सत्यमेव जयते

NATIONAL DISASTER MANAGEMENT GUIDELINES

Cultural Heritage Sites and Precincts

September 2017

NATIONAL DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF INDIA

National Disaster Management Guidelines

Cultural Heritage Sites and Precincts

National Disaster Management Guidelines for Cultural Heritage Sites and Precincts

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प्रधान मंत्री

Prime Minister

MESSAGE

I am happy to know that the National Disaster Management Authority is celebrating its 13th formation day on 28th September, 2017.

From its inception, the NDMA has been faithful to its visions and has been continuously trying to build a safer and resilient nation. It has been successful in facilitating a culture of disaster prevention and preparedness through holistic partnership with all the stakeholders in ensuring safety. Its proactive responses inrescue and relief operations have been appreciated on many occasions.

It is appreciable that the NDMA is releasing important guidelines related with Heritage Safety and Boat Safety on the occasion of the Formation Day. I hope that the new guidelines will empower all the associated stakeholders in preparing themselves with their own disaster risk management plans.

Best wishes to everyone associated with the NDMA on this occasion for all their future endeavours prioritizing the safety of our citizens.

(Narendra Modi)

New Delhi
22 September, 2017

राजनाथ सिंह
RAJNATH SINGH

सत्यमेव जयते

गृह मंत्री
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नई दिल्ली-110001
HOME MINISTER
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MESSAGE

It is heartening to note that National Disaster Management Authority (NDMA) has undertaken an exercise on preparing National Disaster Management Guidelines for Cultural Heritage Sites and Precincts. I am sure this document, which is concise and informative would enable the Planners and Professionals to address and manage the cultural heritage in our country more effectively.

I am pleased to note that this document aligns itself with the Sendal Framework for Disaster Risk Reduction 2015-2030 and links to both national and international approaches, focusing on disaster risk reduction and an integrated approach towards management of risks. I congratulate National Disaster Management Authority for bringing out these guidelines for preserving our cultural heritage.

20.09.17

(Rajnath Singh)

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MOS/Home(R)/1097708/146/2017

किरेन रीजीजू
KIREN RIJIJU

गृह राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HOME AFFAIRS
GOVERNMENT OF INDIA

21 SEP 2017

MESSAGE

Disaster risk management in India has undergone a paradigm shift in recent decades moving from a purely reactive, relief-based approach to a proactive approach that aims to prevent the creation of new risks and reduce existing risks by implementing mitigation measure.

I am personally deeply interested in the cause of disaster risk reduction, so it is with great pleasure that I acknowledge the consistent efforts made by National Disaster Management Authority in laying out the frameworks for disaster management across India. The Authority has issued a series of guidelines on different aspects of Disaster Risk Mangement, and has now extended this work to address the specific challenges faced by our cultural heritage sites and precincts.

Cultural heritage is an invaluable resource for India and needs to be protected for future generations. It is a central aspect of shaping India's identity and brings together the rich histories of its people. At the same time, cultural heritage is increasingly threatened by disaster risks, and hence, risk reduction needs to be prioritized. This document is a seminal step in this direction and addresses different aspects of risk reduction with respect to cultural heritage sites and precincts. It references the latest international frameworks, including the Sendai Framework for Disaster Risk Reduction 2015-30, while being situated firmly within the existing legislative and institutional context at a national level.

I have full confidence that these Guidelines will provide facilitation to concerned Ministries and Government Bodies as well as independent stakeholders and professionals in ensuring that cultural heritage sites and precincts acros India are disaster resilient and adhere to the highest standards of safety. I appreciate the efforts made by National Disaster Management Authority and urge all stakeholders to work together for protection of our cultural heritage.

(Kiren Rijiju)

20th September, 2017
New Delhi.

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राष्ट्रीय आपदा प्रबंधन प्राधिकरण
National Disaster Management Authority
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Government of India

सत्यमेव जयते

Foreword

The preparation of guidelines which address different aspects of disaster risk management, whether they are hazard or institution based, is an integral part of the mandate of National Disaster Management Authority (NDMA). Within this mandate, it was decided to undertake the process of developing National Disaster Management Guidelines for Cultural Heritage Sites and Precincts, in 2015. A Core Committee comprising of cultural heritage experts, representatives of concerned ministries, non-government organisations, institutions and other stakeholders was formed as one of the first steps in this process. The scope of these guidelines and the legal framework within which they would be implemented were issues that were discussed over several core committee meetings and discussions. An initial exercise on identifying specific issues that concern disaster risk management in heritage sites and precincts was carried out over the course of six months in order to inform the structure of the Guidelines document.

The central purpose of these guidelines is to serve as a template for cultural heritage sites and precincts to develop their own disaster risk management plans and strategies through risk assessment, risk reduction measures, preparedness and emergency response measures and planning for post-disaster recovery. Basic methodologies for each aspect of disaster risk management are summarised for the benefit of policy makers as well as site managers and professionals.

The Draft Guidelines were prepared after a series of meetings and consultations and circulation of the initial drafts among the Core Committee Members for their expert review and inputs. After updating the document, the Guidelines were disseminated for wider consultation. The Guidelines are a dynamic document that will be updated on a regular basis, incorporating practical experience with international discourse on the subject. We take this opportunity to express our deep appreciation of the commitment of various stakeholder groups who extended their willing support and cooperation to our efforts. We are grateful to the members of the Core Committee for their suggestions and support.

Shri Kamal Kishore
Member, NDMA

Dr. D.N. Sharma
Member, NDMA

Lt. Gen. N.C. Marwah (Retd.)
Member, NDMA

Shri R.K. Jain, IAS (Retd.)
Member, NDMA

Acknowledgements

I would like to acknowledge the contributions of all the expert members of the Core Group, which have shaped the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts. This document is the outcome of an extensive process of consultation, carried out through meetings, informal feedback sessions and a long dialogue among professionals, experts and stakeholders concerned.

On behalf of NDMA, I would like to express our sincere gratitude to the representatives of the Ministries and Departments concerned, particularly, Dr. R.S. Jamwal (Director-Conservation, Archaeological Survey of India), Shri Navneet Soni (Member Secretary, National Monuments Authority) and Shri D.K. Garg (Chief Engineer, CDO, Central Public Works Department). I would like to thank Shri R. K. Singh (Joint Director, National Institute of Disaster Management), Dr. Arun Menon (Assistant Professor, Department of Civil Engineering, Indian Institute of Technology, Madras), Dr. Priyaleen Singh (Head of Architectural Conservation, School of Planning and Architecture, Delhi) and Shri Divay Gupta (Principal Director, Architectural Heritage Division, Indian National Trust for Arts and Cultural Heritage) who provided invaluable institutional support as well as professional expertise.

Dr. G.C. Misra (Director, Delhi Fire Service) and Shri Virendra Bangroo (Assistant Professor, Indira Gandhi National Centre for Arts) offered valuable insights and suggestions. Eminent professionals such as Dr. Rohit Jigyasu (UNESCO Chair Professor, R-DMUCH, Ritsumeikan University, Kyoto) and Aparna Tandon (Project Specialist, International Centre for the Study of the Preservation and Restoration of Cultural Property, Rome), helped shape the technical aspects of the document.

This exercise has been spearheaded by Shri R.K. Jain (Member, NDMA) and Shri Kamal Kishore (Member, NDMA) who have pursued this initiative for over two years and ensured its timely completion. Members Lt. Gen. N.C. Marwah and Dr. D.N. Sharma provided valuable inputs and encouragement and actively participated in the various Committee Meetings.

The writing of this document was anchored by Ms. Vanicka Arora, (Consultant-Heritage Management, NDMA) who worked assiduously incorporating inputs from a wide range of stakeholders. Dr. Pavan Kumar Singh (Senior Research Officer, NDMA), Smt. Alice Kujur (Deputy Secretary, NDMA) and Shri Pankaj Kumar (Under Secretary, NDMA) provided administrative support and coordinated inputs from stakeholders. Student interns Anurag Shinde, Jekulin Lipi Saikia and Shashank Chaudhary,

from Jamsetji Tata School of Disaster Studies (Tata Institute of Social Sciences, Mumbai) carried out documentation and research to support the Guidelines. Various staff members of the Policy and Planning Division at NDMA have been instrumental in facilitating the preparation of the guidelines for which I am grateful.

Dr. V. Thiruppugazh,
Joint Secretary (Policy and Plan), NDMA

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Abbreviations and Organisations

ASI:	Archaeological Survey of India
BMTPC:	Building Materials and Technology Promotion Council
DDMA:	District Disaster Management Authority
ICCROM:	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICOM:	The International Council of Museums
ICOMOS:	International Council on Monuments and Sites
INTACH:	Indian National Trust for Arts and Cultural Heritage
MoC:	Ministry of Culture
MoT:	Ministry of Tourism
MoRD:	Ministry of Rural Development
MoUD:	Ministry of Urban Development
NDMA:	National Disaster Management Authority
NIDM:	National Institute of Disaster Management
NMA:	National Monuments Authority
OUV:	Outstanding Universal Value
SDMA:	State Disaster Management Authority
UN:	United Nations
UNESCO:	United Nations Educational Scientific Cultural Organisation
UNESCO WHC:	UNESCO World Heritage Centre
UNISDR:	United Nations International Strategy for Disaster Reduction

Executive Summary

The underpinning vision of the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts is to ensure that places of cultural significance are safe and secure for the people that engage with them and that the heritage values they embody are conserved for future generations. The primary objective of this document is to integrate the specific needs of cultural heritage within the framework of disaster risk reduction.

These guidelines lay out the basic framework for various Ministries and Departments as well as other actors that are responsible for the management of cultural heritage sites and precincts. The central objective is to lay out the broad frameworks within which stakeholders can develop disaster risk management strategies. The guidelines are structured on the basis of the disaster risk management cycle. These guidelines are not a substitute for site specific management plans, and only set out the requirements- both physical and institutional that stakeholders should fulfil in order to reduce disaster risks to cultural heritage sites and precincts in general.

The first chapter introduces cultural heritage sites and precincts in India and summarises their diversity and typologies. It outlines some of the specific issues they face with respect to disaster risks and the increasing threat to their heritage value. It also describes the existing frameworks and legislations in place for the protection and management of heritage sites and precincts and sets out the aims and objectives of the guidelines.

The second chapter focuses on identification of hazards and vulnerabilities and carrying out risk assessment for cultural heritage sites and precincts. It looks at multiple scales of sites as well as different aspects of vulnerability and exposure. A brief summary on creating disaster risk scenarios and evaluating the potential impact of these risks in order to prioritise action is also provided.

Chapter three discusses approaches and processes involved in disaster risk prevention, reduction and mitigation, linking back to the previous chapter. It lays out indicative actions for each aspect of reducing disaster risks, through interventions at multiple levels. The fourth

chapter looks at planning for emergency preparedness and response for heritage sites and precincts, outlining approaches for evacuation of people as well as temporary stabilisation procedures. It highlights the possible composition of an emergency response team distributing roles and responsibilities according to the resources available.

The fifth chapter describes post-disaster assessment, recovery and rehabilitation processes. It outlines the basic procedures for documentation and assessment of sites and buildings, emergency stabilisation procedures and considerations for temporary protection. It also highlights the importance of setting up a business plan for recovery and linking rehabilitation with risk reduction.

Chapter six outlines the various kinds of training modules and programmes for raising awareness and building expertise at an institutional level. Finally, chapter seven contains a summary of actions that should be implemented by various ministries and institutions as part of the implementation strategy of these guidelines. Chapters 2, 3, 4, 5 and 6 are accompanied by indicative checklists as part of the annexures. The bibliography and resource section lists a series of manuals and general reference material that is meant to assist heritage managers in their planning endeavours.

These guidelines should be viewed as a template, and not as a substitute, for stakeholders of cultural heritage sites and precincts to develop their own disaster risk management plans and strategies by conducting risk assessment exercises, adopting risk reduction measures, emergency response measures and planning for post-disaster recovery.

It is strongly recommended that the framework and actions that have been set out within this document are approached in a systematic and timely manner to ensure the safety and security of cultural heritage sites and precincts for the people that engage with them as well as the values that they embody.

Glossary of Terms

Acceptable risk: The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.

Capacity: The combination of all the strengths, attributes and resources available within a community, society or organisation that can be used to achieve agreed goals.

Capacity development: The process by which people, organisations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through the improvement of knowledge, skills, systems and institutions.

Climate change: (a) The Inter-governmental Panel on Climate Change (IPCC) defines climate change as: "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due, to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use". (b) The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Conservation: All efforts designed to understand cultural heritage, know its history and meaning, ensure its material safeguard and, as required, its presentation, restoration and enhancement (ICOMOS, 1994).

Concerned with the transmission of cultural heritage, with its significant values intact and accessible to the greatest degree possible (Getty Conservation Institute, 2008).

Cultural heritage: Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values. Cultural Heritage is often expressed as either Intangible or Tangible Cultural Heritage (ICOMOS, 2002).

According to UNESCO WHC,

Cultural heritage is understood to include monuments, groups of buildings and sites of cultural value as defined in article one of the World Heritage Convention.

Article 1

For the purposes of this Convention, the following shall be considered as `cultural heritage':

monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;

groups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science;

sites: works of man or the combined works of nature and of man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological points of view (UNESCO 1972).

Cultural significance: Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups. (ICOMOS Australia, 1994)

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.

Exposure: The presence and number of people, property, livelihoods, systems or other elements in hazard areas (and so thereby subject to potential losses) is known as exposure.

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.

Hazard List (Hazards which may impact cultural heritage sites and precincts)

- Avalanche: snow avalanche, snow slide
- Cold Wave: extreme weather, extreme temperature, cold temperatures

- Cyclone: hurricane, tropical storm, tropical depression, typhoon
- Earthquake: seismic, tectonic
- Fire
- Flood: inundation; includes: flash floods
- Heat Wave: extreme weather, extreme temperature, high temperatures
- Insect Infestation
- Land Slide: debris flow, mud flow, mud slide, rock fall, slide, lahar, rock slide and topple
- CBRN (Chemical, Biological, Radiological and Nuclear): biohazard risk, chemical contamination, nuclear radiation risk
- Storm Surge: coastal flood, wave surge, wind setup
- Technical Disaster: chemical spill/leak, explosions, collapses, gas leaks, urban fire, oil spill, technical failure
- Tornado: waterspout, twister, vortex
- Tsunami
- Volcano: crater, lava, magma, molten materials, pyroclastic flows, volcanic rock, volcanic ash
- Wild Fire: bush fire, forest fire, uncontrolled fire, wildland fire

Mitigation: The lessening or limitation of the adverse impacts of hazards and related disasters.

Museum: A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.

Natural hazard: Natural process or phenomenon 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.

Preparedness: The knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Prevention: The outright avoidance of adverse impacts of hazards and related disasters.

Public awareness: The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Reconstruction: Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric. (ICOMOS Australia 1994)

Restoration: The process of restoration is a highly specialised operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents. It must stop at the point where conjecture begins, and in this case moreover any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp. The restoration in any case must be preceded and followed by an archaeological and historical study of the monument. (ICOMOS, 1964)

Risk: The combination of the probability of an event and its negative consequences.

Risk assessment: A methodology to determine the nature and extent of risk by analysing 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. *Comment:* 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.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Value: The positive characteristics attributed to heritage places and objects by legislation, governing authorities, and/or other stakeholders. These characteristics are what make a site significant, and they are often the reason why society and authorities are interested in a specific cultural site or object. In general, groups within society expect benefits from the value they attribute to the resource (GCI, 2004).

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

World Heritage Property: World Heritage properties are those defined in Articles 1 and 2 of the World Heritage Convention and inscribed on the World Heritage List on the basis of their outstanding universal value, which is fulfilled through meeting one or more of criteria (i)–(x) in the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO / WHC, 2008a).

According to the Handbook of Conservation of Heritage Buildings prepared by the Central Public works Department in 2013,

"Heritage building" means and includes any building of one or more premises or any part thereof and/or structure and/or artefact which requires conservation and/or preservation for historical and/or architectural and / or artisanary and/or aesthetic and/or cultural and/or environmental and/or ecological purpose and includes such portion of land adjoining such building or part thereof as may be required for fencing or covering or in any manner preserving the historical and/or architectural and/or aesthetic and/or cultural value of such building.

"Heritage Precincts" means and includes any space that requires conservation and/or preservation for historical and/or architectural and/or aesthetic and/or cultural and/or environmental and/or ecological purpose. Walls or other boundaries of a particular area or place or building or may enclose such space by an imaginary line drawn around it.

"Early warning system" – The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organisations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

1 Introduction

1.1 Cultural Heritage Sites and Precincts in India

The scope of heritage is vast and multi-faceted and is identified and categorised in multiple ways at a national and international level among various stakeholder groups. Broadly, heritage falls under the categories of natural and cultural heritage. India has a vast repository of cultural heritage, which varies significantly in historicity, scale, association, expression and styles. However, large swathes of this cultural heritage are currently unidentified and unprotected. The heritage that has been officially identified and is under legislative protection by various agencies is also constantly under multiple threats, both natural and man-made.

Tangible heritage includes **buildings and historic places, monuments, artefacts,** etc., which are considered worthy of preservation for the future. These include objects significant to the archaeology, architecture, science or technology of a specific culture (UNESCO 1972) . Tangible and intangible cultural heritage are closely interlinked.

The highlighted portion indicates the scope for this guidelines document. The guidelines will address the specific concerns and challenges presented by cultural heritage sites thus defined. These will include the following identified categories:

1. Archaeological sites and remains
2. Monuments and sites of historic, artistic, religious and cultural significance

---

1972, UNESCO Convention (World Heritage) Convention concerning the protection of the World Cultural and Natural Heritage, adopted in Paris, 16 November 1972 (§ 1, 4, 5) 1.

