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The Disaster Management Plan for the Indian Forts: Lessons and the Way Forward from the Panhala Fort

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ABSTRACT

Forts are the part of our heritage they were the centres of administration, military power, religion, culture and economic activities in old days. Conservation of forts means preservation of our heritage sites. The National Disaster Management Guidelines for Cultural Heritage Sites and Precincts issued by National Disaster Management Authority in 2017. In the light of these guidelines Kolhapur District Disaster Management Authority have prepared Panhala Fort Disaster Management Plan. It is novel step taken by the Kolhapur District Disaster Management Authority which should be followed by the other states. In this backdrop author has mentioned that six series of forts from the state of Rajasthan (in 2013) and twelve Maratha Military Landscape Forts are recently declared as World Heritage Site. So, there is need to prepare fort specific disaster management plan by concern authority in order to conserve our rich heritage as well as to ensure the safety of visitors. Preparation of such plan is an opportunity to inculcate global initiatives of disaster management at the local level.

INTRODUCTION

Heritage represents the glorious past which we have inherited, it connects us with history, aware us about our responsibility to conserve and to transmit it to next generations. It makes us conscious about the continuity, unity, shared memory and cultural identity. It is rightly said that along with having artistic and architectural values, heritage represents the historical, social and cultural narratives of a society. Our natural and cultural heritage are both valuable sources of identity, life and inspiration. The United Nations Educational, Scientific and Cultural Organization (UNESCO) plays a significant role in the identification, preservation and protection of heritage sites that are having Outstanding Universal Value (OUV) to humanity. What makes the concept of World Heritage site as unique one, is its universal application: these sites surpass national boundaries and are considered the collective property of all people of the world. regardless of the country in which they are situated. A growing number of natural and manmade disasters are causing serious threats to heritage sites, Many World Heritage Sites are prone to disasters such as cyclones, earthquakes, landslides, floods, and man-made disasters like fire, pollution etc. it leads to the breaking of the cultural practice's, history and knowledge. India currently has 44 UNESCO World Heritage Sites as of 2025, which include 36 cultural, 7 natural, and 1 mixed-type property.

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DISASTERS AND THREAT TO CULTURAL HERITAGE LANDSCAPES

Disasters in recent years have severely impacted India's cultural heritage, with earthquakes, floods, and human-induced threats like pollution, terrorism causing damage to monuments, temples, palaces, and museums. Events such as the 2001 Bhuj earthquake, the 2011 Sikkim earthquake, and the 2013–14 Himalayan floods highlight this growing vulnerability, driven by rapid urbanization, population growth, and climate change. A recent study conducted collaboratively by IIT Roorkee, IIT Kanpur, Ca' Foscari University of Venice, the ASI, and India's Department of Science and Technology with Italy's MAECI, and published in Heritage journal, reveals that Delhi's Red Fort is experiencing accelerated damage due to air pollution, including loss of carving details, flaking of red sandstone, blistering of walls, patinas on doors, increased dampness, and salt efflorescence on arches. Managing disaster risks for built heritage is complex due to their age, scale, and fragile condition, often worsened by neglect and poor maintenance. While interventions may sometimes compromise heritage value, these structures also demonstrate resilience and can serve as models for broader risk reduction strategies. Despite its importance, cultural heritage has only recently gained recognition within disaster risk management in India.

INDIAN FORTS: WORLD HERITAGE SITES

Historically the forts have served as the central point of local pride and identity, acting as the source of military power, administrative control, and economic activity. Forts served as both hubs of regional power and strategic strongholds in India, signifying both cultural endurance and political strength. Recently the "Maratha Military Landscapes," which includes the 11 forts in Maharashtra and 01 in Tamil Nadu, have been granted the status of UNESCO World Heritage Site. The list of forts includes, Raigad, Pratapgad, Panhala, Shivneri, Lohgad, Salher, Sindhudurg, Suvarnadurg, Vijaydurg, and Khanderi in Maharashtra, and Gingee in Tamil Nadu. In 2013 The serial site, situated in the state of Rajastahan, includes six majestic forts in Chittorgarh; Kumbhalgarh; Sawai Madhopur; Jhalawar; Jaipur, and Jaisalmer. were declared as World Heritage Site by UNESCO. In India Maharashtra state is having maximum number of forts, Maharashtra has nearly 350 to 400 forts which is followed by Rajasthan with more than 250 forts and Madhya Pradesh with near about 30 forts. "Maratha Military Landscapes," forts which are now recognised as World heritage Sites are constructed between 12th to 17th-century. While forts of Rajasthan are constructed between 8th to 18th centuries. As these forts are gone from several environmental changes and manmade interferences it is challenging task to conserve them.

