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Risk Sensitive Heritage Conservation in Sikkim

Photo: AIDMI.

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The Need for DRR Sensitive Heritage Conservation in the Himalayas

The Great Himalayan National Park Conservation Area was inscribed onto the World Heritage List as a natural site this past June 2014. With such an inscription comes, an even greater need and human responsibility for disaster risk reduction sensitive heritage conservation practice. The Park is of outstanding natural beauty found in its forests, wildlife, biodiversity and surrounding diversity of peoples and is facing pressure as its' natural environment is under threat. These threats are manmade (for instance, "international criminal networks are emptying forests of rare wildlife to feed the voracious illegal market" creating habitat loss) and are also occurring as a result of the impact of global climate change (melting glaciers are reducing the mountains geological heritage and directly affecting water sources to people living in the region).

As a preventative measure from further disaster risk, be it man–made or natural, several combined strategies are needed. A people – centered approach is one such method to engage communities in local indigenous solutions to heritage protection. The impact of communities making up civil society (including schools) surrounding the Himalayan mountain range can be a powerful tool because they can voice and implement resolutions. Community based conservation in the area is diverse as it is made up of Buddhists, Hindus and Christians adding to the spectrum of ideas passed down from one generation to the next regarding such innovative solutions of natural heritage protection.

Children can learn about such solutions adding to their repertoire of ancient heritage knowledge, ultimately serving as educational awareness mechanism. Bringing a diverse people together in community participation also aids in fostering both a culture of disaster prevention awareness and a resilience in the face of increasing serious threat.

An additional strategy for natural heritage disaster reduction in the case of the Himalayan National Park is to deepen non–profit/public sector partnerships and align pressing priorities of threat with the private sector. For instance, it would be important to consider organizations such as the World Wildlife Fund (WWF) and the International Union for Conservation of Nature (IUCN) and their partnerships with local, national and international businesses. Are such organizations willing to engage and extend relationship building with the private sector to support disaster risk reduction in the Himalayan region? Initiatives by Google technology for instance, currently provide researchers of WWF with google glasses in the area to monitor wildlife. Can such an initiative be extended to Google mapping to, for instance, monitor changes in the forest landscapes as a result of man-made invasions changing the environments? Such technologies would be an add value strategy to improving such conditions within the boundaries of the Park.

Finally, as the need for disaster risk reduction as a mitigation, and, preventative strategy increases for this area, it would be essential to engage journalists, and the media at large, including social media, to raise awareness of the Park at an international level. As this is a UNESCO world heritage site, educational awareness raising via, the media would intend to serve as a best practice in the case of the Himalayan National Park. ■

– Paola Jani,
International Heritage Consultant

Great Himalayan National Park.

Assessment of Heritage Buildings in Context of 2011 Earthquake: A Report by INTACH

The Indian state of Sikkim was struck by an earthquake on 18th September, 2011 which measured 6.9 on the Richter scale. The epicentre of this earthquake was located near the India-Nepal border about 68km northwest of Gangtok. Three aftershocks of magnitude 5.7, 5.1 and 4.6 followed within 30 minutes. These tremors were felt across a wide region including India, Nepal, China, Bhutan and Bangladesh. About 100 deaths were reported from India with more than 70 in the state of Sikkim. The losses and damage throughout Sikkim were disproportionately high as compared to the rather moderate intensity of shaking caused by the earthquake.

Collapse of wall portion, reinforcement introduced after 1988 earthquake, State Archives and Museum, Gangtok.

The poor design and construction practices followed in Sikkim were cited as the primary reason for the disproportionately high damage suffered by the built structures of the earthquake affected areas. This earthquake also exposed the vulnerability of heritage structures in Sikkim that suffer from an absence of professional conservational knowledge on seismic resistant construction and retrofit. Consequently, the Indian National Trust for Art and Cultural Heritage (INTACH) undertook the tedious task of preparing a list of damaged structures based on an inventory compiled by them in 2004 called 'Cultural Properties of Sikkim'. In this list, a total of 287 heritage properties were documented including precincts, settlements, buildings, sacred structures, places of worship, open spaces and natural properties such as lakes, forest and fields.