> *For the purposes of this Convention, the following shall be considered as 'cultural heritage': Monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science; groups of buildings; groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; sites: works of man or the combined works of nature and of man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological points of view.*

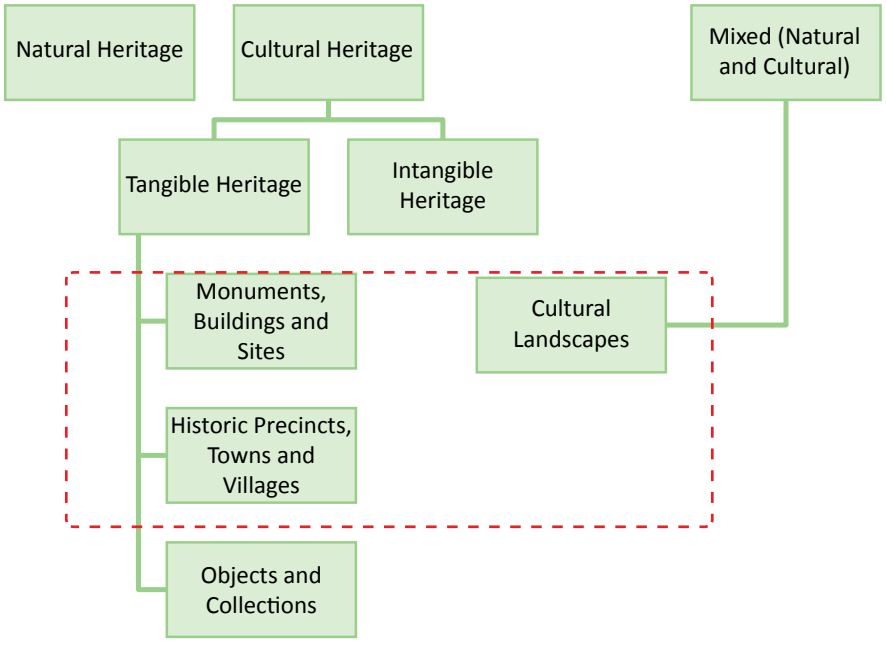

Fig. 1 Scope of cultural heritage sites and precincts

3. Historic precincts, towns, cities and villages that have significance as an ensemble. These may be categorised as cultural landscapes as well
4. Traditional and vernacular buildings that represent a significant cultural practice or tradition

The central authority that is entrusted with the identification, protection and management of sites of historic and cultural significance (and objects of cultural significance) in India is the Archaeological Survey of India (ASI) under the Ministry of Culture. It operates through its State Circles, Museums, Excavation Branches, Prehistory Branch, Epigraphy Branches, Science Branch, Horticulture Branch, Building Survey Project, Temple Survey Projects and Underwater Archaeology Wing. It functions under the provisions of the AMASR Act, 1958. Over 3683 sites have been identified as Centrally Protected Monuments and Sites.

Furthermore, states have their individual legislative acts and have State identified monuments and sites. They may also have special notified areas under State Acts. Additionally, the Master-plans of several cities identify special heritage precincts, notified areas etc. which are controlled through the city administration. Therefore, the legal ambit for built cultural heritage in India varies significantly depending upon its jurisdiction.

In addition to the monuments and sites under the aegis of ASI and State Archaeological Departments, a total of 36 sites have been inscribed as UNESCO World Heritage Sites in India as of 2016-17. These include sites with Outstanding Universal Value and are a mixture of

Natural and Cultural Heritage Sites. Several of these sites are also Centrally or State Protected monuments. An inscription onto the UNESCO World Heritage List is monitored and evaluated by the international community of conservation professionals, under the UNESCO World Heritage Convention (1972) and Operational Guidelines.

In addition to these lists, the Indian National Trust for Arts and Cultural Heritage (INTACH), established in 1984 also carries out listing for unprotected buildings of archaeological, architectural, historic and aesthetic significance. INTACH through its various state chapters has listed thousands of unprotected heritage structures all over India and documented heritage precincts and settlements as well.

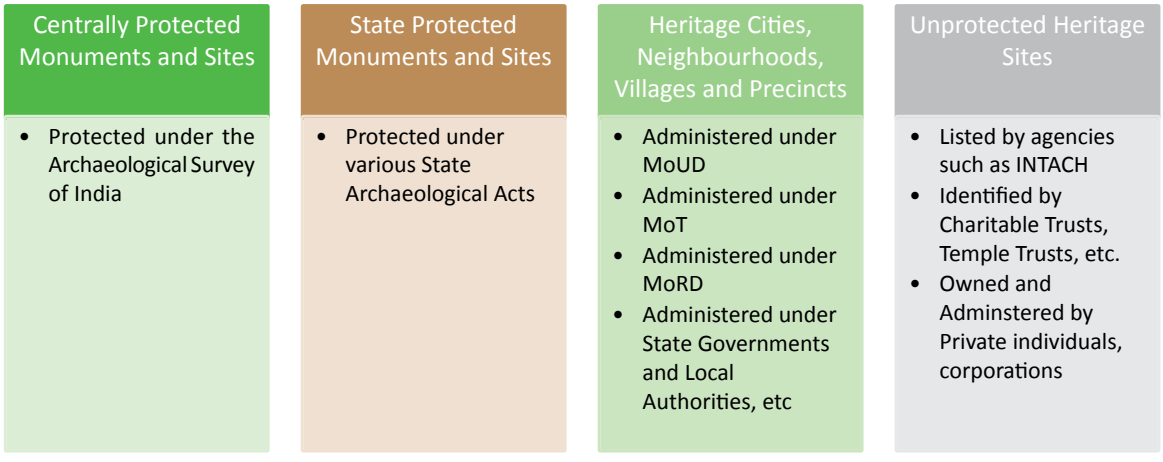

Fig. 2 Overview of cultural heritage sites and precincts

1.1.1 Heritage Values/ Cultural Significance

Heritage Values may contribute directly or indirectly to the economics of the cultural heritage site, generating income through avenues such as tourism, education, recreation, etc. Exact quantification of heritage values in terms of economic capital is a complex process, nevertheless strong relationships between heritage sites and local economies can be found across the country. Thus, while assessing disaster risks to heritage sites, it is essential to consider the potential impact of a disaster to contributors of heritage value. Heritage value also contributes to shared memory and local, regional and national identities, which play a crucial role towards recovery after a disaster.

The critical point of difference when planning for disaster risk reduction for sites of cultural heritage is to address the threats not only to lives and livelihoods associated with the site, directly or indirectly, but also to the heritage values embodied by the site. These values may be represented by the physical fabric of the site, such as its architectural or artistic features,

or may be represented by its usage. In either case, standardised approaches towards disaster risk reduction may conflict with the protection of these values, so it important to document, evaluate and prioritise them.

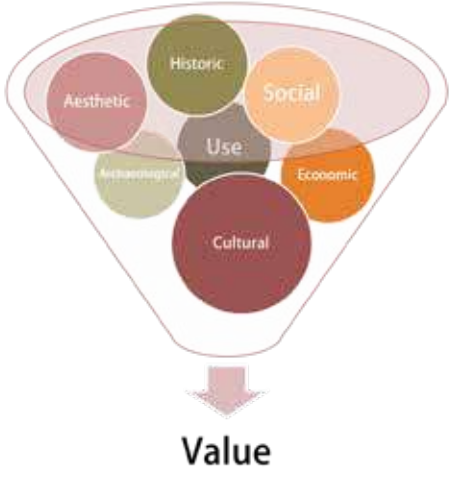

Fig. 3 Aspects of heritate value

Furthermore, given that cultural heritage sites may also contribute towards mitigating the impact of disasters, due to their planning, construction technologies, association with local stakeholders and so on, they may be approached as potential assets in the overall planning for disaster risk management at the scale of neighbourhood, precinct or city.

Furthermore, the scale of heritage value is also an important factor to consider its contribution. The overall value of cultural heritage sites and precincts may be of significance at the following scales:

1. ***Global:*** For instance, UNESCO World Heritage Sites are of Outstanding Universal Value according to a series of criteria established internationally through the UNESCO World Heritage Convention of 1972
2. ***National:*** For India, sites of national significance are recognised by the ASI. Historic cities and urban precincts are also recognised by Ministry of Urban Development
3. ***Regional:*** State Departments of Archaeology, INTACH State Chapters, Master Plans identify regional heritage sites. The Ministry of Tourism, Ministry of Rural Development have also designated some areas and sites at regional level
4. ***Local:*** INTACH, Non-government organisations, local municipal bodies may identify heritage sites that are locally important

Cultural heritage sites can have overlapping significance, such that they may hold different kinds of heritage value to different stakeholders at different scales.

1.1.2 Typologies for Cultural Heritage Sites

In order to better understand the potential risks to heritage sites; it is important to have a holistic understanding of the range of cultural heritage sites in the country. For the purposes of assessing risk, heritage sites in India may be broadly classified based on the following criteria:

1. Ownership and Management
2. Scale
3. Archaeological or Architectural Typology
4. Usage
5. Significance

1.2 Disasters and their Impact on Cultural Heritage Sites and Precincts

The frequency of disasters and their consequent impact to lives, property and livelihoods has seen an unprecedented rise in recent years (UNISDR 2009). A rapidly urbanising world, increasing population, climate-change etc. have increased the vulnerability of nations, especially developing countries such as India.

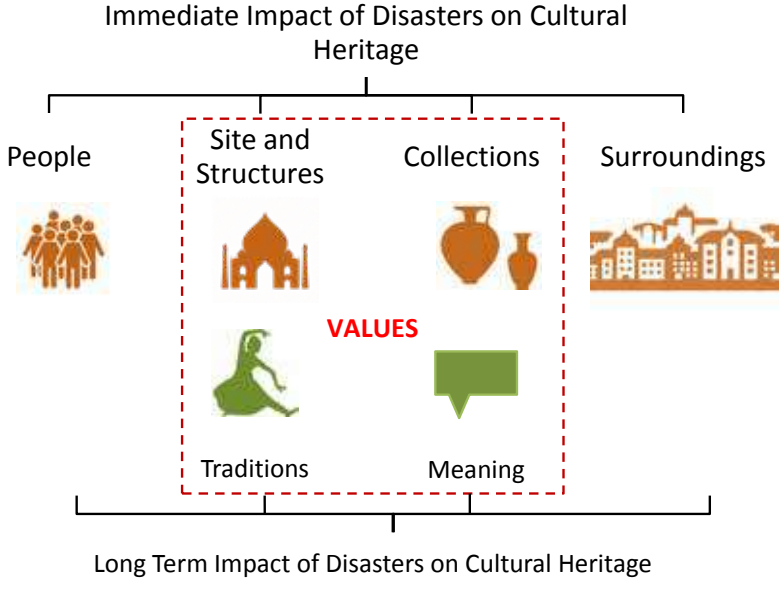

Fig. 4 Impact of disasters on cultural heritage

The impact of disasters on cultural heritage over the past few years in our country has been particularly severe. For instance, the Bhuj Earthquake in 2001 caused wide-spread devastation to both rural and urban settlements including many nationally and state protected monuments

as well as vernacular buildings. The Bhuj City Palace, the commemorative *chatri*s (cenotaphs), suffered extensive damage due to the earthquake. Similarly, in 2011, the Sikkim Earthquake destroyed many Buddhist monasteries and temples. Flash-floods in the lower Himalayas in 2013 and the Kashmir Floods in 2014 caused wide-spread damage to temples, palaces, historic gardens and museums.

The frequency of such events is also increasing due to unsustainable human activity and its impacts on ecosystems and the environment. Events of armed conflict, terrorism, vandalism are also being reported from all corners of the world. Cities under siege are often attacked through the destruction of their built cultural heritage. The recent events in Darjeeling where a UNESCO World Heritage site was attacked are just some examples of such actions in India.

Cultural heritage has only recently been recognised as a key aspect within overall frameworks of disaster risk reduction. A general lack of awareness and a lack of prioritisation of heritage is one of the key challenges in this area. Some critical aspects of disaster risk management for built cultural heritage are:

- Due to the diversity in age, scale and physical conditions of built heritage it is difficult to apply standardised approaches for disaster risk reduction
- Disasters pose a risk not just to the lives of people living, visiting or managing cultural heritage sites and precincts but also to heritage values embodied in the physical fabric
- Poor management, neglect, lack of awareness further complicate disaster risk reduction for built heritage as often the structural integrity of such buildings gets compromised over time
- Interventions that would reduce risk to such sites may sometimes pose a threat to the heritage value and aesthetics
- Built heritage may also offer the opportunity to act as refuge space or as examples of structural resilience using traditional technologies and this aspect may be useful while developing larger scale risk reduction strategies

Furthermore, in India built cultural heritage poses some specific challenges with respect to disaster risk management.

Aspect	Key Issues
Risk Assessment	Continuously updated information regarding cultural heritage sites and precincts available in a streamlined manner, specifically with respect to hazard mapping and identifying vulnerabilities
	Identification of stakeholders and local communities, and including them in the decision-making process
Risk Mitigation	Multiple agencies dealing with different aspects of the same site or precinct, leading to inter-agency coordination issues
	Historic cities, settlements and precincts have high densities of built fabric and infrastructure that have grown and transformed in an ad-hoc manner with little or no documentation
	Poor management, neglect and lack of awareness further complicate disaster risk reduction for built heritage since often the structural integrity of such buildings gets compromised over time
	Interventions that would reduce risk to such sites may sometimes pose a threat to the heritage value and aesthetics
Emergency Preparedness and Response	Complex contextual scenarios in terms of accessibility and connectivity
	Many "Living" heritage sites or sites that are actively in use are at greater risk because of high levels of visitor footfall
	Most 'standard' preparedness and response procedures are impossible to implement in cultural heritage sites without significantly impacting the values of the heritage site
Post-Disaster Recovery and Rehabilitation	Normative ideas of 'authenticity' of material fabric often conflict with ideas of reconstruction within the Indian (and South Asian) context
	Since a large percentage of built heritage is not identified in official lists, assessment of damage and losses in a disaster scenario is extremely problematic
	There is a close relationship between traditional arts, crafts and cultural practices and built heritage, but much of it is unaccounted for. With the loss of built heritage, intangible aspects of cultural heritage are also put at risk

Fig. 5 Key issues for disaster is management of cultural heritage sites

Recent approaches internationally, mark a shift towards the inclusion of cultural heritage as an aspect to be considered within the ambit of disaster risk management. In 2005, the *Hyogo Framework for Action* (UNISDR 2005) mentioned the potential role of 'traditional and

indigenous knowledge and cultural heritage' and the need to account for culture for disaster risk reduction processes. A decade later, the *Sendai Framework for Disaster Risk Reduction* (UNISDR 2015) shows the level of progress made in this area. It identifies the role of heritage in Priority Areas 1 and 3, and specifically highlights the need:

"To protect or support the protection of cultural and collecting institutions and other sites of historical, cultural heritage and religious interest;" (Priority 3, Action (d))

Furthermore, it is essential to recognise the role of cultural heritage and cultural institutions within the overall agenda for sustainable development. The United Nations 2030 Agenda firmly acknowledges the need to:

"Strengthen efforts to protect and safeguard the world's cultural and natural heritage" (Goal 11.4 - Make cities and human settlements inclusive, safe, resilient and sustainable). Our own national policy frameworks also mirror this shift in approach. The NDMA Policy (2009) also acknowledges the role played by indigenous knowledge systems in reducing risks to disaster and the need to emphasise on risk reduction for cultural heritage sites.

The recently drafted **National Policy for Conservation of The Ancient Monuments, Archaeological Sites and Remains** (ASI 2014) identifies disaster management as one of its concerns (Clause 15) and highlights some basic steps for disaster risk reduction for Centrally Protected Monuments and Sites.

1.3 Existing Legislative Frameworks- An Overview

1.3.1 Framework for Heritage Sites in India

"Any section of the citizens residing in the territory of India or any part thereof having a distinct language, script or culture of its own shall have the right to conserve the same"

(Article 29 of the Constitution)

"It shall be the obligation of the State to protect every monument or place or subject of artistic or historical interest, declared by or under law made by parliament, to be of national importance from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be"

(Article 49 of the Constitution)

"It shall be the duty of every citizen of India to value and preserve the rich heritage of our composite culture"

(Article 51 A (F) of the Constitution)

The Indian Constitution sets out the primary framework for identifying, valuing and conserving various tangible and intangible aspects of culture. The Apex Body for the implementation of this Framework with respect to cultural heritage is the **Ministry of Culture,** which acts through the **Archaeological Survey of India**. Under the aegis of the ASI and MoC, national legislations that apply to cultural heritage in India include the following:

- *AMASR ACT 2010*
- *The Ancient Monuments and Archaeological Sites and Remains Act, 1958 and The Ancient Monuments and Archaeological Sites and Remains Rules, 1959*
- *The Antiquities and Art Treasures Act, 1972 and The Antiquities and Art Treasures Rules, 1973*

Several states also have State legislations that apply to State Archaeology Monuments and Sites.

1.3.2 Framework for Disaster Management in India

Disaster management in India is under the purview of the National Disaster Management Authority as the Apex Body constituted under the **National Disaster Management Act (2005)**. The National Disaster Management Act 2005 lays down the institutional, legal, financial and coordination mechanisms for Disaster Management (DM) at the national, state, district and local levels.

The second instrument is the **National Policy on Disaster Management (NPDM), 2009** that states:

"Indigenous knowledge on disaster and coping mechanisms adopted by various States will be given due weightage with special focus on protection of heritage structures."

In May 2016, NDMA laid out the **National Disaster Management Plan (NDMP)** that lays out measures to increase disaster resilience at a national level through sustained action, prioritised into short-term, medium-term and long-term periods. The NDMP works within the Sendai Framework for Disaster Risk Reduction, for which India is a signatory and looks towards providing the framework and direction to government agencies for all phases of the disaster management cycle. Within the mandate of the NDMP, ministries and public institutions have been mandated to develop disaster risk management strategies and integrate them within their overall planning and administration. The NDMA has the primary responsibility for formulating policies, plans and guidelines for Disaster Management for Central Ministries, Departments and States. These guidelines serve as a template for ministries and institutions to develop their own DM plans that need approval and review from the NDMA (NDMA 2009). This includes the various sites and precincts managed under the MoC and ASI.

1.4 Vision, Approach and Objectives

The National Disaster Management Guidelines for Built Heritage will apply to all centrally and state protected monuments and sites, identified special areas and historic precincts.

The underpinning vision of the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts is to ensure that places of cultural significance are safe and secure for the people that engage with them and that the heritage values they embody are conserved for future generations. The primary objective of this document is to integrate the specific needs of cultural heritage within the framework for disaster risk reduction.

The objectives of each stage of the disaster risk management process have been summarised as follows:

Assessment	• Identify and assess aspects of the site/ precincts that contribute to its overall cultural significance • Identify and assess risks to people and also to the overall significance
Disaster Risk Prevention and Reduction/ Mitigation **Emergency Preparedness and Response**	• Prioritise actions as **Critical, Short Term and Long Term** based on an understanding of Acceptable Risk and Cultural Value. An approach of minimal intervention should be adopted as far as possible. • Within the site, an inventory identifying aspects of highest to lowest significance should be prepared and made accessible to staff. This should guide the approach towards risk prevention and reduction as well as emergency response measures • Specialised efforts to secure the site and collections during a disaster should be undertaken to ensure minimal loss to collections due to lack of specialised procedures
Post-disaster Recovery and Rehabiliation	• Post -disaster assessment should take into account the recorded significance of the object/ asset before the disaster in order to prioritise recovery planning • Rehabilitation of heritage sites and precincts should not be overlooked as they are important contributors to community identity.