In Rajasthan, the Rajput forts of Ranthambore situated in the forest, Jaisalmer in the desert, and Gagron were constructed on the river to fit the different circumstances. They blended Sultanate and Mughal styles into their original Indian designs, which eventually influenced Maratha architecture. Within the walls of these forts were temples, palaces, marketplaces, water systems, and even entire towns, many of which are still stand today. Chittorgarh is well-known for its history and legend, Kumbhalgarh was created by well-known architect Mandan, Ranthambore has some of the oldest palace remains, Gagron is protected by rivers and trade routes, Amber represent a fusion of Mughal and Rajput culture, and Jaisalmer is a desert fort with Jain temples and still living town.

Twelve forts, spread over mountains, coasts, and islands, mark-up the Maratha Military Landscapes; each fort represent architectural skill, historical importance, and strategic approach. From the Maratha empires capitals of and Rajgad and Raigad to the garrison of Sahyadri in Salher and Shivneri, the birthplace of Chhatrapati Shivaji Maharaj, these forts reflect the strength and endurance of the Maratha's. The Lohagad, Pratapgad, and Panhala in Western Ghat demonstrate defensive power, while Khanderi, Suvarnadurg, Vijaydurg, and Sindhudurg indicate marine power along the Konkan coast. Tamil Nadu's Gingee Fort, with its unique hilltop design, indicates southern connections of Maratha empire. Collectively, they reflect the competence of Marathas in defending themselves on land and at sea in a variety of landscapes.

These forts are the centres of architecture, history, art and culture. Even though these forts are bearing great significance they are facing various challenges in in order to maintain their integrity. In the era of enhanced interest about art, culture and history among people as well the influence of new selfie and other trends of social media platforms these places are becoming the spots of tourist attractions. Many World Heritage Sites are prone to disasters such as cyclones, earthquakes, landslides, rise in the sea level, storms, heat and cold waves, floods, and man-made disasters like fire, terrorism, pollution etc. hence it's need of time to have separate disaster management plan for these sites in order to conserve them as well as to ensure the safety of the visitors.

BASIC NEED TO CONSERVE THE FORTS DECLARED AS WORLD HERITAGE SITES

ICOMOS (the International Council on Monuments and Sites) has raised significant concerns regarding the

vulnerability of major Indian forts to both natural and human-induced hazards, highlighting the urgent need for disaster management strategies. At Chittorgarh Fort, the surrounding industrial activities—such as quarries, cement factories, and zinc smelting plants—pose serious environmental risks, including air and soil pollution, which can accelerate the degradation of historic structures and compromise landscape stability (ICOMOS, 2022). The broader setting of Chittorgarh is further threatened by urban expansion, industrialization, and mining activities, all of which increase the potential for disasters such as structural collapse, landslides, or fire hazards. Similarly, Jaisalmer Fort faces risks related to unplanned urban development and encroachment, which not only threaten its visual integrity and cultural setting but also undermine the stability of the hill on which it rests, making it more susceptible to water seepage, erosion, and infrastructure-related hazards. At Gagron Fort, unregulated construction and residential encroachment within the fort precincts amplify the risk of structural damage and disaster vulnerability. Amber Fort and Gagron Fort have already suffered loss of original exterior materials, reducing their resilience to environmental stressors and natural hazards. At Chittorgarh and Kumbhalgarh Forts, progressive decay and collapsing structures further compromise their authenticity and increase disaster susceptibility. While all these sites have designated buffer zones intended to mitigate external threats, the absence of clear and enforceable planning policies undermines their effectiveness. From a disaster management perspective, there is an urgent need for integrated strategies that address urban development pressures, industrial pollution, structural stability, and conservation of original materials. Such approaches would not only safeguard the forts' cultural and historical value but also reduce the risks posed by environmental hazards, structural failure, and other potential disasters (ICOMOS, 2022).

The Maratha military landscape forts face diverse location-specific threats. Sea forts, located on offshore islands, are especially vulnerable to coastal erosion, sea-level rise, storm surges, and cyclonic activity, rise in sea levels, accelerated by climate change, resulted into damage to buildings and infrastructure, which compromise their structural stability. Land forts, built on elevated hilltops, face risks from landslides, rockfalls, and weathering of basaltic rock during heavy monsoons, as well as slippery trekking paths that heighten accident risks. Both categories are also threatened by summer wildfires, which endanger biodiversity and historic stonework, and by seismic activity, which is particularly damaging given the age and fragility of the structures. Human-induced pressures further intensify these risks, including poor drainage systems causing waterlogging and erosion, prolonged exposure to wind-driven rain, uncontrolled tourism resulting in overcrowding, vandalism, and structural strain, and unregulated development in buffer zones that alters drainage patterns and undermines foundations. Additionally, uncontrolled vegetation growth, particularly tree roots penetrating the walls, causes cracks in the stone fabric and weakens the fortifications, with the monsoon season accelerating this process through rapid plant growth and moisture retention.