This comprehensive account provided the required construction and material related information as well as knowledge of the historic background of the site. The prime objective of this study was to evaluate the degree and kinds of damage to the cultural heritage properties of Sikkim caused by the 2011 earthquake, and subsequently by long term damages evolved over time due to multiple earthquakes. A secondary motive was to do a comparative study of various construction methodologies being used in the hilly areas, and how well they performed during earthquakes.

About this issue

The destructive potential of disasters to human life and property is known to all. However, what is not known is the detrimental impact that disasters have on the heritage of the areas they strike. Heritage monuments and structures are repositories of centuries of history, culture and tradition and are therefore an integral part of the identity of an area and its inhabitants. However, the damage and destruction of such heritage sites due to disasters often goes unnoticed and is not properly addressed.

This issue of Southasiadisasters.net focuses upon the important theme of the 'Need for DRR Sensitive Heritage Conservation in the Himalayas'. The Himalayan states of India are home to a lot of heritage sites and structures, which include palaces, temples (gompas), monasteries, stupas and old neighbourhoods. The high risk profile of the Himalayas makes a disaster risk reduction (DRR) sensitive approach to conservation of such heritage sites and structures imperative. This issue of Southasiadisasters.net highlights such efforts from Sikkim and other Himalayan states of India.

Full of information on information on good practices and projects that have promoted DRR sensitive heritage conservation in the Himalayas, this issue is must read for all those interested in this important theme. ■

The rationale behind carrying out this study was to emphasise resistant earthquake performance of certain structures and to prove deficiency in retrofitting of historic buildings. Three main kinds of construction technology were assessed for damages to suggest retrofitting techniques for them. They were.

1. **Stone Buildings:** Stone masonry is strong in compression but weak in tension. This leads the walls of stone buildings to develop horizontal cracks along the joints due to seismic exposure. The strength of the masonry is determined by its bond, which in turn, depends upon the composition of the wall and the mortar used. Generally, there is no continuous connection between the two withes. Thus, due to seismic forces or long term stress such as overloading the leaves are likely to delaminate and bulge outwards.
2. **Buildings with a Stone Plinth and Wooden Frame:** '*Ekra Style*', the local wood and stone construction style also known as *Tshe-Khim*, have a stone plinth level and a wooden frame with wattle and daub panels at the upper main level. Local materials such as red soil, cow dung, straw and pieces of wood are used for the panels. This widely used construction system varies slightly within the types set up by the local Lepcha and Bhutia tribes.
3. **RCC structures:** Many of the heritage buildings in Sikkim were rebuilt using modern materials such as the RCC. Reinforced Cement Concrete (RCC) is considered to show good earthquake resistance due to the highly ductile behaviour in case of seismic vibrations, which is the capacity of deformation without collapsing suddenly. If the detailing of connections between the beams, columns and floor slabs is carried out according to prescribed standards, the construction as a whole will be able to resist lateral and vertical forces.

Retrofitting Interventions:

1. **For stone buildings:** Use of horizontal reinforcement in form of steel bands or wooden beams that can be used at various levels. A band on plinth level is proposed when dealing with unstable ground so it is highly recommended for the Sikkim Himalayan region. Avoid vertical bonds in stone masonry, which can be achieved by inserting a through stone that will hold the entire width of wall. While preparing mortar use of traditional materials like straw, or chaff and even modern materials like epoxy and cement are effective in improving the strength of bond.
2. **For buildings with wooden members:** The seismic resistance of wooden framed structures is remarkably good and the damage in the walls will be only superficial, without damaging the entire structure. The only major problem with wood is rotting and ageing. Wherever the wooden members are not in proper condition they should be replaced or reinforced with metal straps especially at structural important joints such as those of struts or columns.
3. **For RCC structures:** The resistance of the structural members can be improved by increasing the reinforcement through attachment of new bars with existing the ones and additional stirrups. The ground floor of large 'Gompa' buildings holds several wall bays without windows or doors where x- or v-shaped steel braces can be applied to add to the stability of the whole structure.