Fig. 6 Key objectives for each stage of the disaster risk cycle.

The disaster management process has been used to structure this document as illustrated below:

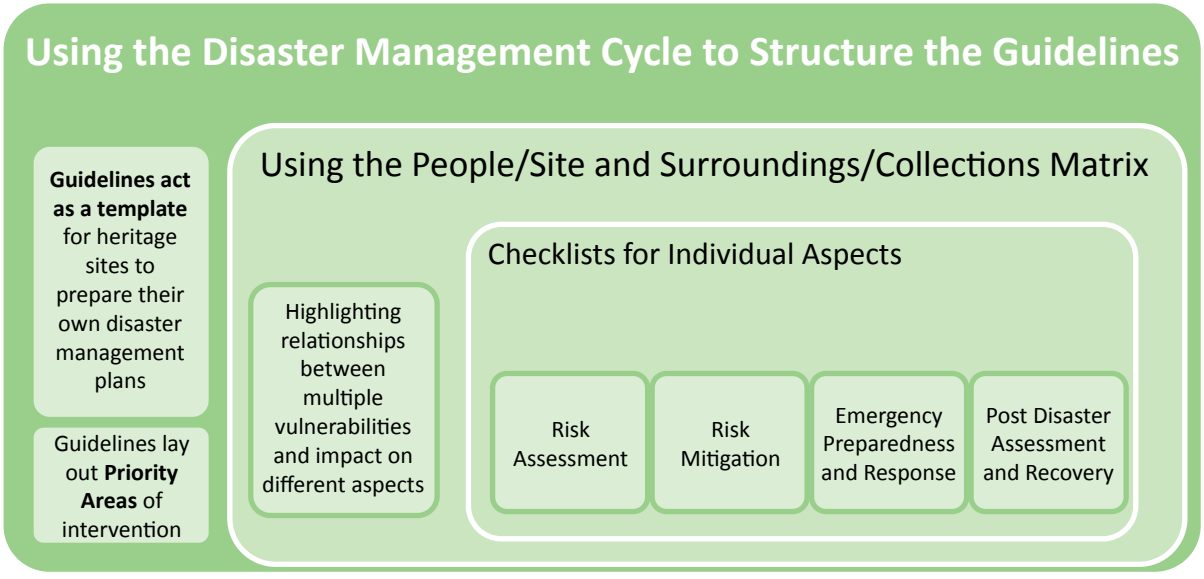

Fig. 7 Structure of the Guidelines

1.5 Scope of the Guidelines

The primary scope of the guidelines is to help steer individual Ministries to undertake exercises in disaster risk management, including but not limited to the preparation of disaster risk management plans for individual cultural heritage sites and precincts. These should be streamlined within the existing legislative frameworks but additionally be dynamic planning instruments so that they are seen in a mainstream management concern as opposed to strategies that are narrow in their vision and scope.

One of the biggest challenges and limitations of these guidelines is addressing the varied scales and typologies of cultural heritage sites and precincts and for this reason individual disaster risk management plans at site and precinct level that integrate with larger city and district level plans, are crucial in addressing the specific challenges presented by cultural heritage sites across the country.

1.6 How to Use the Guidelines

These guidelines lay out the basic framework for various Ministries and Departments as well as other actors that are responsible for the management of cultural heritage sites and precincts. The central objective is to lay out the broad frameworks within which stakeholders

can develop disaster risk management strategies. The guidelines are structured based on the disaster risk management cycle. These guidelines are NOT a substitute for a plan itself, and only set out the requirements, both physical and institutional, that stakeholders should fulfil in order to reduce disaster risks to cultural heritage sites and precincts. Chapters 2, 3, 4, 5 and 6 are accompanied by indicative checklists, which set out some of the basic actions to be undertaken at each level of disaster risk management. The bibliography and resource section lists a series of manuals and references that are meant to assist heritage managers in their planning endeavours. Chapters 7 deals with awareness generation and capacity building and should be used to develop exercises at site and precinct level as well as institutional levels.

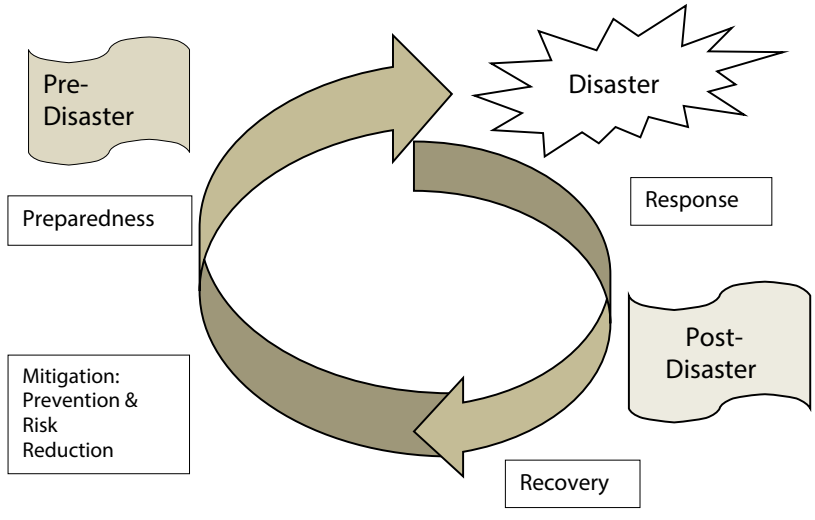

Fig. 8 The disaster management process (Source: NDMP)

2 Risk Assessment

2.1 The Risk Assessment Process

The first step of disaster risk reduction is in understanding how hazards, vulnerabilities and exposure with respect to a precinct or a site interact with each other, to assess the degree of risk. In the case of cultural heritage sites and precincts, potential impact to heritage values is an additional aspect to consider, since it will inform the level and priority of disaster risk action as well as help in the identification of acceptable risks.

Fig. 9 Relationship between hazard, vulnerability and exposure

The broad risk assessment process comprises of the following steps:

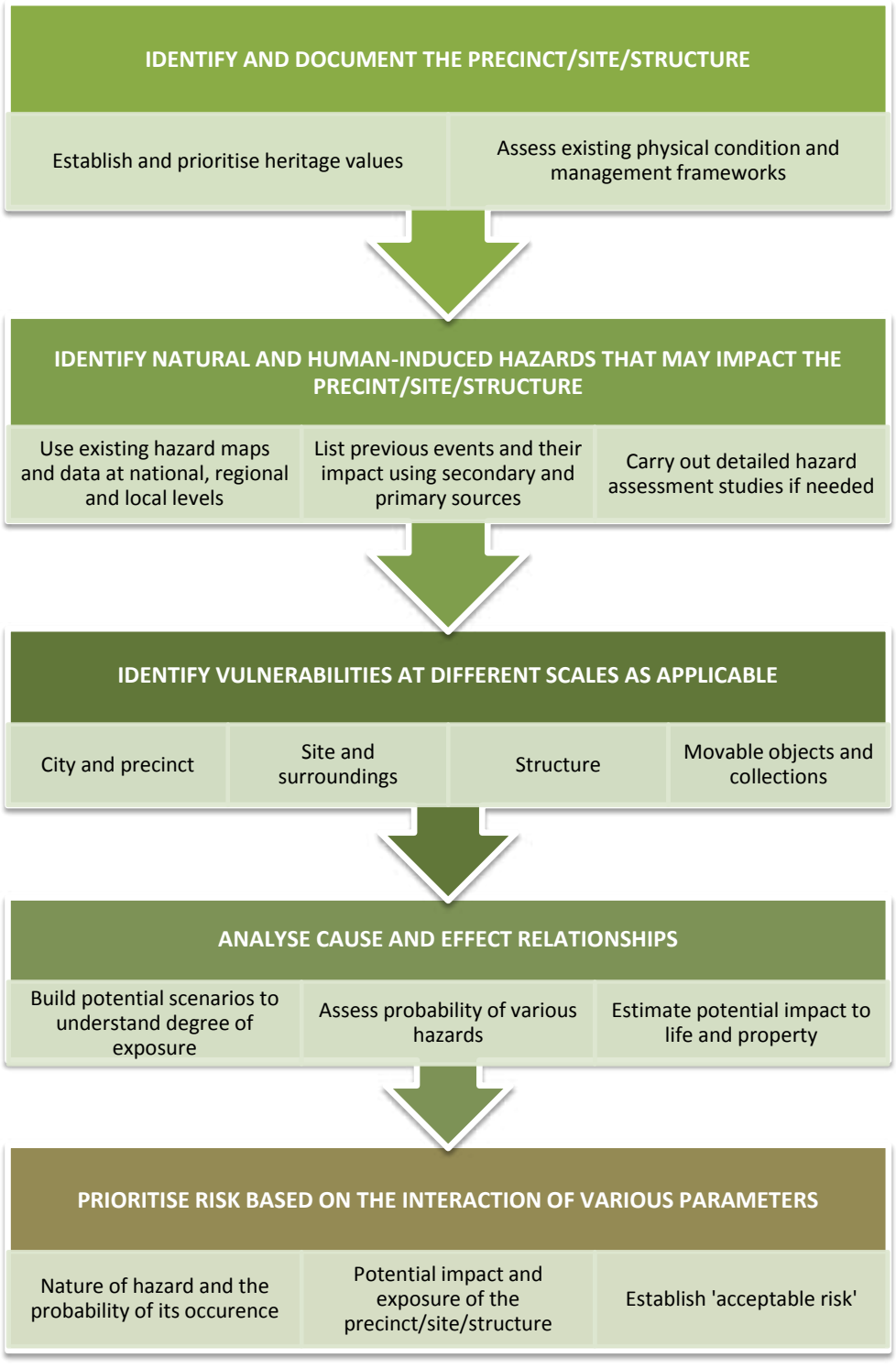

Fig. 10 Risk assessment process

2.2 Identification and Documentation of Cultural Heritage Sites and Precincts

The single greatest challenge is disaster risk management for cultural heritage sites and precincts in India is the lack of existing information and reliable data. Even sites that are centrally protected by the ASI or protected under State Archaeological departments are often not documented fully and the documentation of the sites themselves is rarely up-to-date. Without basic data and understanding of these sites, it is impossible to carry out risk assessment, reduction and certainly impossible to evaluate exactly how much cultural heritage is lost to disasters each year.

Where documentation has been carried out by official institutions or by national and regional NGOs including organisations like INTACH, this documentation is often unavailable to the site managers and local stakeholders, which significantly reduces the usefulness of this data.

With respect to heritage precincts/ neighbourhoods and cities, documentation involves a complex and layered process, given the multiplicity of stakeholders and types of buildings as well as differences between public and privately-owned buildings.

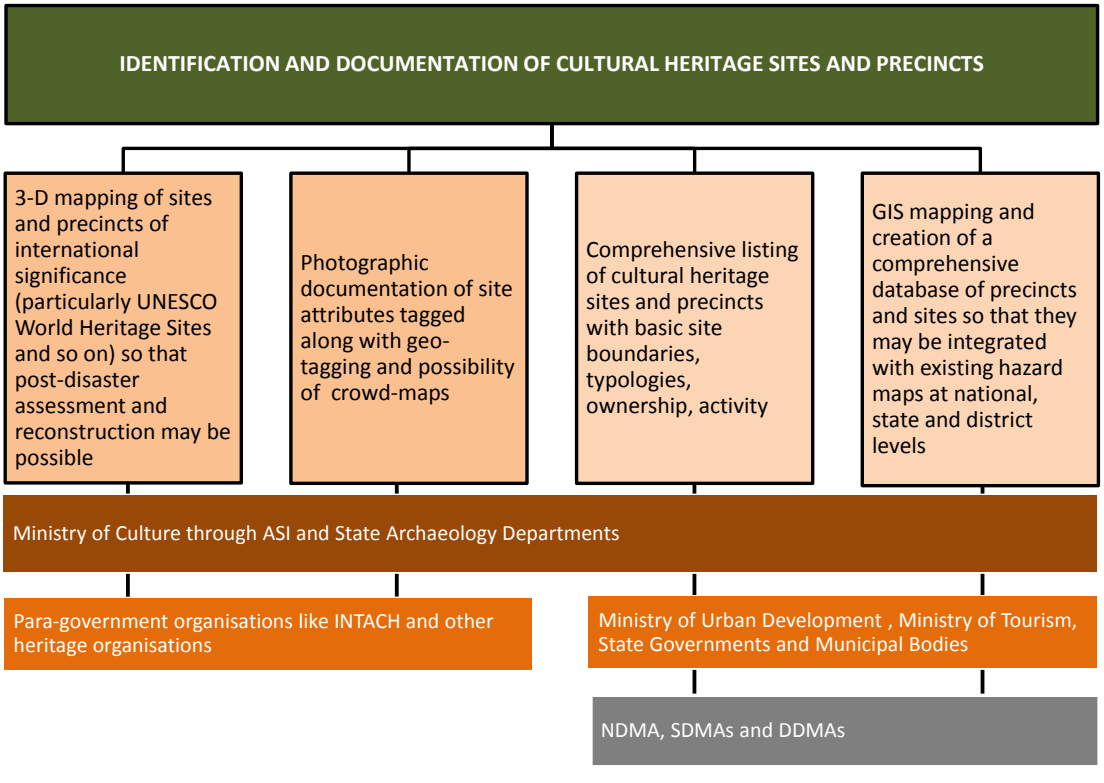

Fig. 11 Identification and documention of sites and precincts

2.3 Identifying Hazards

Within India, hazards can be identified for a cultural heritage site or precinct from the following sources:

- History of past disasters in the area along with their severity of impact and recurrence using local or State archives and records, newspaper archives and so on
- Hazard maps such as Earthquake Zonation, Cyclones and Storms Maps, Landslide Mapping, Flood Basins etc. that may be provided by the NDMA, SDMA, DDMA, Meteorological Department, Geological Department or other sources
- History of previous emergencies available in archives or with staff and management or with local authorities such as police and fire departments

2.3.1 Natural Hazards

An indicative list of the natural hazards as identified by NDMA has been summarised below. Guidelines exist for specific hazards such as Earthquakes, Floods, Droughts etc. prepared by NDMA in previous years.

Family	Main Hazard	Secondary Hazard	Indian States/ Regions affected
Geo-physical	Earthquake	Landslide Fire Liquefaction Surface Displacement Tsunami	58.6 per cent of the landmass of India is prone to earthquakes of moderate to very high intensity.
	Volcano	Surface displacement Ash fall, Lahar Pyroclastic Flow Landslide Fire Tsunami	Barren Island in the Andamans is the only confirmed active volcano.
Hydrological	Flood Landslide Wave Action	Avalanche Coastal Erosion Coastal flood Debris Flow, Mud Flow Rock Fall Flash Flood Flood Hydrological Wave Action	Over 40 million hectares (12 per cent of land) is prone to floods and river erosion.

Family	Main Hazard	Secondary Hazard	Indian States/ Regions affected
Meteorological	Hazard caused by short-lived, micro to meso-scale extreme weather and atmospheric conditions that may last from minutes to days	Cyclone, Storm Surge, Tornado, Convective Storm, Extratropical Storm, Wind, Cold Wave, Extreme Temperature, Fog, Frost, Freeze, Hail, Heat-wave, Lightning, Heavy Rain, Sand Storm, Dust Storm, Snow, Ice, Winter Storm, Blizzard, Cloud burst	Out of the 7,516 km long coastline of India, close to 5,700 km is prone to cyclones and tsunamis.
Climatological		Drought, Extreme hot/ cold conditions, Forest/Wildfire, Fires, Glacial Lake Outburst, Subsidence	5,11,300 sq.km of the landmass of India is drought prone. 50% of forests in India are prone to wildfires. All the states bordering the Himalayas are prone to Glacial Lake Outburst.
Biological		Epidemics: viral, bacterial, parasitic, fungal, prion infections, insect infestations, Animal stampedes	Almost the entire country is prone to various epidemics. In July 2016, there were 11,26,661 cases of malaria, 99,913 cases of dengue, 27,553 of chikungunya and 42,592 cases of swine flu across India.

Fig. 12 Natural hazard identified by NDMA

2.3.2 Human Induced Hazards

According to the NDMP, increasing levels of urbanisation and industrialisation within identified high risk zones has increased the overall vulnerability of populations to disasters. The key hazards leading to a possible disaster that can be attributed to human activity are:

1. Chemical, Biological, Radiological and Nuclear Hazards (CBRN)
2. Terrorism, Violence, Conflict
3. Fire

Other hazards include accidents, poor planning and construction, over-population or over-crowding, environmentally insensitive practices and so on.

Human induced hazards may be identified using the following approaches:

- Records with local emergency responders, such as fire departments, police departments, local hospitals and medical facilities and records within the site or precinct of previous events, caused due to human intervention
- Local area maps highlighting nearby industries, nuclear plants, possible sources of contamination, sources of pollution, sources of ignition and so on
- Socio-economic mapping and other demographic information of the precinct to identify any potential sources of conflict among different interest groups or potentially volatile situations

2.3.3 Scales of Disasters

The scale of the disaster is an important factor to assess the degree of preparedness and vulnerability of a cultural heritage site or precinct. The High Power Committee on Disaster Management, in its report of 2001, categorised disaster situations into three 'levels': L1, L2, and L3. The period of normalcy, L0, should be utilised for disaster risk reduction activity.

Level-L1: The level of disaster that can be managed within the capabilities and resources at the District level. However, the state authorities will remain in readiness to provide assistance if needed.

Level-L2: This signifies the disaster situations that require assistance and active mobilisation of resources at the state level and deployment of state level agencies for disaster management. The central agencies must remain vigilant for immediate deployment if required by the state.

Level-L3: This corresponds to a nearly catastrophic situation or a very large-scale disaster that overwhelms the State and District authorities.

With respect to cultural heritage sites and precincts, a localised hazard may also cause an emergency that is beyond the identified coping capacity. These hazards may include man-made hazards like fire, mass- violence etc. In the case of L1, L2, L3 disasters, emergency infrastructure and response may be severely impacted and the rate of response to the heritage site or precinct may be compromised in this scenario. Therefore, building capacity within the site or precinct is an important aspect of disaster risk reduction.

2. 4 Identifying Vulnerabilities

The assessment of vulnerabilities will be looked at multiple scales; the first being city and precinct, second being site and surroundings, third at the scale of individual structures and buildings and finally, objects and collections that may be housed within the site. Depending on the scale of the cultural heritage site or precinct in question, assessment may involve identification of vulnerabilities at different levels. Please note that this list is indicative and not exhaustive.

