prior knowledge of the heritage- building, collections, documentation

Trained people to make context specific tools for assessing damage

Basic resources

## HOW TO DO IT?

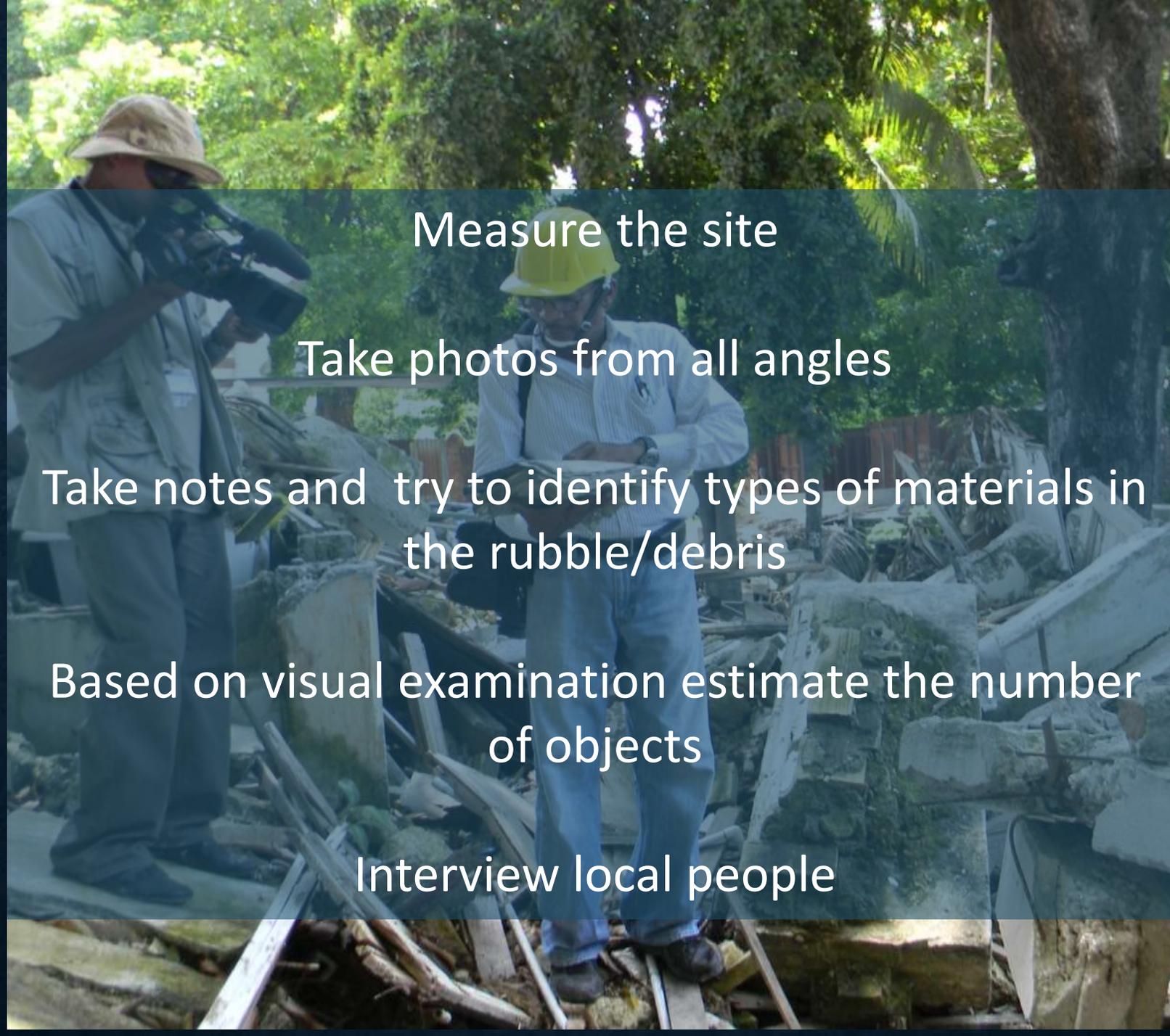
Damage is measured in physical terms

Extent of damage= Treatment required e.g. preventive, minor, major= TIME , RESOURCES=MONEY

**TOOLS FOR ASSESSING DAMAGE  
& RISKS TO CULTURAL HERITAGE  
DURING EMERGENCY SITUATION**

# DAMAGE ASSESSMENT FORMS

- Damage assessment forms are usually **developed based on damage data from past events**; they **facilitate damage collection and identification** by focussing on the **more relevant impacts of a certain hazard** on a certain construction type
- Damage data collected in these forms allows defining an **intervention priority list** and the type of **specific emergency measures** that may be needed (**outputs of Stage I**)
- Data collected from the damage assessment can later be used for **damage and risk modelling**, to **improve prediction models**, to justify the development of risk mitigation policies or campaigns



Measure the site

Take photos from all angles

Take notes and try to identify types of materials in the rubble/debris

Based on visual examination estimate the number of objects

Interview local people

# ON SITE SURVEY & INITIAL ASSESSMENT REPORT

- Short description of the event and its likely causes
- Damage caused-type of damage, degree and location (photo, map)
- Risks-immediate and short-term
- Priorities for intervention-immediate security and stabilization actions
- Resources needed-human, financial, technical, institutional support

# WHAT SHOULD BE THE CRITERIA FOR MAKING DAMAGE & RISK ASSESSMENT?

- The nature of cultural heritage in terms of its materials and construction systems.
- Considerations of values vis-à-vis safety of people and personal safety
- What kind of human and financial resources are available for undertaking assessment?
- What kind and level of documentation is available from before the disaster and where is it located?
- What kind of tools and methods are available for undertaking the assessment?

- How much time is at disposal for undertaking assessments to have an impact on ground?
- Who will undertake these assessment and what is the level of training to undertake such assessments?
- What are the institutional systems and policies available for utilizing these assessments for taking decisions on repairs and restoration vis-à-vis demolition and reconstruction.
- What are the legislations for protection of cultural heritage?

# THINGS TO KEEP IN MIND FOR COLLECTIONS

## 4. Objects damaged:

- Which types of objects/materials are involved?
- How long have items been wet? Buried under debris

## 5. Would we need additional personnel to complete damage assessment?

## 6. Equipment and supplies needed:

- For mitigation operation
- For more detailed documentation of damage
- For move of collections to a safe location

# Form for Damage Assessment

Prepare Damage Assessment Forms suited to your context in advance of an emergency incident to record:

Location

Owner

Approximate number

Damage in terms of treatment required i.e. major, minor, preventive and additional on-site cleaning/stabilization

Is it safe to leave the objects as they are or if immediate action is needed to secure them

# THINGS TO KEEP IN MIND

Services needed:

- Will there be need for a clean up or alternate storage site?
- Will there be need for transportation to an alternate site?
- Will conservators need to be called in?



**PERSONAL SAFETY COMES FIRST**