Room of Tengyur-Kangyur manuscripts; cracks in wall and detached plaster, Dubdi Gompa, Yuksom, West Sikkim.

Conclusion:

From the study carried out, there two major categories of damaged properties were identified. The first one was the old stone masonry buildings such as Buddhist monasteries and Kothis which are an integral part of Sikkim's heritage. The second major group of damaged the buildings are recently built religious structures such as Gompas and Mandirs and institutional buildings made up of RCC. To preserve Sikkim's remaining built heritage in traditional material, this assessment provided valuable findings in terms of retrofitting and restoration possibilities. In the long term however awareness of the high seismic risk has to be raised through sensitising all participants to decrease the vulnerability of heritage and new buildings: Preparedness is always better than recovery. ■

– Aditya Jain

Reference: Earthquake Damage Assessment – Vulnerability of Sikkim's Built Heritage, INTACH (March 2013)

http://www.intach.org/pdf/sikkim-earthquake-damage.pdf

Conservation of the Wall-Paintings in the Gangtok Tsuklakhang in Sikkim

The Indian state of Sikkim is home to a lot of serene and elegant monasteries. The Tsuklakhang monastery is one such place of reverence. Built around 1920, this monastery is located in the complex of the Royal Palace in Gangtok and is an important place of worship for the Buddhists. Built in a style which is quintessentially Sikkimese, the walls of the Tsuklakhang monastery are adorned with splendid murals of the deities of the Buddhist pantheon. However, with the passage of time, these beautiful murals had become quite dark.

To restore back the alluring charm of these murals, HRH Princess Hope Leezum Namgyal, daughter of the last reigning Chogyal, Palden Tondup Namgyal, invited Andre Alexander and his team of conservationists from the Tibet Heritage Fund (THF). This was the first time that any attempt at heritage conservation was undertaken in Sikkim. For, prior to this, the damaged structures were simply rebuilt, without considering the aesthetic and heritage consistency of those structures.

This is how the project titled 'Conservation of the Wall-Paintings in the Gangtok Tsuklakhang in Sikkim' started in 2011. This project was funded by the cultural section of the German Embassy in New Delhi, Shelly and Donald Rubin Foundation, the Tsuklakhang Trust and the Private Estate of the Chogyal of Sikkim. Through this initiative the murals and paintings in the Tsuklakhang monastery were restored.

The Tsuklakhang Monastery is built in traditional Tibetan style temple architecture, east-facing, four-storeys tall with a typical gabled roof, white-washed stone walls, mud plaster and an internal timber frame. The ground floor has a large assembly hall and altar, on level 2 is another large hall.

There are also two smaller shrine rooms, and private rooms for visiting religious dignitaries on the top, including quarters for the Fourteenth Dalai Lama who stayed here in 1954 and visited in 2011.

In November 2011, a small team from THF inspected the temple and found it structurally sound. The wall paintings had darkened, with some cracks and losses of plaster due to an earthquake decades ago. For the conservation work, the expertise was provided by THF and several art conservation experts were called in to take care of the proceedings. During the course of this project too, an earthquake struck Sikkim but the monastery and its murals remained unharmed due to all the restoration work done by the team.

The project started with the preparation of the measured drawings of the entire structure to demarcate the areas of intervention.

It was concluded by the experts that the paintings were covered by soot and dust on the surface, and that the varnish applied probably soon after completion of the paintings in the 1920s had darkened and peeled off in many areas being improper as quality and way of application (unevenly, leaking..). The soot could be cleaned with special restoration soap (potassium hydroxide), and the varnish had to be removed with an alcohol-based solution.

At many places, the paint layer was flaking out, which first needed to be stabilised to carry out any cleaning process. Even the plaster layer at a few places was coming out that needed to be fixed before the pieces start to fall off completely. Once the fixing part was done the cleaning process took nearly eight months to complete. It was a delicate process as the cleaning required carefully handling of existing paintings, identifying the problems associated and then to suggest appropriate methods of intervention.