2.4.1 Settlement and Precinct

1. Planning, density, scale and morphology

- Settlements without clear hierarchy in circulation networks which have an impact on access and circulation, especially during an emergency. Organic settlements with dense and winding circulation networks and multiple bottlenecks in the circulation, including structures like historic gateways, etc.
- Localised topography and rain-water drainage systems, natural water resources and water reservoirs may impact both water-supply as well as waste-water and storm-water disposal
- Settlements with limited access and exit points, especially vehicular access. Walled or enclosed cities or neighbourhoods, or settlements that have a physical boundary, whether natural or man-made
- Historic city cores and precincts with densities that do not conform to existing planning norms and are not serviced by the requisite infrastructure
- Lack of large public open spaces that may act as refuge areas, temporary evacuation spaces or congregation spaces

2. Nature of activities

- Small scale industrial practices that involve heavy machinery, inflammable products and material
- Industrial scale kitchens for hotels, guest-houses, etc., especially those that have been retro-fitted into pre-existing structures and unauthorised additions to facilitate the same
- Historic structures used for storage and warehouses, without structural analysis of the existing structure may increase structural vulnerability, especially towards seismic activity
- Commercial and tourist based activities that are incompatible with pre-existing

historic fabric and expose the settlement to threats of urban flooding, due to increased pressures on drainage and water supply, or fires and vandalism due to lack of security and increased visitor pressures and so on

- Changes to the historic fabric, encroachments or inappropriate additions and alterations have a significant relationship with disaster risk
- Lack of any activity leading to abandonment of sites or areas may also contribute to vulnerability because of lack of regular monitoring and maintenance
- Seasonal surge of activities such as rituals, festivals and pilgrimage may increase the floating population within a city or a precinct significantly

3. Ownership, management and maintenance

- Multiplicity of owners and managing authorities leading to poor coordination and lack of effective implementation at the ground level
- Lack of clarity due to absence of proper documentation or contesting ownership claims for individual properties
- Presence of different managing institutions within the precinct adds to the diversity of stakeholders. The overlap of responsibilities and jurisdiction can also make it difficult to streamline management because of lack of hierarchical clarity making implementation of disaster risk management strategies a difficult process
- Furthermore, maintenance and upkeep of precincts happens at multiple levels and with varying frequency. Thus, poorly maintained neighbourhoods with outdated infrastructure or improperly installed infrastructure leads to significant increase in vulnerability

4. Infrastructure and Services

- Improperly installed electrical wiring, transformers and distribution panels, overloaded circuits, exposed wiring
- Absent or poorly managed rain water drainage and sewerage systems
- Unsanitary surroundings, lack of streamlined waste disposal
- Improperly installed, poorly managed gas supply lines
- Poor pedestrian infrastructure, uneven road surfaces, lack of fire-tender access
- Poor way-finding infrastructure

2.4.2 Site and Surroundings

1. **Planning, typology and landscape**
    - Localised topography, soil conditions, natural drainage and slopes of the site, proximity to large bodies of water, etc.
    - Proximity to industrial areas, chemical or nuclear plants, etc.
    - The site layout, building material and typology of site and the context of its immediate surroundings may inherently have greater vulnerability to certain hazards
    - Number of buildings within a site, density and adjacencies of individual structures, etc.
    - The surrounding context of the site/ building may hinder access to the site, increase issues of localised drainage, water-supply, particularly emergency water-supply and so on
    - Big trees, overgrown or dense vegetation, forested or desert landscapes
2. **Access and circulation**
    - Lack of clear circulation and exit pathways and vertical circulation such as ramps or staircases
    - Insufficient provision of access and exit points or poor physical connections and circulation with surroundings due to issues such as unpaved, uneven surfaces or blocked pathways
3. **Security and visitor management**
    - Insufficient security and managerial staff
    - Inadequately trained security staff
    - Absent or inadequate automated security system in case of sites with movable artefacts
    - No clear chain of command for managing the site
    - No manual back-up for security in case of emergency
    - No protocol in place for emergency response
    - No list of emergency contacts
4. **Infrastructure and services**
    - Electrical wires are old, outdated and exposed or electrical system is overloaded
    - Electrical distribution system is exposed or improperly installed
    - Drainage from roof and terraces is inadequate, poorly maintained

- Drainage in wet areas is inadequate or poorly maintained
- Sewage system is outdated or inadequate or poorly maintained
- Ventilation in the building through natural means is inadequate
- Mechanical ventilation is inadequate
- Excessive fluctuation of humidity and temperature inside the heritage buildings, especially where collections are displayed and stored
- No monitoring or inadequate monitoring of humidity and temperature for sites which are constructed of materials susceptible to weathering and biological damage
- Inadequate pest control procedures
- Inadequate lighting and no emergency back-up for lighting

2.4.3 Individual Buildings and Structures

Apart from the overall issues that are applicable to sites and surroundings, individual structures and buildings should be evaluated for the following vulnerabilities:

1. Typology, structural systems and materials

- There is a vast range of typologies, construction systems and materials seen in structures of heritage value in India. Many of these typologies and systems have evolved to be resilient to certain kinds of hazards, particularly in the case of vernacular buildings. At the same time, certain typologies and systems are also vulnerable to certain hazards. Therefore, it is important to be familiar with the original structural systems and construction methodology used. Some examples of possible construction materials are given along with potential vulnerabilities. Construction systems may vary significantly contributing to overall vulnerability
- Archaeological remains and sites, exposed to the external environment are particularly at risk due to constantly changing conditions that may weaken the integrity of the remains and lead to issues such as biological attack, erosion and so on
- The layout of individual buildings may contribute to its vulnerability in various ways. For example, irregularly planned structures or structures with uneven loading are vulnerable to seismic action.

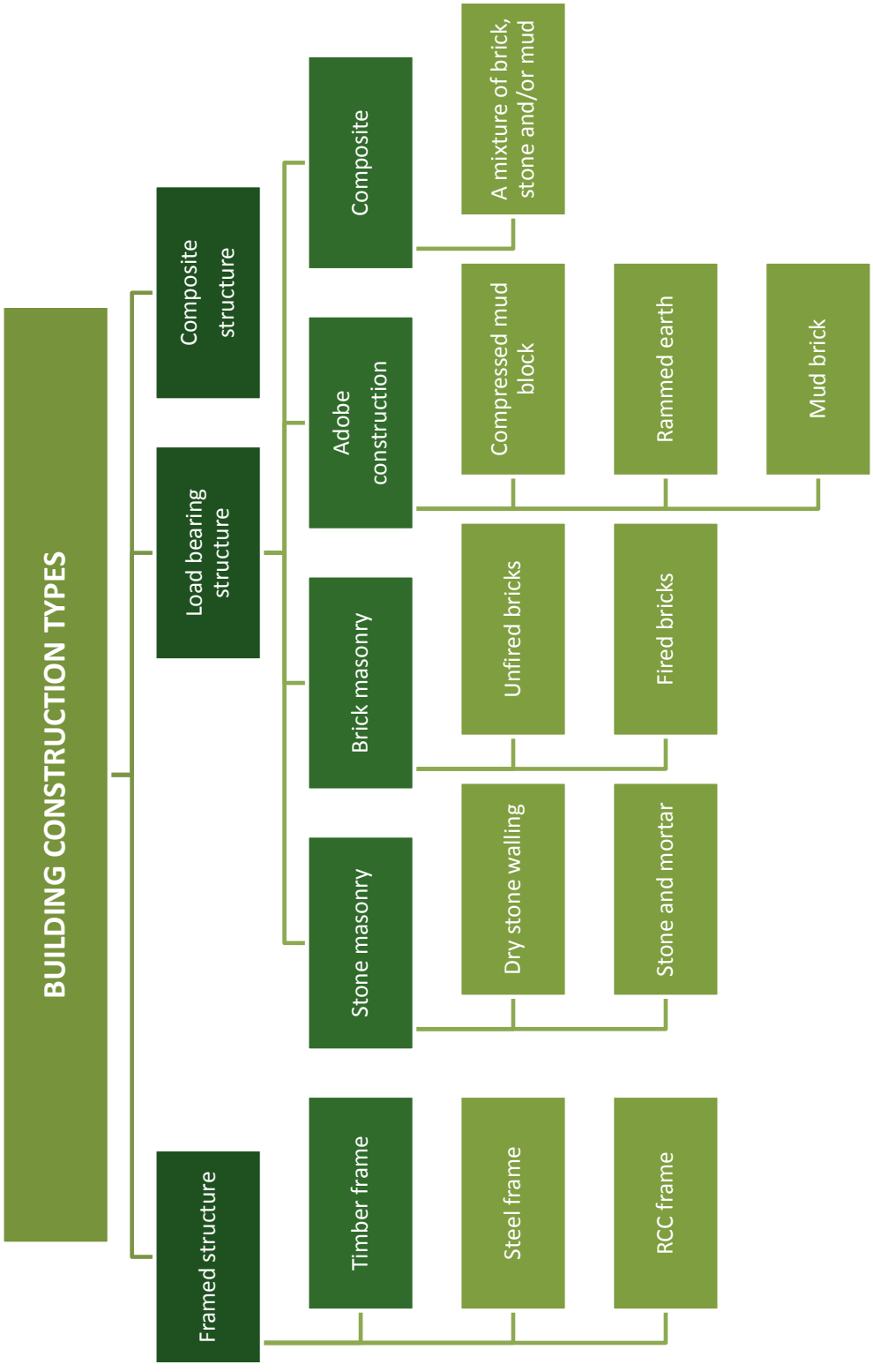

Fig. 13 Overview of construction techniques seen in heritage sites in India

The following are some examples of typical vulnerabilities of certain building materials:

- Mud and clay in the form of adobe construction may be vulnerable to extreme changes in temperature and moisture, heavy rainfall, crushing due to external forces, while in the form of baked bricks it may be vulnerable to torsion, crushing, etc.
- Timber, bamboo and other organic material are vulnerable to biological attacks including mould, fungi, termites and other insects, excessive damp and moisture and fire
- Stone construction using stone blocks or random rubble masonry or other forms of masonry may be vulnerable to slippage, crushing, torsion due to external forces
- Metals and alloys are prone to rusting, expansion, etc., when exposed to water or moisture over time and prone to twisting, torsion, bending when exposed to extreme forces or temperatures
- Glass is extremely vulnerable to extreme temperatures, external forces, etc.
- Lime when used as concrete or as plasters and mortars is vulnerable to changes in temperature and moisture, crushing due to external forces and to biological action when used with other additives
- Cement and cement composites are vulnerable to high temperatures and extreme humidity and moisture

2. Structural and physical condition

In case of an existing building, a structural assessment by a specialist should be carried out to identify structurally vulnerable sections of the building. Testing through non-destructive, intrusive and destructive tests may be recommended by the specialist. The building age, its structural system and non-structural components should be clearly understood and communicated. Buildings older than 50 years should be given special consideration and regular structural audits. Materials and finishes of the building should be documented and assessed.

- The age of the structure when co-related with the life expectancy of individual building materials and systems may result in inherent structural vulnerability
- Damage to structural elements of the building
- Partially collapsed portions, missing elements
- Structural cracks, damaged masonry or frames
- Poorly maintained structure and finishes
- Poor joinery systems, ageing or damaged mortars, etc.

- Seepage and dampness in the structure
- Rusting, degraded metal elements
- Biological damage due to pest attacks such as mould, fungi, insects etc.

3. Use and activity

- Unused, abandoned structures are often at increased risk, since these aspects are connected to maintenance schedules and regular upkeep activities
- Ongoing conservation work, archaeological conservation, retrofitting activities, re-use proposals and other additions and alterations within a structure may temporarily increase its vulnerability due to exposed structural elements, increased loading on the structure and change in its layout and usage
- Activities such as religious rituals, commercial activities that involve the usage of ignition sources, combined with a large influx of people may increase vulnerability
- High footfalls in small concentrated interior spaces, leading to increased live loads, exceeding the designed capacity of the building

2.4.4 Objects and collections

Please refer to National Disaster Management Guidelines for Museums issued by NDMA in May 2017, that offer a detailed overview of vulnerabilities to objects and collections.

2.5 Analysing Risks through Scenario Building

After identifying the hazards and vulnerabilities, the next stage in the risk assessment process is to create potential scenarios to understand the relationships between primary and secondary hazards and associated vulnerabilities. This process should examine multiple hazards acting on a site or precinct simultaneously to fully understand the extent of vulnerability of the site. Scenario building also helps in the prioritisation of risks.

For example,

A temple constructed with bricks and mud-mortar is in a location that receives heavy rainfall leading to temporary flooding. While the flood water may not cause much permanent damage to the structure, it may lead to erosion of the mortar, long-term seepage and make the structure susceptible to biological attacks. These secondary hazards may cause long-term damage over time, increasing the vulnerability of the temple significantly in the process.

2.6 Prioritising Risks

Disaster risks can be prioritised based on the following criteria:

- **Probability:** The probability of a specific disaster scenario occurring in a site. The probability might be high, medium or low. Certain hazards are also recurring in nature for certain regions, for instance, seasonal flooding due to high levels of rainfall, possible wild-fires due to sustained high temperatures etc.
- **Potential Impact:** The severity of the consequences of the disaster scenario on the cultural heritage site and its components, including people, property, livelihoods and other physical attributes in which heritage values of the property are embedded, such as landscapes and infrastructure, the disruption of human activities, the loss of traditional knowledge, etc. Impacts might be evaluated in the following terms: catastrophic or severe; mild; gradual; no consequence.
- **Consequence to Heritage Value:** Within a single site, some attributes could be essential and irreplaceable to convey the heritage value, whereas others, although important, could be restored. The level of risk to the site for a specific scenario is assessed vis-à-vis the probability, severity of consequence on people, lives and livelihoods, and potential loss of values.

The prioritisation of risk may depend on several other factors such as:

- Although the risk level of a disaster scenario may be quite high, the probability may be very low, in which case hazards with a greater probability of occurrence should be prioritised.
- Prioritisation also depends on the costs and benefits associated with both implementation and maintenance stages. This is linked to the availability of human and financial resources
- Another factor in the prioritization of risk is the effect that the proposed measure may have on risks to one heritage component at the cost of reducing the risk to another component, to visitors and staff, or to the environment.
- Planning for an event with **high probability of occurrence** and a **high level of potential impact** should be prioritised. Risks that will have a detrimental impact on human life should be given the highest priority. Impact to heritage sites, precincts, movable heritage, storage and infrastructure should be prioritised based on the identified value of each.

3 Measures for Disaster Risk Prevention, Reduction and Mitigation

3.1 Framework for Preventing and Reducing Risks and Mitigating Potential Impact

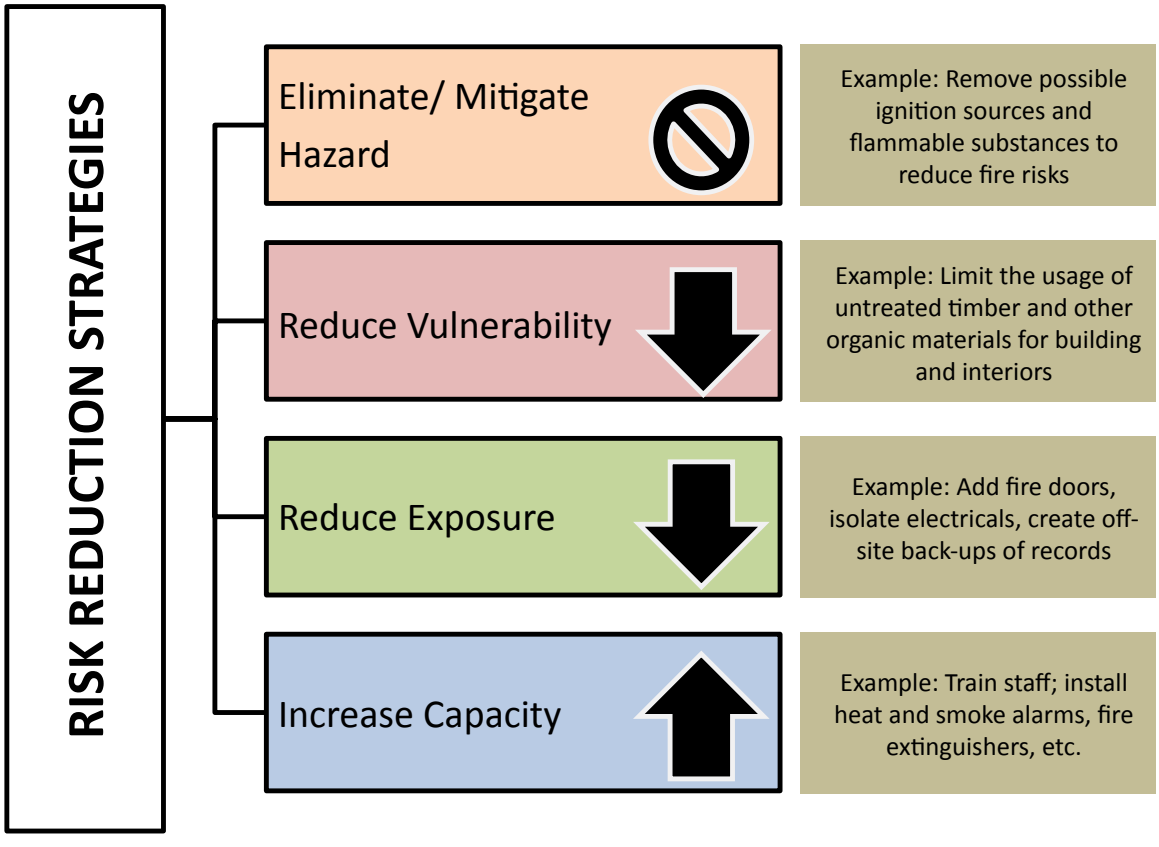

Fig. 14 Framework for risk reduction

The framework for disaster risk reduction comprises of a four-pronged approach as follows:

1. **Elimination or prevention of the hazard:** The source of the risk is removed through planning and action. For example, if the hazard is terror, theft or vandalism, the risk may be reduced by increasing security and monitoring of the site or precinct and controlling access. Natural hazards, such as earthquakes, heavy rainfall, volcanoes etc. cannot be prevented in this manner, especially with respect to immovable cultural heritage property. In extremely rare scenarios, relocation of the cultural property is considered, though it must be remembered that in most scenarios the context of a cultural heritage site contributes towards its overall heritage value.
2. **Reducing vulnerability:** Even though many hazards cannot be prevented, vulnerabilities identified that emerge within the structure itself, in its immediate context or at the scale of the city and precinct can be addressed. For instance, retrofitting of ageing built fabric may significantly reduce its vulnerability to hazards such as earthquakes and landslides.
3. **Reducing exposure:** Various measures to reduce the exposure of a site can be undertaken as a risk reduction measure. These may be based on principles of containment, isolation, etc., where the extent of damage can be minimised through structural and non-structural means.
4. **Increasing capacity:** The impact of the hazard can also be mitigated through implementing clear strategies for the management of visitors, communicating risks to the public in a clear and effective manner and so on, which increases the capacity of the site to respond to a disaster. Further details on this aspect can also be found in Chapter 4.