CONSTITUTIONAL AND LEGISLATIVE FRAMEWORK FOR HERITAGE SITES IN INDIA

The Indian Constitution provides the primary framework for identifying, protecting and conserving different aspects of our rich cultural heritage. For these provisions are laid down in the form of Fundamental Rights, Directive Principles of State Policy and Fundamental Duties. Article 29 of the Indian Constitution empowers Indian citizens who are having unique script, culture and language to conserve the same. Article 49 states that it is an obligation of State to protect the places, monuments or subject of artistic or historical interest from the destruction or disfiguration. Article 51 A (F) of the Constitution impose duty upon citizens to preserve and value our composite culture and rich heritage.

Ministry of Culture is the apex body for the matters connected with preservation and conservation of cultural heritage. It acts through Archaeological Survey of India. Under the authority of the Archaeological Survey of India (ASI) and the Ministry of Culture (MoC), Indian cultural heritage is governed by key national legislations:

- Ancient Monuments and Archaeological Sites and Remains Act, 1958 and its Rules, 1959
- Antiquities and Art Treasures Act, 1972 and its Rules, 1973
- The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 (amended the Ancient Monuments and Archaeological Sites and Remains (AMASR) Act, 1958.)

In addition to this several states are having their own regulations for State Archaeology sites and Monuments.

STATUTORY FRAMEWORK UNDER DISASTER MANAGEMENT ACT, 2005

In India the Disaster Management Act, 2005 laid down institutional, legal and financial framework for disaster management. It provides three tier structure of disaster management at national, state and local level.

Another important document is National Policy on Disaster Management (NPDM) 2009 The National Policy on Disaster Management (NPDM) 2009, provides a detail framework for disaster risk reduction and response in India. It signifies a pivotal shift from a relief-centric strategy to a proactive approach focused on prevention, mitigation, preparedness, and response. The National Policy on Disaster Management

which is the reflection of the Disaster Management Act, 2005 by creating institutional mechanisms at national, state, district, and local levels intended to build a disaster-resilient and safe nation. While highlighting disaster Prevention, Mitigation and Preparedness NPDM suggest three tier approach for conducting mitigation measures and one of the important aspects of that three-tier plan is "Indigenous knowledge on disaster and coping mechanisms adopted by various States will be given due weightage with special focus on protection of heritage structures."

The National Disaster Management Plan (NDMP),2019 is an updated version of the original NDMP 2016, prepared by the National Disaster Management Authority under the Ministry of Home Affairs. It is in tune with the Disaster Management Act, 2005.The NDMP is align with Sendai framework for Disaster Risk Reduction and it also provide a guidance and structure to government entities throughout the disaster management cycle. The NDMP requires that, ministries and public entities shall create disaster risk management plans and inculcate them into their overall policies and administration. It is responsibility of the NDMA is to develop disaster management policies, strategies, and recommendations for Central Ministries, Departments, and States. On the basis of these, ministries and institutions establish their own disaster management plans, and have to take approval from NDMA. This framework is also applicable to sites and precincts under the Archaeological Survey of India (ASI) and the Ministry of Culture (MoC).

THE NATIONAL DISASTER MANAGEMENT GUIDELINES FOR CULTURAL HERITAGE SITES AND PRECINCTS

The National Disaster Management Guidelines for Cultural Heritage Sites and Precincts (NDMA, 2017) create a structure for the protection of Indian cultural heritage sites from hazards by applying comprehensive disaster risk management (DRM) perspective. These guidelines are issued with aim to assist various ministries, departments of government and disaster management authorities for the preparation of disaster management plans of the site, in order to ensure the conservation of heritage site as well as the safety of human lives. These guidelines are revolving around the risk assessment, mitigation, preparedness, response, and recovery which are key component of the Disaster Risk Mitigation cycle. The guideline emphasizes on identification of disaster risk, vulnerability assessment, and prioritizing risks to heritage sites. Structural strengthening, documentation, regular maintenance, maintaining proper drainage system are the mitigative measures suggested in the guidelines. The guidelines emphasise on preparedness through awareness programmes, training, evacuation plan and establishing coordination between disaster management authorities and heritage site authorities. Guidelines also emphasise on response as well as post disaster recovery of heritage site. For that focus is on preparation of evacuation plan and restoration of damaged site with the help of such material and techniques which will conserve the authenticity of heritage site. Institutional framework is also provided in order to create coordination among local, state and national authorities. In short, these guidelines are trying to imbibe heritage protection in to the nation's disaster management framework at the same time it is in tune with international efforts such as the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals.