During the entire project several local interested restorers were trained in carrying out the process. Many monks from the temple also tried their hands on restoration and cleaning of the paintings and received basic training, as did Princess Hope Leezum and her family members.

This conservation project elicited a lot of positive response in the press and the local community. Such a response is a testament of the love and reverence of the people to their heritage. Since heritage is an integral part of our identities, projects like these that preserve and conserve it should be promoted and encouraged. ■

– Aditya Jain

Reference: Conservation of the Wall-Paintings in the Gangtok Tsuklakhang in Sikkim, 2011 Work Report.

DISASTER MANAGEMENT

Cost of Disasters to India Unknown

We do not know what the weather related disasters cost to citizens of India or its economy. And this cost, we must know as it is going to go up and up. Globally, extreme weather and climate change are already shaving 1.6 percent off worldwide Gross Domestic Product (GDP) — or about $1.2 trillion per year — according to a study by DARA. By 2030, it will be up 3.2 percent of global GDP, costing the United States over 2 percent of its GDP and India over 5 percent[1]. This year, meteorological researchers in India suspect that climate change is a contributory factor to the changing weather patterns that have caused the late arrival of the monsoon after a summer of swelteringly dry heat that has broken temperature records[2].

One possible step ahead can be from the Indian Meteorological Department (IMD) to help citizens find out how costly extreme weather events could be. For example, while the Odisha Super Cyclone killed 10,000 and caused damage worth $4.5 billion; fourteen years later, Cyclone Phailin, another storm almost as strong, killed only 40 people (still very sad) with economic losses of about $700 million. The reason for this dramatic turnaround was years of disaster risk prevention and preparedness resulting in a concerted effort by the state to build resilience against extreme weather[3].

Extreme events that India faces include flood, drought, storms and landslides, and heat waves. Though the costs of these events are often enlisted and calculated for relief and compensation purposes, the method, tools and mechanisms are not systematic and do not take into account full range of losses and damages for effectively dealing and coping with future impacts[4]. As a result, the overall all loss and damage picture, is not yet accurate, systematic or system wide. Multiple impacts of several disaster events interact and collide. Successive

1 National Journal Warns The Economic Price Of Climate Change Is Already Here, And Growing by Jeff Spross Posted on February 9, 2013 at 12:00 pm Updated: February 9, 2013 at 8:40 am. Available at: http://thinkprogress.org/climate/2013/02/09/1563101/national-journal-warns-the-economic-price-of-climate-change-is-already-here-and-growing/

2 By Shiba Nanda Basu (2014) India counts human and economic cost of late monsoon: Record temperatures have left many Indians suffering, causing scientists to explore possible climate link. Available at: http://www.rtcc.org/2014/06/24/india-counts-human-and-economic-cost-of-late-monsoon/

3 The World Bank. Weather-Related Loss & Damage Rising as Climate Warms, November 18, 2013. Available at: http://www.worldbank.org/en/news/feature/2013/11/18/disaster-climate-resilience-in-a-changing-world

4 Mihir Bhatt, All India Disaster Mitigation Institute (AIDMI) Asia Pacific Forum on Loss and Damage (2014) Why India Must Focus on Loss and Damage? Available at: http://www.google.co.in/ url?sa=t&rct=j&q=&esrc=s&source=web&cd=30&cad=rja&uact=8&ved=0 CFEQFjAJOBQ&url= http%3A%2F%2 Freliefweb.int%2Fsites%2Freliefweb.int%2Ffiles%2Fresources%2FAsia %2520Pacific%2520Forum%2520on%2520Loss%2520and%2520Damage_%2520April%2520Newsletter%25202014.pdf&ei= 20vRU5fIPIq3u ATV84GgAQ&usg= AFQjCNGk1yfzxxD9 AefbNy66u PsQekRqhw&bvm=bv.71667212,d.c2E

Finance Commissions have tried to capture this cost with rigor over decades. But the total always remains a step away from conclusive.