A thorough risk assessment exercise that prioritises risks is essential to develop sound strategies for risk reduction and/or mitigation. Some of the key areas for actions are described in the next sections, looking at multiple scales, ranging from the settlement and precinct, site and surroundings and the individual structure.

With respect to disaster risk reduction for cultural heritage sites and precincts, certain aspects need to be considered:

1. **Preserving and retaining cultural heritage values** as identified by the stakeholders. Interventions that would lead to a loss of these values should be weighed carefully against the potential benefits before being executed
2. **Retaining authenticity** of the site or precinct is an important consideration. While one of the primary concerns of disaster risk reduction is to minimise physical losses to property, standard interventions, such as structural retro-fitting may reduce the authenticity of the

site and should be carried out with caution. An approach of minimum and appropriate intervention should be followed as far as possible, that weighs the advantages of the proposal in risk reduction with the possible impact to heritage values and authenticity

3. **Using traditional technologies and skill** and indigenous knowledge systems should be prioritised as they contribute to the continuity and value of cultural heritage
4. A degree of **acceptable risk should be established** for the cultural heritage site or precinct and such a threshold should inform risk reduction interventions

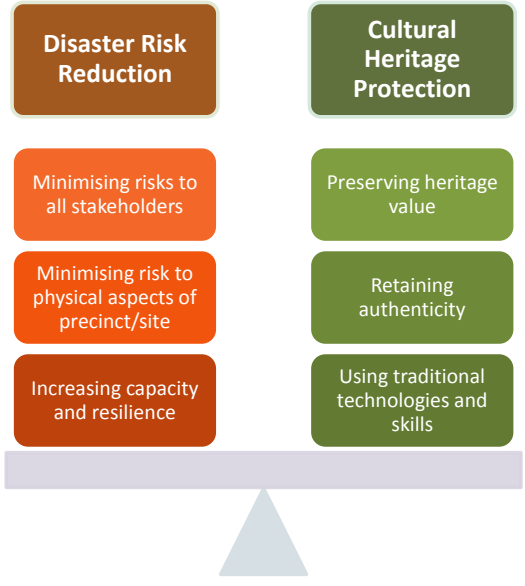

Fig. 15 Balancing concern of disaster risk reduction and cultural heritage protection

3.2 Strategies for Risk Reduction

An indicative list of risk reduction strategies has been given in this section. The diversity of cultural heritage sites and precincts in India is too vast to create a standardised list of actions, and each site requires a comprehensive risk reduction plan. Some broad guidelines are listed below:

3.2.1 Settlement and Precinct

1. At the precinct level, urban and local planning measures for disaster risk reduction should be integrated with the following:
    - State Disaster Management Plans and District Disaster Management Plans
    - Zonal Development Plan and Master Plan for the City or Precinct
    - Guidelines that apply to delineated heritage property/ precinct

2. Planning should be undertaken in consultation with local authorities and emergency responders and critical infrastructure service providers to ensure that all risk reduction efforts are coordinated and streamlined within existing frameworks
3. Clear access and exit circulation pathways within the precinct along with unobstructed entrances and exit routes for individual sites should be provided as far as possible
4. Activities within the settlement should be regulated, particularly those that could be potentially hazardous
5. New constructions, additions, modifications and retro-fitting should be regulated by the concerned authorities
6. Conservation at settlement level, infrastructure additions and upgradation work should also be undertaken based on sound documentation, analysis and planning
7. Ensuring that all services- electrical, water-supply, drainage, sewage, waste-disposal etc., are upto date, maintained regularly and adhere to existing codes and regulation
8. Capacity building exercises should be undertaken at a settlement level to raise awareness among local communities and stakeholders and highlight special issues with respect to heritage sites to local emergency responders
9. Heritage impact assessment exercises should accompany new development, re-development, regeneration, infrastructure provisions, etc., in order to ensure that vulnerability of heritage sites and precincts are not increased due to changes in the surrounding settlement

3.2.2 Site and Surroundings

1. Issues of planning, entrances, exits and accessibility to the site as well as within the site should be addressed. The site should be universally accessible as far as possible. Where universal access is difficult to achieve, alternative routes and circulation must be designed for all visitors/users
2. Changes, additions and alterations at the site level should be evaluated for their impact on the overall integrity and vulnerability of the site. These should be reversed if needed. Any new intervention at site and surrounding level should only be carried out after a heritage impact assessment exercise
3. It may not be possible for existing hazardous elements such as industrial areas, chemical and nuclear plants to be relocated. In such cases, the potential impact of any disaster should be contained through structural actions, isolating of the site as needed, changing entrance/exit points and so on

4. Individual elements within the site such as big trees, overgrown vegetation, water bodies, electrical sub-stations, etc., which may potentially increase risks should be removed/ relocated/isolated/contained to minimise impact
5. A clear security and visitor management plan should be prepared for all institutional/ tourist/religious sites. The plan should include training and capacity building for all management and security staff; outline clear hierarchies for action in case of emergency and highlight protocol for different emergency situations
6. In the case of public/institutional/religious sites, an assessment of visitor loads, peak visitor capacities should be undertaken. Seasonal variations in number of visitors should be accounted for and provisions should be made for managing the access and circulation within the site at peak times
7. All infrastructure including electrical supply, water-supply, rainwater drainage, sewage and garbage disposal should be regularly maintained and inspected. Emergency infrastructure should be installed and its working should be inspected at regular intervals
8. All public heritage sites must have designated spaces for emergency vehicles, temporary refuge and gathering spaces

3.2.3 Individual Buildings and Structures

1. Structural actions

Before any structural action is carried out at the level of an individual building/structure, a structural audit should be undertaken by a qualified specialist in historic buildings along with impact assessment studies as to the potential impact of a structural intervention on the authenticity and heritage value of the site or precinct[2]. All structural actions should be based on scientific analysis and rigorous documentation, follow an approach of minimum intervention, and be reversible as far as possible. The following actions may be carried out to reduce vulnerability at a structural level, depending on the physical assessment of the structure:

- **Conservation and restoration** involving structural repairs to foundations, walls, roofs, etc. including actions like stitching of cracks, repairing masonry, grouting of mortars, etc.

Cultural heritage sites and precincts in general are historic in nature and do not need to adhere to the National Building Code, given their date of construction. However, within historic precincts and even cultural heritage sites, new structures may sometimes be constructed. These need to adhere to the following:

• The National Building Code, 2005 issued by the Bureau of Indian Standards

• Bye Laws issued by Urban Local Bodies

- **Retrofitting** may involve the addition of structural support systems, props, shoring, bracing, etc. that use newer materials and technologies to strengthen the structure and reduce its structural vulnerability
- **Reconstruction** may involve partial or complete dismantling of the structure and reconstructing using the same materials and technologies or adding further structural support systems to ensure better structural performance
- **Re-use** or change of circulation patterns, accessibility may involve the addition of elements such as fire-doors, partitions, roofing systems, etc.
- **Relocation** is an extreme measure and is to only be considered in a scenario where no other alternative is possible and the potential loss of heritage is severe, and only to ensure absolute survival of the structure

2. Non-structural measures

- All vertical and horizontal surfaces should be assessed; issues of seepage, rising damp, and water and moisture ingress should be investigated and treated
- Surface issues like cracking plaster, damaged floor, ceiling and roof finishes should be treated
- All movable interior elements such as partition walls, large furniture items, fixtures such as chandeliers should be securely attached to the building, especially when the site is vulnerable to seismic hazards
- Movable items and storage should be planned within the building such as to minimise risk from water damage in floods and storms, biological attacks from insects and other pests, etc.
- Individual interior spaces should be well ventilated and original passageways and corridors should remain accessible, even if they are not open for public use
- In the case of archaeological sites, temporary shelters where needed should be installed and adequate protective measures from exterior elements should be provided

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• Development Controls issued by Local Development Authority

Further references include:

• Model Building Bye-Laws,2016 issued by Ministry of Urban Development

• National Disaster Management Guidelines on Ensuring Disaster Resilient Construction of Buildings and Infrastructure issued by NDMA

- All hazardous or potentially hazardous and flammable material should be removed from access of unauthorised personnel. Else it should be stored in an area where its potential impact to visitors and staff in case of an emergency is minimal
- Lightning rods should be appropriately installed and the building should be equipped with wireless communication equipment, public address systems
- In case of buildings where a new usage is proposed, leading to a change in internal layout, prior assessment of all interventions should be undertaken

3. Infrastructure and services

- Electrical systems including distribution boxes, lines and power backup systems should be assessed for safety, and remedial measures taken, if necessary. All splice joints should be replaced with connectors. All defunct wiring, loose wiring should be addressed, and fail-safe mechanisms installed. Electrical services should be up-to-date and monitored on a regular schedule. Infrastructure should be routed according to BIS standards and kept out of reach of visitors and the general public
- Emergency lighting should be supplied with back-up electrical supply, in case of failure
- Water supply, storm-water drainage and sewerage systems should be assessed for leakage risk and remedial measures taken if necessary. Where water sources are located close to electrical supply sources, the location should be changed or temporarily secured while long term solutions are sought

4. Security and visitor management (For public and institutional buildings and sites)

- All publicly administered heritage sites must strive for universal access to visitors. This means making the building and facilities accessible to differently-abled visitors and at-risk groups including elderly and young children
- All water supply points, electricity supply and back up points should be marked clearly and members of the administration and security teams should be familiar with these to be able to switch off when required. Emergency water supply and lighting systems should be maintained
- Security audits should be regularly carried out, either internally or using an external expert in security systems or risk management. Entrances, exits, vulnerabilities in access, areas that need specialised security, should be assessed carefully and recommendations prioritised and implemented

- Based on security audit, and existing resources additional security measures such as x-ray scanners, metal detectors, handheld scanners, CCTV monitoring, automated door barriers and biometric access control should be installed. This depends on size of site, location and collections type
- Emergency routes and refuge areas should be clearly marked on an emergency plan and be available to visitors and displayed in all public areas. Staff members should be familiar with the emergency plan. IS standard signage should be installed in all areas of the building clearly marking exit routes and emergency evacuation procedures
- Training of security staff for specialised security mechanisms against acts of war, terrorism and conflict should be carried out regularly, particularly in areas with identified threats of violence
- Teams of volunteers should be trained and their contact information should be easily accessible in case of emergency. These can be regional networks that include people familiar with the site. Networks should also be strengthened between heritage sites so that trained professionals from other sites can be requested to assist in times of emergency

5. Maintenance and inspections

- Maintenance and regular upkeep are critical aspects of reducing disaster risks for cultural heritage sites and structures and should be rigorously implemented as part of weekly, monthly and annual schedules. Regular inspections and safety audits should be prioritised for large and complex heritage sites. A roster of cleaning activities, minor repairs, infrastructure upgradation and replacement should be created and implemented. In general, cultural heritage buildings that are in continuous usage are monitored more closely and potential risks can be addressed more effectively

6. Movable heritage objects/ collections management (Refer Museums Guidelines)

- All collections should be documented, reference images, material description and location with an off-site backup. Detailed catalogues and inventories should be maintained
- Heavy objects, fragile objects, etc., should be anchored for safety of the object as well as people. They should be displayed at an appropriate height and distance. Anchoring and base isolation should be carried out for all objects identified to

be at risk from falling or from mechanical impact. Other earthquake mitigation measures such as shock absorption should be implemented

- Items prone to damage from water should be displayed and stored on upper floors to mitigate risk from flood. Cases should be waterproof, moisture proof and offer a controlled environment
- Micro-climatic conditions, fluctuations of moisture, temperature, light and radiation, activities of pests and biological agents should be documented, since they impact the integrity of the collection
- Combustible items should be encased in fire retardant casing, with constant monitoring of heat and smoke levels

4 Planning for Emergency Preparedness and Disaster Response

4.1 Planning for Evacuation and Emergency Response

Each cultural heritage site or precinct needs a comprehensive plan for emergency response including evacuation, immediate response protocols and procedures, etc., that take into account the specific challenges presented by the site/precinct. The following aspects should be taken into consideration while creating an emergency response plan:

1. **Creating an emergency team** that includes the management, administrators and staff of the site or precinct as well as representatives from local stakeholders where applicable. This emergency team should have a clear chain of command and be in direct contact with the various departments dealing with different kinds of emergencies. The emergency team should be trained in basic first aid and emergency response and their names, designations, responsibilities etc., should be clearly communicated to the general public.
2. **Identification of evacuation routes, spaces that may act as temporary refuge areas,** and displaying these routes and spaces in a clear manner as signage, maps, printed literature, etc., for wide distribution.
3. **Identification of routes and locations for emergency services** including local police stations, hospitals, fire stations, DDMA and other emergency services. The emergency plan and evacuation plan for the site/precinct should be linked with the neighbourhood level and district level plans (if they exist). For certain typologies of heritage sites, the site itself may have the potential to act as a temporary refuge area for evacuees in a disaster, so it is important to look at the overall context of the site and identify its vulnerabilities and strengths with respect to its surroundings.
4. **Identification of various kinds of emergency supplies and equipment** and their storage for ease of access should be undertaken.

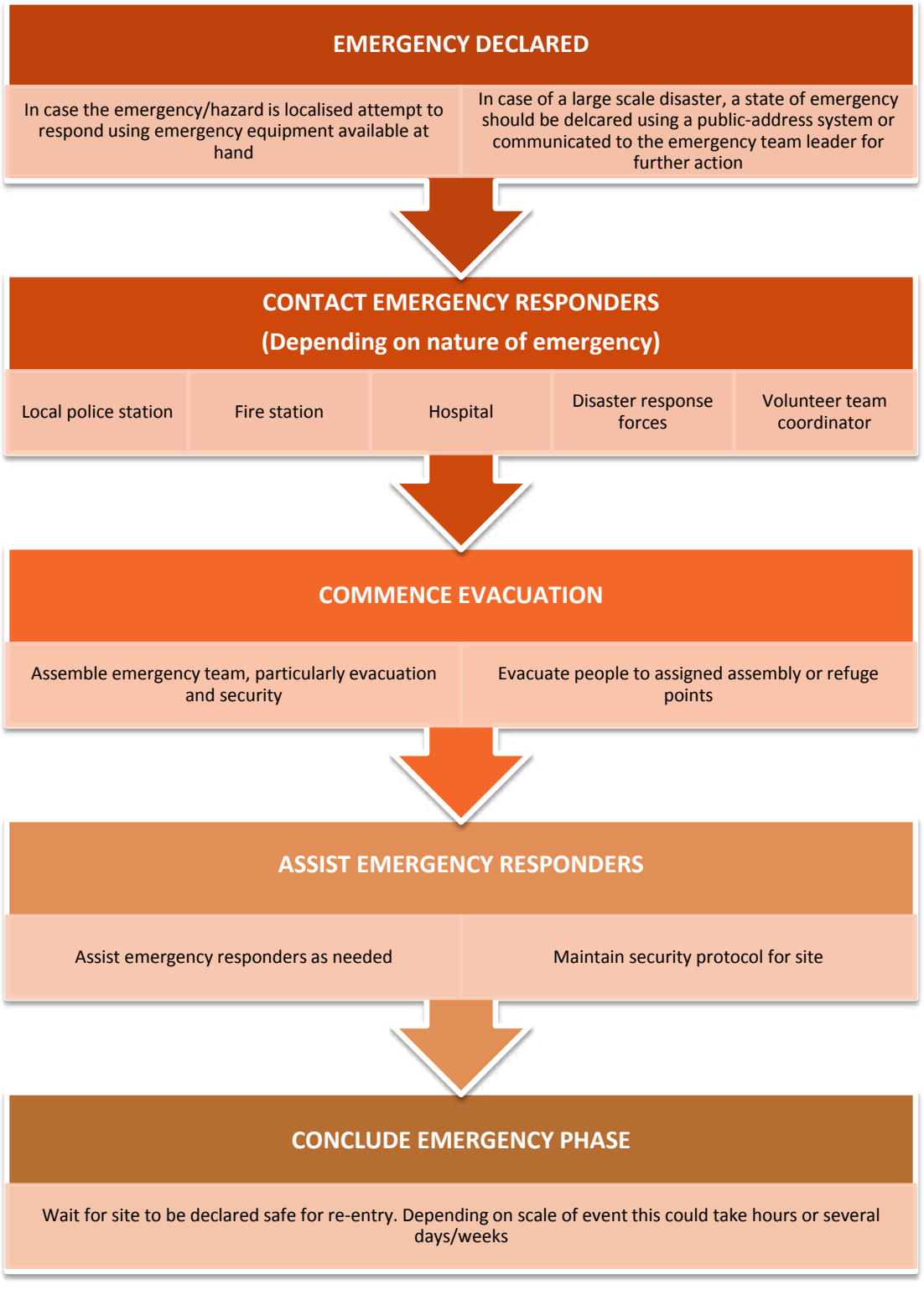


Fig. 16 Evacuation and emergency response

Basic components of an evacuation plan

1. Clearly marked exit routes with universally understood emergency signage. Evacuation may use a primary route and/or secondary routes. The evacuation pathway must be free from obstruction and remain lit even during the loss of power. All evacuation maps should be displayed at significant locations, particularly public areas
2. Fire exits, fire staircases and fire towers should be clearly marked and their access must be clear of any obstruction at all times
3. Assembly/refuge points for people within the site or in the neighbourhood
4. Adequate training for responding to specific emergency situations where external assistance may be difficult to arrange
5. Evacuation routes should be tested through drills and training exercises and should be universally accessible and clearly marked
6. Evacuation should be discussed and coordinated with local emergency responders such as the fire station and local police, so that in an actual emergency these pathways are known and familiar to both the evacuees and the emergency responders.

4.2 Monitoring and Early Warning Systems

Monitoring is an integral part of overall conservation and maintenance of heritage and is a useful tool in disaster risk mitigation (as discussed in the previous section). Monitoring of the following aspects of cultural heritage sites/ precincts should be undertaken to ensure timely response:

1. **Monitoring of physical condition of the buildings and structures:** Changes to the physical condition of individual structural elements as well as non-structural elements should be undertaken at recurring intervals. Basic monitoring can be undertaken by site staff or by the manager while specialised monitoring should be undertaken for sites that have clear structural vulnerabilities and/or high level of significance that is at risk of being impacted by a disaster.
2. **Monitoring of visitors/users:** Continuous monitoring of the numbers of visitors/users is a useful tool in assessing vulnerabilities of the site and judging peak loads of a site. Currently little data exists in most protected monuments and sites regarding daily influx of visitors and even lesser analysis of this data has been undertaken to enable policies and proposals for visitor management. Many digital and ICT tools are now available to

track visitors and users within an area. These can be employed on a regular basis and especially during peak season or special days like festivals, parades, celebrations, etc. Security systems may include X-Ray scanners, metal detectors, hand-held scanners, vehicle scanners, CCTV monitoring, biometric access control systems, etc.