PANHALA DISASTERMANAGEMENT PLAN – A ROADMAP FOR THE INDIAN FORTS DECLARED AS WORLD HERITAGE SITES

Panhala fort is situated in Kolhapur district of Maharashtra. It is one among the 12 "Maratha Military Landscape" forts which are declared as World Heritage Site by UNESCO in July 2025. Before this declaration, in November 2024 Maharashtra State Disaster Management Authority approved first ever fort-specific disaster management plan for Panhala Fort. Panhala Fort is situated in category III of earthquake-prone zone and vulnerable to cloud burst, land slide, structural damages and wildfire.

The District Disaster Management Authority (DDMA) of Kolhapur took initiatives and prepared a first of its kind Disaster Management Plan (DMP) 2024-25 for the historic heritage site of Panhala fort under the guidance of Maharashtra State Disaster Management Authority. This plan is in tune with the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts issued by National Disaster Management Authority (NDMA) in September 2017.This plan includes vision, aim and objectives of disaster management plan of Panhala Fort. Profile of the Panhala Fort in terms of location, transportation network and geomorphology has been mentioned in it.

The study of geomorphology is important in order to understand the landform and physical processes that shape a particular place; it gives a scientific base for environmental management, disaster risk assessment and sustainable development. The study of geomorphology of that particular place assist to identifying possibilities of hazards such as floods, landslides, seismic activity and erosion. It is helpful to make disaster management plan. Geomorphology also plays a vital role in the protection of cultural heritage, as the

stability and conservation of monuments and landscapes are often directly connected with the geomorphological settings. Hazard profile of the Panhala Fort is mentioned. what are the hazards to which fort is vulnerable and these hazards are categorised as natural hazards, technological hazards and human hazards. Plan provide the vulnerability assessment of the fort along with measures for disaster risk prevention, reduction and mitigation. A well-defined evacuation plan for Panhala Fort provides the safe evacuation of visitors, staff, and the local community during disasters such as fires, landslides, fires, or earthquakes by reducing confusion, establishing clear communication, and providing safe evacuation routes. Post-evacuation protocol include community communication, headcounts and counselling and support services to should provide emotional and medical assistance to all affected individuals. In order to ensure an effective and coordinated preparedness, response, and recovery measures, all Panhala Fort employees are authorized, resourced, and trained to face disaster and support disaster response under the direction of a designated Disaster Response Team headed by the Response Lead. The Panhala Fort Disaster Management Plan provides a detail framework for protecting the surrounding communities and for conserving the structural integrity and cultural heritage of fort. It emphasises the importance of coordination between local, regional, national, and international stakeholders for generation and utilization of funds. This coordination is also necessary for effective implementation of plan.

The Panhala Fort is prone to wildfire, structural damage, landslide and cloud burst. For effective handling of any of these hazard plan provides the sustainable tourism practices, community training and structural reinforcement through this it ensures preparedness and resilience against disaster. plan also provides effective response mechanism by ensuring volunteer awareness and training program, it highlights the need of coordination between disaster management authorities and local communities.

In concluding paragraph, it is mentioned that in order to keep the pace with era there is need to update the plan periodically on the basis of research, lessons learned from the disaster and technological upgradation. This plan is definitely helpful for the long-term conservation of the Panhala fort which is now one of the World Heritage Site.

LESSONS FROM THE PANHALA FORT DISASTER MANAGEMENT PLAN

Panhala Fort Disaster Management Plan is the first of its kind. It represents the efforts taken by of Kolhapur District Disaster Management Authority to implement the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts issued by National Disaster Management Authority. It highlights their level of awareness about DRM and zeal to assimilate it in disaster management activities at local level. It gives local effects to global initiatives. It integrates the disaster risk reduction activities in to heritage conservation and represents vertical and horizontal integration of disaster management activities at local level. On the basis of this all the forts and World Heritage Sites have to prepared their own disaster management plan. Kolhapur District Disaster Management Authority have sent this plan to NDMA to recommend it as model plan for all heritage site.

CONCLUSION

The Disaster Management Act, 2005 is the pivotal legislation in India for disaster management. Act provides the institutional, legal and financial framework for disaster management. The National Disaster Management Authority established under the Act is the apex body for disaster management in India. The NDMA has issued the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts in September 2017. Even after eight years of declaration of these guidelines only Panhala fort of the Maharashtra state is having its own fort disaster management plan. Forts are the core of our history, culture, religion and were the centres of economic and political activities in olden days. There is dire need to conserve them from further deterioration due to manmade and natural hazards. At least state of Maharashtra, Madhya Pradesh and Rajasthan should take immediate steps to implement the guidelines issued by NDMA for the conservation of the cultural heritage sites and have to direct the district authorities to prepare the fort disaster management plan for the forts which are located within their jurisdiction. The Disaster Management Act, 2005, the National Disaster Management Guidelines for Cultural Heritage Sites and Precincts issued by NDMA and Panhala Fort Disaster Management Plan will definitely serve as guiding documents for the preparation of fort specific disaster management plan.

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