India is facing rapid economic and population growth, especially in areas that are hotspots for disasters. Look at India's coastal areas that are affected by sea level rise in addition to heat waves, storms, cyclones and coastal floods. And the same areas are facing rapid economic growth. Cost of extreme events in terms of food security, health loss, access to drinking water, and education are going up. A recent report by the World Bank looking at the likely impact of warming on agricultural production, water resources, coastal ecosystems and cities across three regions – South Asia, Sub-Saharan Africa, and South East Asia has found India's food security, water resources and health at risk from warming climate[5]. Also, cost estimates for cities and trans-boundary losses are hard to calculate, and therefore go unaccounted. Continuing failure to plan ahead for more extreme weather in India's cities could lead to huge economic and health costs, and hit India's most vulnerable citizens particularly hard[6].

According to the annual release of British risk consultancy Maplecroft's 'Climate Change and Environmental Risk Atlas', by 2025, China's GDP is estimated to treble from current levels to USD 28 trillion, while India's forecast is to rise to USD 5 trillion[7]. As India's economy

globalizes, each disaster event will have far wider economic impact than it had in the past.

Cost of Gujarat earthquake today, may God forbid, will be three times more than in 2001 because of growth of income and assets in the impact region. A flood around Delhi can cause millions and around Mumbai may reach billions. Kolkata and Mumbai are among the cities where the economic exposure to the impacts of extreme climate related events will be highest over the next 30 years[8]. Still, there are no sectoral or sub-national cost estimates that are systematic and system wide.

The estimates are even more difficult to make as disaster reporting is not always uniform or up to date. The National Disaster Management Authority (NDMA) has made initial efforts, and with success, the work on its hand is yet to be completed. For example, CATDAT Damaging Earthquakes Database 2011 – Annual Review has noted that "the Sikkim earthquake on 18th September 2011 was deemed to have caused at least 1 lakh crore rupees (1000 billion rupees or $22.3 billion US) damage in Sikkim, as estimated early after the disaster (Sikkim Ministry on 21st September 2011). However, as the net capital stock is at the most approximately $3.9 billion US (about 200 billion rupees) in Sikkim according to CATDAT, it is hard to believe the initial assessment of the ministry; thus this value has been ignored. However, a more reliable estimate is approximately US $1.7 billion damage for total damage in India"[9].

Reporting loss and damage is even less reliable due to delay in making estimates, lack of coordination, limited tools, still developing methodologies and availability of

5 The World Bank (2013) India: New report finds India's food security, water resources and health at risk from warming climate. Available at: http://www.worldbank.org/en/news/feature/2013/06/19/india-new-report-finds-indias-food-security-water-resources-and-health-at-risk-from-warming-climate

6 Samuel Mintz (2014) Indian cities face 'huge' risks without climate planning. Source: Thomson Reuters Foundation - Wed, 5 Mar 2014 16:00 GMT. Available at: http://www.trust.org/item/20140305152832-lvni2

7 The Times of India (2013. India among world economies at risk of climate change impact, PTI | Oct 30, 2013, 04.52PM IS. Available at http://timesofindia.indiatimes.com/home/environment/global-warming/India-among-world-economies-at-risk-of-climate-change-impact/articleshow/24938473.cms

8 The Times of India (2013. India among world economies at risk of climate change impact, PTI | Oct 30, 2013, 04.52PM IS. Available at http://timesofindia.indiatimes.com/home/environment/global-warming/India-among-world-economies-at-risk-of-climate-change-impact/articleshow/24938473.cms

9 James Daniell & Armand Vervaeck (2011) CATDAT Damaging Earthquakes Database 2011 - Annual Review, Last update: January 30, 2012 at 9:41 pm by Armand Vervaeck and James Daniell. Available at: http://earthquake-report.com/2012/01/09/catdat-damaging-earthquakes-database-2011-annual-review/

skills. The concept of loss and damage is yet to be clearly defined and comprehensive models for assessing loss and damage do not yet exist[10]. The All India Disaster Mitigation Institute (AIDMI)'s ongoing study on regional disaster authorities in the region shows that skills and capacities to estimate loss and damage remains a bottleneck to their effectiveness. Another key challenge is that there is no system to estimate the full range of losses in monetary or economic terms, for example how to put a dollar figure on the 'cost' of loss of human life or cultural heritage (CDKN.2012)[11]. If what is lost is not known how can India know what was its cost? And without knowing economic costs, cost to human security is even less likely to be known.