3. **Meteorological monitoring:** Localised monitoring of relevant meteorological parameters including temperature, rainfall, wind speeds may be needed for certain cultural heritage sites/precincts to ensure adequate preparedness and emergency response.
4. **Monitoring of localised parameters such as moisture, heat, etc.:** Monitoring of site parameters such as moisture levels, temperature, humidity levels, change in pressure are useful tools for early warning. In enclosed spaces or spaces with movable collections it is essential to have heat or smoke detectors to detect fires, security and alarm systems to alert against theft, vandalism, violence and other illegal activities and each site should be equipped with a basic security team, especially if objects or collections of high value are located within the site.

4.3 Emergency Response Systems within the Site/Precinct: Automated and Manual

Cultural heritage sites and precincts should be equipped with the following emergency response systems:

1. **Fire suppression systems** that respond to the specific needs of the site or precinct. Fire suppression systems can be automated or manually operated or a combination of both depending on the typology of the site. However, it should be considered that in the case of many cultural heritage sites and precincts, standardised systems of fire suppression may not be compatible with the historic fabric and their installation/ and use may impact the heritage values of the site. Therefore, it is important to understand the material, construction and aesthetic value of the site as well as assess possible ignition sources before setting up a fire suppression system. All staff and management should be regularly trained in the usage of these systems and these should be easily accessible and regularly serviced and replaced when needed
2. **Public address systems** and provision for wireless communication in case of loss of telephonic networks and communication. This could include walkie-talkies, hand-held radios and intercom systems. Public address systems are particularly useful for large scale sites and heritage precincts with inhabitants

3. **Security systems** like automated door locking, cut-off for elevators systems and access to potentially hazardous areas within the building, cut-off for electrical supply and water supply systems. Basic physical barriers at entrances and exits, locking systems should be provided in every heritage site in both public spaces as well as storage and archive areas. These should be monitored regularly
4. **Emergency lighting and electrical back-up systems** that provide public areas with enough lighting in the scenario of a power failure, as well as, protection of electrical equipment from power surges and fluctuations

Other response systems that respond to the specific hazards identified during the risk assessment stage should be incorporated as well. It is important to take the site requirements and limitations into consideration while implementing such systems.

4.4 Emergency Response Systems at Neighbourhood and District Level

The emergency response systems at neighbourhood and district level should also be examined with respect to the cultural heritage site/precinct for compatibility. For instance, many heritage precincts have dense settlements, are difficult to access due to terrain, planning, road widths, etc., and are difficult to navigate due to the nature of activities. Therefore, emergency access to the precinct or site may be compromised in case of an emergency. DDMAs and SDMAs should be consulted while drawing up an evacuation and emergency response plan for the site or precinct. Capacity building exercises should be undertaken at both scales in order to coordinate response protocols.

4.5 Creating an Emergency Team

The hierarchy of the emergency team and the allocation of responsibilities should be clear and communicated to managers and staff of the site as well as local stakeholders that would be directly affected by an emergency. The emergency team should engage local leaders and volunteer groups as well. Since cultural heritage sites and precincts can be of extremely different scales in terms of staffing, the size of the team will vary. It is important to assign roles within the team and communicate the information regarding team structure and key resource personnel to the local authorities and emergency responders so that protocols of communication are established prior to the disaster.

A basic structure is illustrated below:

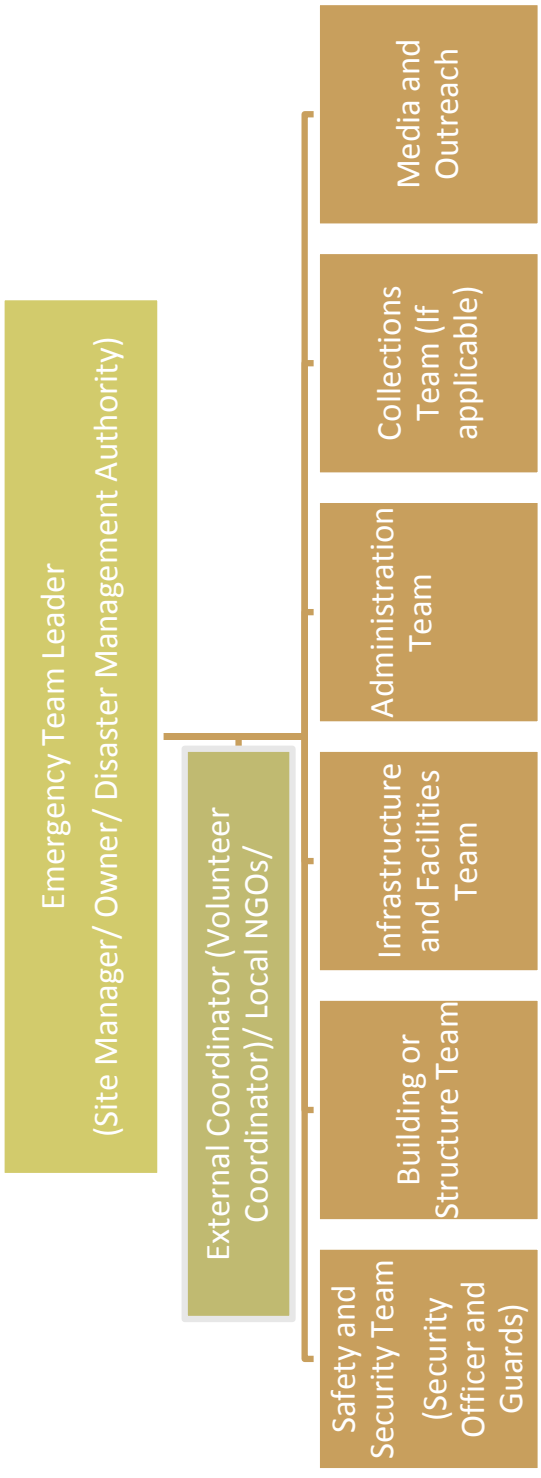


Fig. 17 Structure of emergency team

4.5.1 Roles and responsibilities of the emergency team

A clear emergency response protocol should be established that clearly indicates the flow of communication. Such an exercise should be carried out in coordination with the DDMA/ SDMA and local emergency responders to familiarise all stakeholders with the process and the potential challenges of dealing with a heritage site. A brief summary of the roles and responsibilities of each teams is given

Team Member	Pre-Disaster	During Disaster	Post-Disaster
Emergency Team Leader (Site manager or owner or local DDMA/ SDMA official depending on scale)	Set up an emergency response plan, evacuation routes Circulate evacuation plan among all team members and local emergency responders and discuss emergency protocols for various disaster scenarios Assign responsibilities to rest of the team Arrange a budget for implementing the plan Carry out regular drills and workshops	Inform emergency responders, initiate evacuation process Ensure updates at regular intervals from internal team and from emergency responders	Discuss post disaster strategies with in house team and other stakeholders Assign resources for initial assessment Use assessment to develop a long-term recovery plan along with a fund-raising strategy if needed
External Coordinator (Local NGOs, Emergency Responders)	Use workshops and training programmes as an opportunity to develop a trained team of volunteers Record the details of volunteers in a database and coordinate with other heritage sites/precincts in the region for possible networks of specially trained volunteers	Assess with emergency team leader if external assistance is required Create teams of volunteers and give them adequate briefing for their response	Use volunteer team assistance in conjunction with internal activities and check where assistance is most required Rapid visual assessment exercises using approved formats and assistance with emergency stabilisation procedures

Team Member	Pre-Disaster	During Disaster	Post-Disaster
Safety and Security Team	Ensure that all members of the security and management staff attend training and drills regularly All security staff should be conversant in the different responses to different kind of emergencies and basic CPR and first aid Security members should know locations of high value and high risk areas within the site and security systems and backup available	Ensure evacuation and emergency response protocol is initiated Assist differently abled, elderly, children and women in evacuation Ensure that no visitors enter unauthorised or dangerous areas If space is safe, ensure safety of building elements/site elements or collections Cordon off building and access in cooperation with local fire/police	Ensure access to site/ area is controlled and that elements/ collections removal and storage is done under supervision to avoid theft or vandalism Work in coordination with external coordinator to ensure that security is maintained throughout the post-disaster assessment and emergency stabilisation process
Building/ Structure Team	Ensure building services and building is maintained as per annual, monthly and daily schedules. Ensure all audits, such as structural audit, fire-safety audit, are undertaken by certified professionals in a timely manner		Modify (stabilise) the environment (remove wet material, open windows, fans) Arrange temporary storage area etc. if needed and carry out rapid visual assessment to ensure safety of site for re-entry
Facilities Team	Audits of building services, emergency services should be done regularly All defunct services should be upgraded regularly	Turn off access to facilities at risk such as power supply, gas supply etc. and ensure that essential infrastructure is available such as water, wireless communication etc.	After environment is stabilised ensure that access to facilities is restored as soon as possible with coordination with external agencies

Team Member	Pre-Disaster	During Disaster	Post-Disaster
Administration Team	Ensure that all records, archives and key documentation of the site/ precinct has a digital back-up as well as physical copies that are stored in an off-site secure location Internal funds should be assigned regularly towards risk assessment, risk reduction and emergency management		Internal funds to be assigned for post-disaster assessment and temporary stabilisation Administration team should be able to coordinate with other similar sites within the region to mobilise external assistance if needed
Collections Team	Collections should be documented and prioritised and the collections team should be trained in proper procedures for retrieval and temporary storage of collections	After ensuring that site is safe for human access, prioritised collections should be retrieved first, catalogued and stored	Ensure all damage is documented and photographed. Determine what is needed for recovery — volunteers, material and equipment, outside expertise, space, specialised storage or treatment facilities.
Media and Outreach Team		Media Team should be coordinating with other teams to ensure that information provided by the site is accurate and succinct	Coordination with external agencies to offer clear and brief description of loss and damage and appeals for assistance if needed

Fig. 18 Roles and responsibility of emergency team

4.6 Emergency Supplies and Equipment

An indicative (not comprehensive) list of emergency supplies and equipment is listed. Temporary salvage of sites may only be undertaken once the emergency has been declared as stabilised and the site is declared safe for re-entry. An assessment of stabilisation equipment may be needed

for complex sites. Potential suppliers and store-houses for such material can be arranged for, while creating the emergency plan.

For Evacuation of people

- Emergency lights, flashlights
- First aid kits
- Masks
- Wheelchairs and stretchers as needed

For temporary stabilisation or salvage of building/site

- Hard hat or helmet
- Safety goggles
- Masks
- Flashlights and Emergency Lamps
- Assorted gloves including standard rubber gloves, acid resistant gloves, heat resistant gloves or mitts
- Assessment forms and clipboards with stationery
- Cameras with spare battery packs and spare memory cards
- Caution tape
- Labels and stick-on tags
- Duct tape
- String and Rope
- Basic tool-box
- Basic storage boxes and packing material including water-proof sheeting for temporary covering of exposed areas
- Basic hardware including timber battens, nails, screws, etc. for emergency stabilisation

5 Post-disaster Assessment, Planning and Recovery Processes

5.1 Post-disaster Documentation and Assessment of Loss

Post-disaster documentation, assessment can only be undertaken once the emergency is concluded and the situation within the site/precinct and its surroundings has been adequately stabilised. Documentation and assessment of the situation is integral to formulating a post-disaster recovery plan and generating the resources needed for the same. The following aspects should be considered while undertaking documentation and assessing loss and damage due to disaster.

1. **Standardised procedures and methodologies for carrying out post-disaster documentation and assessment:** Post-disaster documentation and assessment can vary depending upon the scale of the disaster and the consequent impact on the site or precinct. In general, a visual survey of the site/precinct is undertaken in the first stage to inform the process of detailed surveys and assessment. The visual survey can be a simple checklist to ensure that the site/precinct is safe for re-entry and assessment, or be a means to assess if immediate stabilisation procedures such as shoring up structural components on the site and creating access by removal of debris are needed. The format for documentation and assessment should be developed while creating the disaster management plan. Several established methodologies authorised by international agencies already exist for this purpose.
2. **Scheduling and timelines for carrying out assessment:** Post disaster damage assessment of cultural heritage sites and precincts should only be undertaken once the risks that have been created from the disaster have been addressed and the safety of the professionals or volunteers undertaking the assessment exercise can be ensured. A timeline which outlines initial visual surveys followed by detailed documentation and assessment should be discussed with local authorities and emergency responders to ensure coordination at each stage of this process.

3. **Mobilising resources for assessment:** In case of L2 and L3 level disasters, the damage to cultural heritage sites/precincts may be wide-spread and it may not be possible to carry out assessment using internal resources. New technologies, such as crowd-based maps, ICT platforms where volunteers can share information should be utilised to maximise efficiency. Teams of trained volunteers can be assigned specific tasks to conduct rapid visual assessment.
4. **Compiling the data in a meaningful way to inform the process of post-disaster recovery planning and action:** Damage assessment and compiling the total losses due to disaster should be communicated to local stakeholders, management and possible funding or donor agencies in a clear and effective manner so that planning for recovery can be undertaken in an efficient and transparent manner. The post-disaster needs assessment based on this data should prioritise actions based on:
    I. Elements of the site which are at highest risk due to the disaster
    II. Elements which are of the highest significance and are the most vulnerable
    III. Elements that have suffered the greatest damage but are retrievable
    IV. Relatively stable aspects
    V. Irretrievably damaged elements

The basic procedures involved in post-disaster assessment are (ICCROM):

Assessment of the context	• It is essential to ensure that the site/precinct and surroundings are safe for entering and working and that it is secure and that basic services are available
Evaluating initial assessment	• An overall picture of the site damage will enable the rescue team to list out immediate needs and resources, gather permissions and assistance, set out criteria for salvage procedures and develop the initial plan
Secure and stablise	• Depending upon the scale of the disaster, it may be necessary to secure the location before undertaking any type of salvage operation
Salvage or transfer of collections based on initial assessment	• Based on initial assessment, it may be deemed urgent to remove certain elements from their location and shift them to a secure temporary location
Detailed assessment	•This should be undertaken by qualified professionals only. Detailed assessment should be accompanied with documentation, visual as well as descriptive to keep a detailed record of the condition of the object prior to any treatment

Fig. 19 Post disaster assessment process

5.2 Emergency Stabilisation- Approaches

Before long term repairs, recovery and reconstruction processes can be undertaken, interim measures to stabilise the site or precinct may be necessary to ensure safe access to the site and reduce risks from the disaster. A structural expert or conservation expert should be consulted for the least invasive approach towards stabilisation which ensures that the values of the site/ precinct are not further compromised by such interventions.

Some interim stabilisation steps have been listed below:

1. Creating a temporary shelter/roof for the structure to protect it from environmental damage, to secure the interior spaces and to stabilise working conditions for any interior spaces
2. Shoring, propping, anchoring or bracing to add temporary structural support to a building that has suffered impact/structural damage. These processes require the inputs of a qualified expert since inappropriate supporting systems can cause further damage
3. Drying out structure or interiors using mechanical ventilations, fans, de-humidifiers depending on extent of damage due to water or moisture to arrest biological attacks, prolonged humidity, etc.
4. Dry or wet surface cleaning depending on material for surfaces that are of high value and are at high risk
5. Dismantling of structure may be considered in some scenarios where the structural system allows for a re-assembling process and in the scenario where extensive documentation exists

Stabilisation processes should only be undertaken after assessment stage is complete and decisions regarding prioritisation of actions have been agreed upon by stakeholders.

Interim stabilisation of the site/precinct is also important since it offers the site managers, local stakeholders and authorities time to get organised, raise funds and take considered decisions regarding post-disaster repairs and recovery exercises. Haste should be avoided at all costs since it can result in further adding to the loss of heritage value in the process of recovery and cause further damage.

5.3 Post Disaster Repairs and Reconstruction

Post disaster repairs and reconstruction of damaged sites/precincts should be undertaken only on the basis of sound documentation and assessment practices. Poor reconstruction

practices cause further physical damage to heritage fabric as well as increase it structural vulnerability. Reconstruction and rehabilitation approaches need to take into account the legislative frameworks already in place for different typologies of heritage sites and precincts. In general, the following principles should be followed:

1. An approach of **minimal intervention** should be undertaken for sites of historic and archaeological importance and any intervention should be based on **sound documentation and research.** Aspects of authenticity and visual integrity should form the basis of any reconstruction, repair, and retro-fitting attempt.
2. As far as possible, **traditional skills and technologies** where they still exist should be employed in the repair and restoration of damaged structures. This helps ensure continuity of building and crafts traditions.
3. Many cultural heritage sites and precincts hold strong cultural/ socio-economic associations with the local population and restoring them instils a sense of normalcy after a disaster. These considerations should facilitate the conservation/ reconstruction of heritage within the overall recovery plan.
4. Principles of 'build back better' form a central component of international frameworks such as the Sendai Framework. However, the notion of 'better' with respect to cultural heritage is yet not clearly defined. This means that **retro fitting measures, which may increase the structural stability of cultural heritage sites, should be undertaken with caution** and only after carrying out community consultation among stakeholders discussing clearly on the benefits as well as limitations of such an approach. Retro-fitting may have a significant impact on integrity and value and this potential impact should be discussed and evaluated against the benefits.

5.4 Funding, Partnerships and Business Planning

Generating resources for post-disaster rehabilitation and recovery requires the contribution of local, regional, national as well as international partners and institutions, which often makes the task of fund raising as well as the task of effectively utilising the funds a complex process. A sound business plan with clear objectives and timelines should be prepared by the cultural heritage site manager, considering the views of local stakeholders, and used for raising funds.

Funds are typically financed and disbursed through the State exchequer, in coordination with the Centre and/or international funding agencies. The usage of funds is determined through the relevant ministry, and in the case of Centrally/State Protected monuments and sites this would be the MoC, while urban precincts and centres would be funded under the MoUD. Un-

protected heritage can be funded through non-government agencies, PPP funding and other partnership mechanisms.

5.5 Linking Recovery to Risk Reduction

Recovery, rehabilitation and reconstruction processes should be linked to risk reduction and reducing the potential impact of future disasters. The idea of 'build back better' reinforces this approach. Often post-disaster recovery processes may provide insight into managing risks and emergencies and highlight gaps in the previous approach towards disaster risk management. Risks that were earlier not addressed can be incorporated and identified vulnerabilities can be removed or reduced through sound reconstruction, restoration or even reassigning of usage. The recovery phase should also be used as an opportunity for building capacity among professionals and local stakeholders for better risk reduction.