The IMD has taken leaps ahead in the recent past in informing India's citizens. Cyclone Phailin on Odisha coast in October 2013 was one such example where advance notice reached the last person as the cyclone moved, and as a result thousands of lives were saved. In fact, accuracy of IMD predictions, which proved foreign forecasters wrong on the intensity and timing of Cyclone Phailin[12]. The Indian Red Cross, United Nations Development Programme, local NGOs and Revenue Department of Government of Odisha moved mountains to save lives. However cost of loss of income and assets remained a struggle.

Similarly the heat wave in Ahmedabad in May 2014 was predicted on daily basis giving citizens and agile municipal authority time to plan and take suitable actions. Hardly ever, before such mitigative actions were possible in India. Collaborative work of Public Health Foundation of India, Climate Development Knowledge Network and others[13] made this possible. However, the cost of heat wave to the citizens and municipal authority remains a guess. Costs of heat wave to the poorest such as street vendor women or the excluded such as Dalit street sweepers remain unknown.

Drought remains a big challenge and drought related early warning from IMD unfolds in different manner in different districts of India. Districts in middle Gujarat rapidly respond to early warning while districts in east Maharashtra say, take far more time. Though we can be almost certain that India can avoid famine we have got to be more sure on predicting cost of drought and using early warning to avoid hunger and malnutrition among the rural and urban poor. Seasonal showers will be 7 percent below average in India this year because of the potential emergence of an El Nino, the India Meteorological Department predicts. In 2009, the last time India experienced the weather pattern, rainfall fell short by 22 percent, reducing grain output and leading to faster inflation, official data show[14].

In view of growing operational requirements from various user agencies, IMD has embarked on a seamless forecasting system covering short range to extended range and long range forecasts[15]. The IMD plans are forward looking and soon India will have almost seamless climate and weather forecast in all its districts. Weekly and even hourly forecast to the targeted citizens — farmers, and landless labourers, commuters, street vendors, businesses, or tourists—at risk will be a reality soon. Not many countries in Asia are able to boast of such a seamless forecast.

As climate changes, the likelihood of extreme events will increase. Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report (AR5) also points to this direction. Climate change may soon flood India's harbours, some more than others, causing loss of new and old investments in ports and shipping. Possible cost of tsunami to these ports and harbours remains a guess. As massive domestic and global investments are poised to be made in ports, and coastal roads, highways, bridges and transport, India must find more accurate cost estimates of disasters it faces.

Stronger tropical cyclones, extreme heat, and precipitation patterns will push up climate change related risks. Economic development overlooking these trends can slow down the march towards a stronger and prosperous India.■

– Mihir R. Bhatt *and* **Mehul Pandya**

10 UNFCCC (2012) Current knowledge on relevant methodologies and data requirements as well as lessons learned and gaps identified at different levels. Available at: http://unfccc.int/resource/docs/2012/tp/01.pdf

11 CDKN. 2012. Loss and Damage: From Defining to Understanding to Action. Available at: http://cdkn.org/2012/09/loss-and-damage-from-defining-to-understanding-to-action/ (accessed on December 10, 2013)

12 Times of India (2013) Cyclone Phailin: IMD vindicated, proves foreign forecasters wrong TNN | Oct 14, 2013, 04.57AM IST. Available at: http://timesofindia.indiatimes.com/india/Cyclone-Phailin-IMD-vindicated-proves-foreign-forecasters-wrong/articleshow/24118617.cms

13 For more information please visit CDKN (2014) REPORT: Addressing heat-related health risks in urban India: Ahmedabad's Heat Action Plan. Available at: http://cdkn.org/2014/05/addressing-heat-related-risk-india/