6 Training, Capacity Building and Raising Awareness

Training, capacity building and raising awareness are central aspects of disaster risk management and must be undertaken at multiple scales. With respect to cultural heritage sites and precincts, due to the diversity of stakeholders that are involved, programmes must be developed between agencies and institutions targeted towards different action areas within disaster risk management. Furthermore, these programmes must be part of a recurring cycle, to ensure continuous upgradation of disaster risk preparedness and ensuring that the continuity of response protocols is maintained. Training and capacity building should be designed with the following central objectives:

- Highlight the need for holistic approach towards disaster risk management that responds to the specific needs of cultural heritage sites and precincts
- Enable site managers and site staff to carry out basic risk assessment for their sites independently and build systems for management, through risk reduction measures, emergency response protocols and recovery processes
- Stakeholders including site managers and local communities should be equipped to implement, monitor and update disaster risk management plans in their assigned capacity
- Networks between different agencies responsible for the management and administration of cultural heritage sites and precincts should be established to build institutional capacity and cooperation
- Highlight specific issues that deal with a hazard that emerges due to specific geographical and cultural context

The mandate for training and capacity building for disaster risk management is primarily with the National Institute for Disaster Management (NIDM). However, State Institutes for Disaster Management as well as SDMA/DDMAs should carry out training at their levels.

The following steps should be undertaken prior to personnel training in the form of drills or longer programmes:

1. Undertake risk analysis and risk prioritisation and assess existing capacities of the staff
2. Identify each of the critical functions of staff and design emergency team and structure
3. Develop standards and protocols for preparedness and response
4. Identify external resources and partnerships needed to carry out specific drills and exercises
5. Prepare draft disaster plan and use it as a test for undertaking drills and simulations and update the plan based on the response
6. Additionally, training and awareness building activities should be undertaken based on specific hazard typologies and specific risks that a site may face

6.1 Capacity Building for Disaster Risk Management Professionals/ Emergency Responders

Programme	Description	Duration
Introduction to Heritage Concerns and Issues	This module introduces the specific concerns and scope of cultural heritage and challenges of disaster risk reduction involved	2-3 days
Disaster Risk Management for Cultural Heritage Sites and Precincts	This type of course will provide interdisciplinary training for participants to equip them to undertake integrated disaster risk assessment of cultural heritage, build comprehensive systems for disaster risk management incorporating various measures aimed at reducing risks, respond to disasters and recovering from them to be able to formulate disaster risk management plans for cultural heritage sites and precincts	1-2 weeks
Emergency Response and Stabilisation for Cultural Heritage	This module will train emergency responders in the appropriate emergency response procedures applicable for cultural heritage sites and precincts, highlight the processes for retrieval of artefacts and collections, illustrate measures for temporary stabilisation that will not adversely affect cultural heritage sites and so on	3 days-1 week

Fig. 20 Training of disaster risk management professionals

6.2 Training of Site Staff and Management

The following programmes should be integrated within the annual/monthly calendars for sites with pre-existing management plans or systems:

Programme	Description	Duration	Frequency	Participants
Basic Security Protocol Delivery	Basic training to security and staff about critical infrastructure, security and standard responses	1 hour	Once a month	Particularly security staff, managers
Risk Assessment Training	Participant should be able to undertake basic risk assessment of the building, infrastructure, management, etc.	2-3 days	Once in 2-3 years	Site manager and staff members. May be in coordination with the heritage practitioners involved in the conservation/ management of the site
Table Top Exercise	A Table Top Exercise is a paper drill intended to demonstrate the working and communication relationships of functions found within the disaster management organisational plan	½ Day	Once in 3 months	The exercise is intended primarily for the administrators, managers and personnel who could conceivably be placed into an officer's position upon activation of the disaster management plan
Emergency Drill or Workshop at Site/Precinct Level	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 day	Once in 6 months	Ideally visitors should also be participants in this drill to raise awareness but also provide a realistic scenario to staff and management

Fig. 21 Training programmes for staff and management

6.3 Raising Awareness among Local Communities, Residents and Visitors

Due to the specialised concerns and challenges of addressing disaster risk management for cultural heritage sites and precincts, it is important to tailor activities for raising awareness for disaster risk management for local communities that reside within and around these sites as well as visitors and tourists. Local communities can also be mobilised as volunteers during and after a disaster, so prior training will ensure a robust response and also streamline coordination. Awareness can be raised through the following actions:

Programme	Description	Duration	Frequency	Participants
Off-site Interpretation/ Orientation/ Fixed Literature	ICT based literature or printed literature that highlights the emergency plan for the site or precinct. This can be interactive or in the form of brochures and maps	N/A	N/A	All local stakeholders, visitors to the site should be able to access this information freely and widely
Basic Emergency Protocol Delivery	Basic training to engage security and emergency responder in the area about acceptable routes, procedures	½ day	Variable (Depending on Level of Exposure to Risk)	All stakeholders that spend extended periods of time on the site
Emergency Drill or Workshop at Site / Precinct Level	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 day	Once in 6 months	Residents, visitors and other stakeholders should be participants in this drill to raise awareness but also provide a realistic scenario to staff and management

Fig. 22 Awareness generation programmes

6.4 Training for Heritage Practitioners/Professionals

Training of cultural heritage practitioners should be undertaken to equip them with necessary skills to integrate concerns of disaster risk management. These can be in the form of short term workshops or programmes or sustained training incorporated within existing syllabi of professional degrees. Some possible formats for training are described below:

Programme	Description	Duration
Disaster Risk Assessment Methodologies	This module will explore the basic relationships between hazards, vulnerabilities and disaster risks, illustrating each stage in the disaster risk management process. Building upon this base, approaches and methods for risk assessment will be introduced	2-3 days
Disaster Risk Management for Cultural Heritage Sites and Precincts	This type of course will provide interdisciplinary training for participants to equip them to undertake integrated disaster risk assessment of cultural heritage, build comprehensive systems for disaster risk management incorporating various measures aimed at reducing risks, respond to disasters and recovering from them and eventually be able to develop disaster risk management plans	1 -2 weeks
Post Disaster Assessment for Cultural Heritage Sites and Precincts	This module will focus on post-disaster assessment methodologies for heritage sites and precincts, and equip heritage practitioners with the tools needed for carrying out assessments at various scales and in various scenarios of disaster	2-3 days
Planning for Disaster Risk Recovery	This module explores actions that are involved in post disaster recovery and rehabilitation of cultural heritage sites and precincts	2-3 days

Fig. 23 Training of heritage practitioners

7 Conclusion and Action Plan

7.1 Implementation

Some of the provisions for sites and precincts that have been detailed in these guidelines need to be undertaken with immediate effect, while the implementation of longer term strategies and changes may require time and resources. The prioritisation of these actions can be divided into short-term (0-1 year), medium-term (1-5 years) and long-term actions (5-10 years). An outline of various actions proposed within the framework of these Guidelines is given:

Level	Action	Agency Responsible
National	A national survey of all centrally protected monuments and sites with GIS databases, site extents, vulnerability mapping should be carried out 3D maps/documentation for UNESCO World Heritage Sites and detailed risk assessment and disaster risk management plans for UNESCO World Heritage sites should be prepared	MoC (ASI and NMA) in collaboration with NGOs and other cultural institutions and networks
	Identify and disseminate methodologies, practices, and techniques to monitor the capacity and impact of tourism on cultural heritage sites and precincts	MoC in collaboration with MoT with expert inputs
	Create a streamlined Disaster Risk Management Plan which includes a detailed strategy for risk reduction of all ASI monuments and sites	MoC/ASI
	Scientific exercise on risk assessment of cultural heritage sites which may inform a methodological framework for different hazards and different typologies of cultural heritage sites	ASI with technical inputs from experts in the area

Level	Action	Agency Responsible
	Build institutional capacity and include DRM within nationally approved syllabi for heritage professionals Shorter training programmes to be organised for staff and management with a roster of programmes	ASI in collaboration with NIDM/NDMA
	National Response Forces should receive basic training for handling emergencies in heritage sites and precincts	NIDM, CISF, NDRF
	New schemes involving heritage precincts/sites should include disaster risk planning within their ambit, with specialised approaches to deal with heritage precincts and neighbourhoods	MoUD, MoT, MoRD, MoC and other ministries
	A manual on best practices and detailed guidance which refers to the Indian context should be developed	MoC with assistance from NDMA and other institutions where needed
State	A network and directory of trained experts should be prepared at state levels to ensure a database of trained professionals that can be resources during an emergency	State Archaeology Departments to take the lead
	Include the different categories of cultural heritage which are looked after by state government in DRR plans	SDMA, State archaeology Department
	Enforce and monitor the implementation of State Archaeological Acts governing the cultural heritage sites and precincts	State Archaeological Department
	Conduct environmental impact assessment(EIA) as well as Heritage Impact Assessment(HIA) prior to any infrastructure or development projects	State Archaeological Departments, Union local bodies. Inputs maybe sought from Ministry of Environment Forest and Climate Change
	Coordinated state level plans to be developed for state protected monuments and heritage precincts	SDMAs, State Archaeology Departments, State Government

Level	Action	Agency Responsible
District	Districts should streamline heritage concerns within overall disaster risk management plans and build capacity at the district level	DDMA, Local ULBS, Panchayats
NGOs/ Allied Heritage Institutions	Survey of unprotected heritage to be undertaken to understand risks to unprotected heritage sites	-
	Roster of training activities and drills that build capacity at the institutional level	Institutions, universities

Fig. 24 Implementation strategy

7.2 Revising and Updating the Guidelines

This document is a dynamic document and will be updated every 3-5 years based on the milestones achieved as outlined in the action plan and on the field experience of professionals, site managers and policy makers. The Guidelines themselves will be supplemented with additional resources such as detailed assessment formats to be developed with technical expertise and exhaustive case studies undertaken for different hazards and different typologies of cultural heritage sites, best practice case-studies, etc.

Bibliography

Abhas K. Jha, Jennifer Duyne Barenstein, Priscilla M. Phelps, Daniel Pittet, Stephen Sena. *Cultural Heritage Conservation in Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disaster*, World Bank, 2010

Anand S. Arya, Teddy Boen, Yuji Ishiyama. *Guidelines for Earthquake Resistant Non-Engineered Construction.* UNESCO, Paris, 2014

Anna Paolina, et.al. *Risk Management at Heritage Sites - A Case Study of the Petra World Heritage Site.* UNESCO; UNESCO Amman Office, 2012

Anshuman Saikia, Denis Nkala, Ian Davis, Madhavi Malalgoda Ariyabandu, Mihir R. Bhatt, Satchit Balsari, T. Nanda Kumar. *Risk Sensitive Heritage Conservation in Sikkim*. All India Disaster Mitigation Institute, Ahmedabad, 2014

Archaeological Survey of India. *The Ancient Monuments and Archaeological Sites and Remain (Amendment and Validation) Act, 2010.* New Delhi: Archaeological Survey of India, 2010

Archaeological Survey of India, J Paul Getty Trust, USA, British Museum, UK and National Culture Fund. *Guidelines for ASI Museums.* Archaeological Survey of India, New Delhi, 2013

Cynthia Rockwell, Simon Lambert. *Protecting Cultural Heritage in Times of Conflict.* ICCROM Italy, 2016

David Myers, Stacie Nicole Smith, and Gail Ostergren. *Consensus Building, Negotiation, and Conflict Resolution for Heritage Place Management*. The Getty Conservation Institute, Los Angeles, 2009

Devdas Menon, Amlan K. Sengupta. *Handbook on Seismic Retrofit of Buildings.* Central Public Works Department, New Delhi, Indian Building Congress, Indian Institute of Technology, Madras, 2007

Eugenie Crete, et.al. *Endangered Heritage: Emergency Evacuation of Heritage Collections.* UNESCO, ICCROM, 2016

G.B. Menon, J.N. Vakil. *Commentary on National Building Code (Part 4) – Fire and Life Safety.* Gujarat State Disaster Management Authority, Indian Institute of Technology, Kanpur, 2008

Getty Conservation Institute. *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions.* Getty Publications, Los Angeles, 2000

Hans-Rudolf Meier, Michael Petzet and Thomas Will. *Cultural Heritage and Natural Disasters, Risk Preparedness, and the Limits of Prevention-Heritage at Risk.* ICOMOS, France, 2007

Helen Aprile, Gina Doubleday, Michael Gibson. *World Heritage.* Richard Forster, 2014

Herb Stovel. *Risk Preparedness: A Management Manual for World Cultural Heritage*. ICCROM, 1998

ICOMOS. *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.* International Council on Monuments and Sites, Paris, 2010

ICOMOS. *International Charter for the Conservation and Restoration of Monuments and Sites*. Venice, 1964

ICOMOS Australia (2004/2013). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance.* 2013

ICOMOS. *Kyoto Declaration on Protection of Cultural Properties, Historic Areas and their Settings from Loss in Disasters.* ICOMOS, Kyoto, 2005

Maggie Ibrahim, Andrew Kruczkiewicz. *Learning from Experience: A Summarized Review of Early Warning Systems, Moving towards Early Action.* World Vision, 2016

Marta de la Torre. *Assessing the Values of Cultural Heritage.* The Getty Conservation Institute, Los Angeles, 2002

Ministry of Law and Justice. *The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Ordinance*. Government of India, New Delhi, 2010

NDMA. *National Disaster Management Guidelines: Seismic Retrofitting of Deficient Buildings and Structures*. National Disaster Management Authority, New Delhi, 2014

NDMA. *National Disaster Management Guidelines on Community Based Disaster Management*. National Disaster Management Authority, New Delhi, 2014

NDMA. *National Disaster Management Guidelines- National Disaster Management Information and Communication System.* National Disaster Management Authority, New Delhi, 2011

NDMA. *National Disaster Management Guidelines on Management of Cyclones*. National Disaster Management Authority, New Delhi, 2008

NDMA. *National Disaster Management Guidelines: Management of Nuclear and Radiological Emergencies.* National Disaster Management Authority, New Delhi, 2009

NDMA.*National Disaster Management Guidelines on Management of Earthquakes*. National Disaster Management Authority, New Delhi, 2007

Ministry of Culture. *National Policy for Conservation of the Ancient Monuments, Archaeological Sites and Remains*. Government of India, New Delhi, 2014

Neville Agnew, Martha Demas. *Visitor Management and Carrying Capacity at World Heritage Sites in China*. The Getty Conservation Institute, 2013

Rachel Cox. *Controlling Disaster: Earthquake-Hazard Reduction for Historic Buildings*. National Trust for Historic Preservation, Washington, DC, 2001

Rajib Chattaraj, Bhubaneswar Koner. "Retrofit of the Structures of Historic and Heritage Importance."

Rajib Shaw, Noralene Uy, and Jennifer Baumwoll. *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region*. United Nations International Strategy for Disaster Reduction, Bangkok, 2008

Sipra Mitra. *Conservation of Heritage Buildings - A Guide*. Directorate General, Central Public Works Department, New Delhi, 2013

K. Smith. *Environmental Hazards: Assessing Risk and Reducing Disaster.* Routledge

Söderlund Consulting. *Be Prepared: Guidelines for Small Museums for Writing a Disaster Preparedness Plan*. Commonwealth Department of Communications, Information Technology, and the Arts, New York, 2010

Stephen Kelley, S. Patrick Sparks. *ICOMOS Methodology for Building Assessment and Mitigation following the 2010 Haiti Earthquake*. ICOMOS, Haiti, 2010

T.S. Brar, M.A. Kamal and R.K. Jain. *Seismic Retrofitting of Heritage Buildings: Conservation Interventions.* Department of Earthquake Engineering, IIT Roorkee, Roorkee ,2012

UNISDR. *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*. World Conference on Disaster Reduction, Hyogo, 2005

UNISDR. *UNISDR Terminology for Disaster Risk Reduction*. UNISDR, Geneva, Switzerland, 2015

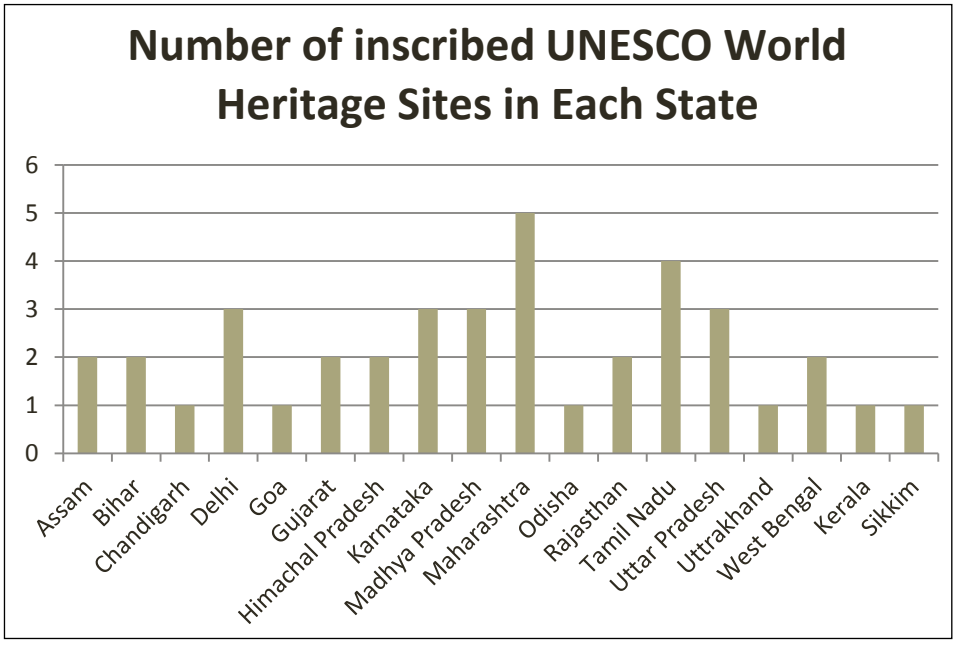
UNISDR. *The Sendai Framework for Disaster Risk Reduction 2015–2030*. Sendai, 2015

Annexures

1. Distribution of Nationally Protected Monuments and Sites and UNESCO World Heritage Sites

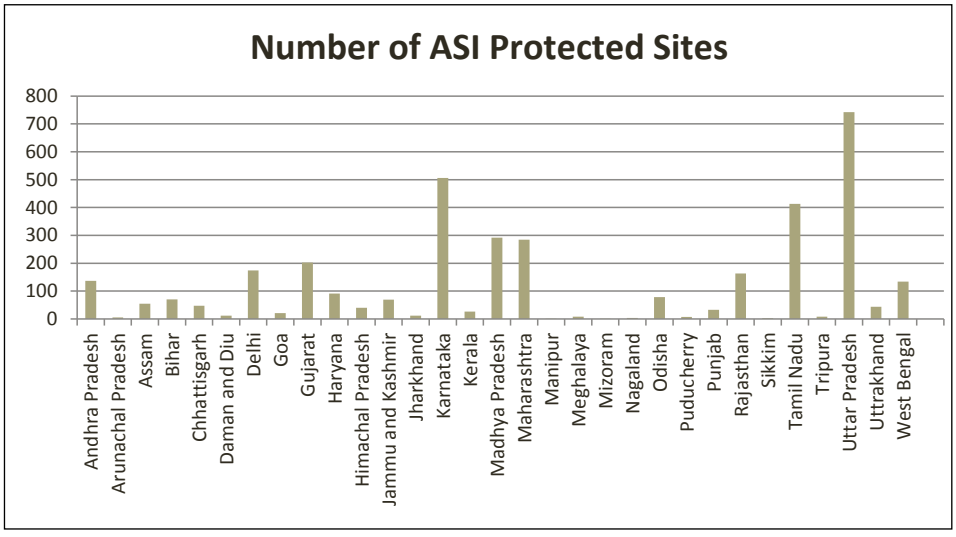
UNESCO World Heritage Sites located in India (2016-17)

Total Number	**36**
Natural	7
Cultural	28
Mixed	1



Centrally Protected Monuments and Sites and their state-wise distribution

States	Number of ASI Protected Sites
Andhra Pradesh	137
Arunachal Pradesh	5
Assam	55
Bihar	70
Chhattisgarh	47
Daman and Diu	12
Delhi	174
Goa	21
Gujarat	202
Haryana	91
Himachal Pradesh	40
Jammu and Kashmir	69
Jharkhand	12
Karnataka	506
Kerala	26
Madhya Pradesh	292
Maharashtra	284
Manipur	1
Meghalaya	8
Mizoram	1
Nagaland	4
Odisha	78
Puducherry	7
Punjab	33
Rajasthan	163
Sikkim	3
Tamil Nadu	413
Tripura	8
Uttar Pradesh	742
Uttarakhand	44
West Bengal	134
Total	3683



**(Figure does not account for the newly created state of Telangana)*

2. List of National and State Archaeological Acts

NATIONAL ARCHAEOLOGICAL ACTS

- The Treasure Trove Act, 1878
- The Ancient Monuments Preservation Act, 1904
- The Ancient Monuments and Archaeological Sites and Remains Act,1958
- The Ancient Monuments and Archaeological Sites and Remains Rules,1959
- The Antiquities and Art Treasures Act,1972
- The Antiquities and Art Treasures Rules,1973
- The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010

STATE ARCHAEOLOGICAL ACTS

- Amendment to Andhra Pradesh Ancient and Historical Monuments and Arch Sites and Remains Act 1960, 2001
- Arunachal Pradesh Ancient Monuments, Archaeological Sites, and Remains Preservation Act, 1990
- Assam Ancient Monuments and Archaeological Sites and Remains Act,1959
- Bihar Ancient Monuments and Archaeological Sites Remains and Art Treasures Act,1976
- Delhi Ancient and Historical Monuments and Archaeological Sites and Remains Act, 2004
- Goa, Daman and Diu Ancient Monuments and Archaeological Sites and Remains Act, 1978
- Gujarat Ancient Monument and Archaeological Sites and Remains Act, 1965
- Himachal Pradesh Archaeology Monuments Sites Act, 1976
- Jammu and Kashmir Ancient Monuments Preservation (Amendment) Act, 2010
- Karnataka Archaeology Monuments Sites Act, 1961

- Karnataka Treasure Trove Act, 1963
- Kerala Ancient Monuments and Archaeological Sites and Remains Act, 1968
- Madhya Pradesh Ancient Monuments and Archaeological sites and Remains Act, 1964
- Maharashtra Ancient Monuments and Archaeological Sites and Remains Act, 1960
- Meghalaya Heritage Act, 2012
- Mysore Ancient and Historical Monuments and Archaeological Sites Rules 1965
- Odisha Ancient Monuments Preservation Act, 1956
- Punjab Ancient and Historical Monuments and Arch Sites and Remains Act, 1964
- Rajasthan Monuments, Archaeological Sites, and Antiquities Act, 1961
- Tamil Nadu Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1966
- Telangana Heritage (Protection, Preservation, Conservation, and Maintenance) Act, 2017
- Tripura Ancient Monuments and Archaeological Sites and Remains Act, 1997
- U.P. Ancient and Historical Monuments and Archaeological Sites and Remains Preservation Act, 1956
- West Bengal Preservation of Historical Monuments and Objects and Excavation of Archaeological Sites Act, 1957

3. Basic Checklists for Risk Assessment

This checklist is based on a simple yes/no format which corresponds to developing an overview of the risks to a site/precinct as well as connecting them to the hazard concerned. Please note that many disaster scenarios have more than one hazard acting simultaneously and that this list does not substitute a detailed assessment of risks undertaken by an expert.

HAZARDS ADDRESSED								RISK FACTORS	YES	NO	COMMENT
GEO-PHYSICAL	HYDROLOGICAL	METEOROLOGICAL	CLIMATOLOGICAL	BIOLOGICAL	CBRN	TERRORISM	FIRE				
								Documentation of the site/ precinct is absent, insufficient or incomplete			
								Heritage site/precinct falls in active earthquake zone (Zone IV/V)			
								Heritage site/precinct is located near an identified geological fault or in an area with known history of landslides			
								Heritage site/precinct is near a water-body such as a lake, river, ocean (closer than 500 metres)			

HAZARDS ADDRESSED								RISK FACTORS	YES	NO	COMMENT
GEO-PHYSICAL	HYDROLOGICAL	METEOROLOGICAL	CLIMATOLOGICAL	BIOLOGICAL	CBRN	TERRORISM	FIRE				
								The site/precinct is near an industry/industrial area, particularly heavy industries			
								The site/precinct has high number of visitors or huge mass gathering on certain days/ months making precincts overcrowded at specific times			
								The site/precinct has insufficient entrances and exits and poor circulation networks			
								The site/precinct has been impacted due to previous disasters and has a history of recorded hazards			
								The site/precinct is inaccessible/poorly accessed/ partially accessible, especially with respect to differently abled, elderly and children			
								Regular monitoring and maintenance of the site/ precinct is absent/poorly managed/insufficient			
								Presence of inflammable liquids/materials, multiple ignition points or harmful chemicals used near the heritage site/ precinct			

HAZARDS ADDRESSED								RISK FACTORS	YES	NO	COMMENT
GEO-PHYSICAL	HYDROLOGICAL	METEOROLOGICAL	CLIMATOLOGICAL	BIOLOGICAL	CBRN	TERRORISM	FIRE				
								Large trees, vegetation and other potential obstructions are present			
								Security arrangement is inadequate/poor			
								Individual buildings/ structures have gone through structural changes in the past, changing the structural loading/behaviour			
								There are structural cracks in the heritage structure			
								There are leakages in the heritage building			
								Ventilation system of the building is inadequate/absent			
								Doors, windows, fences, gates are in poor condition			
								There is biological growth/ vegetation or mould growth within the structure			
								Sewage and wastewater management system of the site is inadequate			
								Storm water system in the vicinity is inadequate/absent			

HAZARDS ADDRESSED								RISK FACTORS	YES	NO	COMMENT
GEO-PHYSICAL	HYDROLOGICAL	METEOROLOGICAL	CLIMATOLOGICAL	BIOLOGICAL	CBRN	TERRORISM	FIRE				
								Regular inspection and testing of electrical installations, faulty equipment replaced and no overloaded circuits			
								Building security staff were not well-trained for all kinds of possible emergency, especially evacuation, emergency response etc.			
								Several structures are near each other along with other potential obstructions			
								Regular monitoring of weather condition, humidity and temperature for the site/ precinct is inadequate			

(This checklist uses references from: Tools for the Assessment of Social and Hospital Safety for Multi-Hazard in South Asia- UNHABITAT, SAARC and UNISDR, NPS Museum Handbook, PART 1 (2000) as well as Managing Disaster Risks for World Heritage-UNESCO, ICCROM, ICOMOS, and IUCN)

4. Some Case Examples

1. Resilience of Cultural Heritage: The Construction System of Taq and Dhajji Dewari

Taq construction consists of load-bearing masonry walls with horizontal timbers embedded in them. It is a composite system of construction with a modular layout of load-bearing masonry piers and windows bays tied together with ladder-like construction of horizontal timbers embedded in the masonry walls at each floor level and window lintel level. They serve to hold the masonry walls together and tie them to the floors. These horizontal timbers tie the masonry in the walls together, thus confining the brick mud or rubble stone of the wall by resisting the propagation of cracks. The masonry piers are almost always 1 to 2 feet square and the window bay is 3 to 4 feet width. The *Taq* is used for the front walls (Jain, n.d.) (Langenbach).The construction practice which stands in contrast to the codes has the following characteristics:

- Use of mortar of negligible strength
- Lack of any bonding between the infill walls and the piers
- Weakness of the bond between the wythes of the masonry in the walls
- The use of heavy sod roof

The Earthquake Resistance of Taq Construction

- This timber-laced masonry work well in earthquake because of its ductile-like behaviour as a system
- This behaviour is the result from the energy dissipation because of the friction between the masonry and timbers
- Mortar used in the masonry is of low-strength mud or lime, rather than high-strength cement mortar use now-a-days
- With timber-laced masonry, mortar is not designed to hold the bricks together, but rather to hold them apart
- Timbers is used to tie them all together

Dhajji Dewari

Dhajji Dewari is a timber frame into which one layer of masonry is tightly packed to form a wall, resulting in a continuous wall membrane of wood and masonry. The term is derived from a Persian word meaning "patchwork quilt wall". The frame of each wall consists not only of vertical studs, but also often of cross-members that subdivide the masonry infill into smaller panels, imparting strength and prevent the masonry from collapsing out of the frame. The Dhajji Dewari is frequently found used for partition walls between buildings (Langenbach 2009).

The Earthquake Resistance of Dhajji Dewari Construction

- The presence of timber studs, which subdivides the infill, arrests the loss of the portion or all several masonry panels and resists progressive destruction of the rest of the wall
- The closely spaced studs prevent propagation of diagonal shear cracks within any single panel
- It reduces the possibility of out-of-plane failure of masonry of thin half-brick walls even in the higher storeys and the gable portion of the walls (Langenbach 2009, Rai & Murty 2005)

This both type of construction has emerged after the 2005 earthquake as a good example of earthquake resistant vernacular buildings. Most of these buildings are hidden away within the mountains areas both in Pakistan and India. Earthquake in Kashmir have occurred with regularity over the centuries, and the Kashmir houses reflect an adaption to this threat through Taq and Dhajji Dewari construction (Langenbach 1992).

2. Post-Disaster Restoration and Reconstruction of Cultural Heritage: Ayna Mahal and Darbargadh Complex after the Bhuj Earthquake

The Gujarat earthquake also known as Bhuj earthquake occurred on 26th January 2001. The epicentre was about 9-kilometres south-west of the village of Chobari in Bhachau Taluka of Kutch District of Gujarat (2001). Bhuj was within 20 kilometres of the fault break and suffered very severe damage. The palace complex in the old walled city consisted of a collection of buildings in a variety of styles, dating from the 18th century suffered extensive damage and collapsed partially or completely. The entire structure of the Ayna Mahal complex was badly affected by the earthquake and urgent measures to repair and strengthen needed to be taken to save the entire complex. For restoration and reconstruction, the Architectural Heritage Division at INTACH along with Gujarat Chapter took the following steps to save the complex with financial support from CARE, India (Vasavada).

PHASES	TASK	COST	TIME SCHEDULE	DETAILS OF TASK
Phase 1	Documentation	1,00,000 (INR 1 lakh)	Six weeks	• Room-to-room condition survey of the existing state of the building was done • Whenever required instrumentation survey was done to ascertain the exact deformation in structural elements that had occurred during the earthquake • All the items of restoration were listed and a detailed inventory of items and materials to be used was prepared • An estimate of works was prepared before the commencement of the works. The estimate covered all the items of construction, repairs and restoration as required
	Restoration	8,00,000 (INR 8 lakhs)	Ten weeks	• Strutting and shoring the external walls for stability was carried out • Supporting and stabilising the floors structure • Masonry repairs included strengthening by simple filling of cracks, by grouting the structural cracks, consolidate the connection between walls and floors, walls and pillars, walls, and roofs • Essential electrical repairs and reinstallations were undertaken

PHASES	TASK	COST	TIME SCHEDULE	DETAILS OF TASK
Phase 2	Restoration of damaged structures	1,00,00,000 (INR 1 crore)	Twelve months	• Restoration of the Ayna Mahal, Hira Mahal, and Fuvara Mahal, including the peripheral walls and ceilings elements which had buckled • Repairs to pillars, doors, windows, and grills within the building • Repairs to adjoining areas that had bearing on the cluster of museum building • Restoration of infra-structural service was carried out
Phase 3	Restoration of the museum complex- Interior of the museum cluster	1,50,00,000 (INR One crore fifty lakhs)	Eighteen Months	• Reinstatement of the decorative art work in wood, masonry, and plaster was carried out • Essential public convenience around the building for public use was provided • Immediate surroundings were cleared and made accessible

5. Checklists for Emergency Preparedness and Response

This checklist can be used to determine level of emergency preparedness within a site or a precinct in a broad manner. It outlines essential tasks for early warning systems, evacuation and emergency response procedures.

	ACTION	YES	NO	COMMENT
Monitoring and Early Warning Systems	Monitoring systems for humidity, temperature, water levels, smoke/particulate matter exist where applicable			
	Monitoring of active structural faults/cracks, changes to building envelope/interiors is done on a regular basis			
	Fire alarms such as heat detectors, smoke detectors are installed			
	Early warning systems for intruders, tampering of security systems installed			
	A public-address system or other wireless system for communication has been installed			
	CCTV systems, X-ray scanners, metal detectors and other electronic and mechanical surveillance equipment as identified are in place			
	Emergency lighting and back-up generator is available where needed, specifically in public areas			
	The site is staffed with security personnel, guards, etc. where needed			

	ACTION	YES	NO	COMMENT
Evacuation	A detailed evacuation plan with emergency exits, refuge areas, etc. has been prepared and shared with all site managers and emergency responders			
	The evacuation plan is located in prominent locations inside the building as well as in public areas in the site and surroundings with BIS signage marking evacuation routes and exits			
	Instructions and protocols for evacuation have been prepared, detailing the actions to be taken by staff in discovering an emergency			
	A directory of emergency contacts list has been prepared and is easily available to site managers, residents, etc.			
	All evacuation routes and access points are universally accessible, free from obstructions and have provision for emergency lighting where needed			
Emergency Response	Specific sets of protocol exist for different emergencies and these have been clearly communicated to staff and management			
	A directory of emergency contacts exists and is readily available			
	The emergency response agencies, including nearest fire stations, police stations, hospitals, etc. have been contacted and familiarised with any specific challenges in accessing the site or addressing any specific areas			
	Staff have access to weather band radios and other wireless communication			
	A basic list of emergency supplies has been made and stored in a secure and easily accessible location			
	Fire sprinklers, extinguishers etc. are available and are maintained regularly			
	A first-aid kit with supplies is available			
	Up to date copies of important documents and records stored off-site			

6. Post-disaster Assessment Formats

An indicative list of aspects to be assessed and recorded has been illustrated below. Detailed assessment formats should be developed based on local conditions, available information and resources. Several established Rapid Visual Screening formats exist for buildings, which can be modified for the assessment of heritage structures as well.

Name of Structure				
Address	Geographical Location Latitude: Longitude:			
Assessor Name and Affiliation				
Date/s of Disaster				
Condition before disaster	Good	Fair	Poor	Unknown
Mode of examination	Rapid Visual assessment (External)	Partial Assessment (Exteriors and Interiors)		Detailed Physical Assessment
Does building have any movable objects/ collections	Yes	No		Unknown
Building Management/ Protection	Centre	State	City	Other
Ownership	Private	Public	Government	Other
Site Details	Site Area		Built Area	
	Number of floors		Building Height	

Building Use	Tourism	Religious	Community
	Residential	Commercial	Institutional
	Government	Not In use	Other
Building Technique/ Construction			

Element	**Extent of Damage**				**Reference/ Comment**
	Extensive >7 5%	**Major 50-75%**	**Moderate 25-50%**	**Minor <25%**	
Foundation					
Vertical supports-columns, walls, etc.					
Horizontal supports-beams, lintels, etc.					
Partitions, non-structural walls					
Openings-windows, doors, etc.					
Floors, ceilings, etc.					
Decorative elements					
Finishes					

7. Template for a Disaster Risk Management Plan

A draft structure and contents list for a Disaster Risk Management Plan for Heritage Sites and Precincts has been illustrated below, along with possible sources and frameworks that need to be referenced for each.

Section/Chapter	Description
Introduction	This section should include the aims and objectives of the Disaster Risk Management Plan, the legal and policy frameworks that it functions under, the scope of the plan and its links with the management of the site.
Documentation	The documentation would include existing site plans, GIS documentation, drawings mapping out built and unbuilt features of the site, residents/ users and stakeholders involved as well as a summary of all the heritage assets and resources that constitute the site.
Risk Assessment	The hazard mapping at the site level and at the context along with a detailed identification of vulnerabilities at different scales. Disaster scenarios building upon the possible hazards should be used to identify potential impact to lives and property as a means of identifying risks.
Risk Reduction	Proposals for risk reduction including preventing hazards where possible, mitigating the impact of hazards, reducing the vulnerability of the site through structural, planning and non-structural measures, potential use of traditional knowledge systems as a means to mitigate risk. At this stage, care should be taken that proposals for risk prevention and mitigation should not have adverse impact on the heritage value of the site.
Emergency Preparedness and Response	Planning and procedures for emergency preparedness for people and heritage, roles of security and managers in case of an emergency, actions taken during the first 72 hours of a disaster

Section/Chapter	Description
Post-Disaster Assessment and Planning for Recovery	Assessing the damage to the site, post-disaster recovery planning, repair, and restoration for short-term and long-term, Linking recovery to mitigation
Implementation, Budget and Phasing	Identify the funding source-state or central government, or NGOS or other cultural institutions and networks. Identification of agency responsible for implementation, time-frame
Reviewing and Updating the Plan	Awareness raising activities, regular emergency drills, Periodic review based on the effectiveness of the plan after implementation and in the light of the experience of an emergency, if any has happened

Contact Us

For further information on *Guidelines for Cultural Heritage Sites and Precincts,*

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