14 Bloomberg (2014) Bond Bull Looks for Dark Clouds to Salvage Monsoon: India Credit By Shikhar Balwani Jul 18, 2014 12:01 AM GMT+0530 Available at: http://www.bloomberg.com/news/2014-07-17/bond-bull-looks-for-dark-clouds-to-salvage-monsoon-india-credit.html

15 S. D. Attri and Ajit Tyagi, Government of India Ministry of Earth Sciences. India Meteorological Department (2010) Climate Profile of India. Available at: http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&sou rce=web&cd=1&cad=rja&uact=8&ved=0CB0QFjAA&url=http%3A% 2F%2Fwww.imd.gov.in % 2Fdoc%2Fclimat e_profile. pdf&ei=a5HSU7ilC8y MuAT Gu4LoDg&usg= AFQjCNFerXkfrpQ4xAqqw6 WrAxa_a3nFnA&bvm= bv.71892024,d.c2E

Heritage Hazard Vulnerability and Capacity Assessment Tool for Hilly Regions

Heritage sites are embodied in extremely fragile environments, and needs to be looked after with immense care. This is particularly true of the hilly areas of India and Sikkim. For, the state Sikkim alone has 305[1] unprotected monuments. Hazard vulnerability assessment of such cultural sites provides necessary data for required agencies during the process of planning. One of the major threats to the heritage sites and the visitors themselves is the crowd which flocks these sites. It requires professional management interventions to cater the requirements of visitors, as well as to make sure the integrity of site is also kept preserved.

Factors	Indicator	Sub-Indicator	Level of vulnerability	Remark
1. Geographic and Topographic conditions	i. Soil characteristics	Type of Soil i. Sandy ii. Clayey iii. Rocks		
	ii. Ground water	i. Hard ii. soft iii. salty iv. high chemical conc.		
	iii. Physical attributes	i. Plains ii. hills iii. river edge iv. slope v. sea shore vi. island		
2. Weather	Extreme conditions	i. Dry ii. rainfall iii. hot iv. cold v. snow		
3. Natural Risks	Risk from natural hazards	Flood, storms, Earthquake, heavy rains, land slide, flash floods, volcanic actions		
4. Risk from Pollution	Effect on Heritage Structure	Smoke, air quality, water quality, effect on site		
5. Distance to water body	Risk from floods and Tsunami	River, lake, pond, sea, canal		
6. Human induced risks	Physical damages to structure	Vandalism, riots, conflicts, urbanisation, crowd		
Factors		**Indicator**	**Level of vulnerability**	**Remark**
7. Site Assessment: Site Assessment (with surroundings): Any monument or a building under observation have to be seen in the larger context of immediate surroundings and the fabric it's been embedded within. The following exercise will give an overview of immediate surroundings of the monument and the kind of problems it may face during any emergency or disaster situation.				
• Is the monument protected by ASI? • Does the ASI law of prohibited and regulated zones around a monument apply here?		Yes/No		

1 http://isikkim.com/2011-05-sikkim-has-305-unprotected-monuments-041/

Factors	Indicator	Level of vulnerability	Remark
• What kind of fabric surrounds the monument	(dense urban/ town/ small village/ sea shore/ natural forest)		
• What kind of management takes care of the site surrounding?	(ASI/ Trust body/ Temple Management Authority/local authorities/ municipality)		
• What is the level of coordination amongst the various stakeholders?	(Managing authority/ local govt./ Communities/ tourist)		
• Is there any site management plan in place, if yes, then what are its parameters	(the areas of concern for disaster planning infrastructure, crowd, emergency response)?		
• What are the emergency response measures from the local authorities for the site and its surroundings (hospitals with capacity, fire house, volunteers)?			
• Are the current management systems effective/ sufficient enough to handle any adverse situation?			
• What is the status of traffic, crowd and vehicular movement around the site (traffic police/private guards/ regulation of crowd)?			
• If the site is close to sea prone area, some special assessment need to be made.	i. Distance from sea shore ii. Is there existing embankment or protective walls iii. Effect of sea breeze on the structure (deterioration of surface, stability) iv. Earthquake and Tsunami preparedness v. In case of flooding, what are the existing response measures(early warning, evacuation of people from the site, flood water drainage)		
• Previous year's flood and disaster records, its spread and impact.			
8. Monument Assessment: The monument complex/ heritage structure itself plays a very important role for the assessment and preventive measures to be undertaken for the disaster situations. A lot of parameters are to be taken into consideration and evaluation to ensure the well being of people who come to visit the monument.			
• Is there any management plan for the?	monument (structural /tourist /traffic flow /crowd /disaster)		
• Who takes care of the monument	(ASI/ Trust body/ Temple Management Authority)		
• Is the monument having enclosure walls?	(if Yes, its height, and approach inside the complex/evacuation planning for emergencies)		
• Is there any special provision for managing large crowds on special occasions and important festival?			
• Is there a emergency medical help unit in the vicinity?			
• General Signals for visitors around the monument? (Entry-Exits, public utilities, toilet, medical assistance, Emergency exits, barricading)			

Factors	Indicator	Level of vulnerability	Remark
9. Visitor Statistics: A thorough analysis of these statistics will help in planning out the strategies for managing crowds at any particular give time in the year, and when is the maximum requirement of such management.			
• Average number of visitors for any particular day • Total number of visitors for any particular month (mean average) • Important occasions when there are probabilities of excess crowd like purnima, ekadashi, festivals • What is the average footfall on these important occasions?			
10. Staff Statistics: These data will be helpful in assessing the actual resource that can be deployed immediately in case of any disaster like situation, and the best possible way to plan for further assistance required at higher level like city administration or the emergency response teams from the authorities.			
• Total number of staff employed for various tasks in the monument complex? • Under whose direct monitoring they come under? • What kind of jobs they are employed for? • Their complete profile and any special skills which can come handy in emergency situations • Are they trained to manage sudden crowd fall out? • Are the personnel equipped with emergency response kit like • A central monitoring Setup to utilize all the resources	(Medical training, mechanical knowledge (generator, water pump, driving) (First Aid, whistle, torch, oxygen mask, walkie talkie, loud speaker) (human & equipment)		

RAINFALL INSURANCE

Update on Rainfall Insurance at SEWA

In continuing the rainfall insurance provided by SEWA to its members, SEWA has continued its collaboration with Agriculture Insurance Company of India for the Rainfall Insurance. Since 2012, SEWA has been recommending some changes in policy features following the feedback of the farmers and the rainfall pattern. These changes included covering the risk throughout the dry day and constant heavy rain days. These changes were incorporated and the policy was revised.

The main advantage of the Rainfall Insurance is the transparent process, but since last 3–4 years the government and Insurance Company do not want to change their working pattern. It takes a long time to collect the information of rainfall from the GSDMA. This is because at times the information for all the days is not uploaded on the site. Also there is a hierarchy with the Insurance Company which further delays the calculation of the payout.

On the other hand, the research organizations conducting the research on feasibility focus more on the research and the results. There is no information on the hand holding mechanism and the continuation of the Project. This makes it difficult to continue the Project for long term and in a sustainable manner.

Recently in the year 2014, Research Organization has completed its research and stopped the financial support for Implementation. Due to SEWA's work with an integrated approach for the members, we were able to continue to provide the Rainfall Insurance to the members. However, we could not provide any discount or promotional schemes to the members.

From this year, the Central Government has stopped the crop Insurance and is more focused on Weather based Insurance. But due to lack of coordination and communication between Central and State Government, AIC did not provide the policy on time. They provided the policy just before 7 days of the due date. Also, lack of financial support, promotional event from government and Insurance Company SEWA was able to reach only 200 farmers.

The overall observations are as below:

- Insurance Company should provide promotional event and material for marketing support.
- Government should consider Insurance as necessary risk mitigation tools and it should be included in subsidy form
- There is also huge requirement to establish the Rain gauge machine as per the lowest distance, preferably at village level.
- Research Organization should involve for long period or it should include the hand holding procedure for any project. ■

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