Current Strategies of Risk Mitigation for Disaster Surveillance of India

Sukhendu Dey*, Kamalesh Sen

Abstract

This study aimed that the risk mitigation for disaster in India, and damage the socio-economic condition, loss of the natural resources, death of the living bodies remain high. Clearly, the continuous process of risk mitigation for disaster in India, very intricate due to the several factors, for example socio-economic condition, climate change, rise of sea levels etc,. These different factors dominance the frequency and intensity of flood, earthquakes, tsunami, landslides, wildfires, drought, cyclones, different epidemics diseases, needs of the different scheme for proper implementation, lack of traditional structural measures and finally end-to-end risk mitigation of disaster and prior protection of the environment and ecosystem. The article identifies current strategies of risk mitigation for disaster by India different disaster and risk mitigations agencies in present scenario. The article recommendation may be guide the policymaker and the stakeholders in formulating the sustainable risk mitigation for disaster surveillance of India. A good attempt was taken by the govt. of India to recognize, promote more potential through online training, different awareness programme organized by early warning system, National Institute of Disaster Management (NIDM) Govt. of India.

1. Introduction

Any catastrophe has caused loss of life and misery all over the world. Now, the main interest of the government is the flexibility of sustainable communities, but most of the endangered communities particularly in developing countries are the incondite sections of the community, specially poor people, who have not sufficient capacity to join the effectively in the elasticity efforts (Kanji and Agrawal, 2020). Several good researches were focused on the geographical, social, physical, economic, political and

Sukhendu Dey and Kamalesh Sen, The University of Burdwan, Burdwan-713104, West Bengal, India
* Corresponding Author Email : sukhendudey.envs@gmail.com

finally infrastructure quality enhancement as per social media analysis, print media analysis, mathematical modeling and finally physical observations (Giri and Vats, 2019). Recent observed for disasters like as health aspect (pandemic disasters), cyclone, earthquakes, landslides, tsunamis and volcanic activity, avalanches and floods, extreme temperatures, drought, wildfires, cyclones, storms, disease epidemics, insect or animal plagues, etc. (Fraser, 2021; Shahbazi et al., 2020). The anthropogenic activity of disasters namely, hazardous materials, nuclear disaster either power plant or blast, radiological activity, chemical-biological weapons, cyber-attacks, transport accidental, etc. (Gill and Malamud, 2017).

Modern application on basis of disasters mitigation in kind application of GIS as ability predicted of vulnerability zone require aspect on the basis of hazards perceptive. Observation to potentially support as disaster risk management is coming into increased scrutiny (Alexander, 2008). Its take actions needs as different steps of the disasters management aspect on, minimize future losses, preparedness and crisis management, disaster often focused on saving lives, and crisis management aiming at re-establishing services supporting human activities (Jaman et al., 2021). Previous literature as extensively discussed on the technical and scientific observation, scientific challenge as required to maximize in term of beneficial space to mitigation of disaster risk management. The exclusively observed as extent space-based earth, grants actually meet the disaster risk management decision framework (Jaman et al., 2021).

Social media as a significant tools for mitigation role of the media in natural disaster as unarguable. The media supporting acts as a transmitter of valuable information throughout the disaster mitigation of life cycle. This is more effective argued that the relevant functions of the media variability such as radio, TV as well as e-communication, newspaper awareness, and more supporting as Facebook, WhatsApp's to make supporting its effects as well as remedies. As long term mitigation, the media leads to disaster information which could provide repeatedly on disaster coverage (films and demonstration as virtually, documentaries, news and special programs), which ultimately helps the community raise disaster awareness rather than future events (Rodriguez 1997).

Immediate response team is not only the common recognized term, but also its plays a vital role in life-saving management in risk mitigation for emergency disaster management response. The main objectives of this study are current strategies of risk mitigation for disaster surveillance of India.

2. Global Mitigation of Disaster

Natural or manmade disaster occurred suddenly, happening over the month or it may run even the years and affects the large region and it finally damages the natural environment in the world. Different good planning and mitigation measures can also help the reduction of the risk mitigation for disaster (Jones et al., 2014). Mitigation across perspective to prevent as reduce the risk of life, property, social and economic activities and natural hazards (Shahbazi et al., 2020). Major aspect on mitigation primary decides awareness, education, preparedness, prediction and warning systems, which can leads to the disruptive impacts of a natural disaster on communities (Jaman et al., 2021). Mitigation measure parameters applied such as adopting of zoning, land-use practices, and building subjection. However, to minimization for actual damage from hazards and identify vulnerability zone by GIS system (Alexander, 2008). As landslide- and flood-prone areas towards planning needs at zoning ordinances and constructed to require element for post disaster mitigation. Moving towards up holding of mitigation practices searching for community commitments, limitations and barriers, and innovative solutions, e.g., Flood plain support area to the community as open space, wildlife and recreation attractions, or mountaineering and physically good ness trials (Shahbazi et al., 2020). With awareness and educational has to be leads in cooperating of disaster knowledge and research for social media mitigation practices. Mitigation initiative of all above corresponding need to engaged the key points that addition in growing, adopting, implementation, and elongation of mitigation, public officials, insurance as well as finance, civil groups who are able to architects planners also engineer; supporting specialist like as marketing, educator and researchers (Izumi et al., 2019). As communication and coordination researcher, practitioners and policy incorporating to enhances likelihood of implementing effective mitigation programs.

Table 1: Current Perspective Disaster Management

Disasters	Description	Management & Reducing Aspect
Bushfires, Australia 2020 ("The Australian Bushfire Mitigation Strategy," 2018)	Australian bushfire season, Black Summer, as period of unusually intense bushfires in many parts of Australia.	Completely close of insulation system in an IP66. Control by order of secure communication and automatic control. Advanced sensors with safety functionality are designed to monitor and manage high-disability earth faults. No form of recovery is a fire or bushfire mitigation solution. Recovers must be used in single shot mode on a fire risk day.
Flash Floods, Indonesia-2020	Flash floods, occurred in the Indonesian capital of Jakarta and its metropolitan area. Couse overnight rain overflow Ciliwung and Cisadane rivers, which dumped nearly 400 millimetres (15 in) of rainwater	Keep safety of people and displaced hundreds in a district on the Indonesian island of Sulawesi, and Search and rescue officials were still looking for missing people after the floods struck the North Luwu district of South Sulawesi province, said RadityaJati, a spokesman for the national disaster mitigation agency. Jati said search and rescue operations were hampered by thick mud covering roads and houses, and rain was continuing to fall.
COVID-19, China and all over the world, 2019-2020 (Yu et al., 2020)	COVID-19 as a pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (stork-covi-2) and ongoing pandemic, first identified in December 2019 in the city of Wuhan, China. The World Health Organization declared the outbreak a public health emergency of international concern.	Current situation social distancing masking, and vaccination, government police in primary stage-I lock down, then unlocking process.
Volcano Eruption, Philippines-2020	Taal Volcano in Batangas by Eruption, January 12, 2020, a phreatomagmatic eruption from its main crater that spewed ashes across Calabarzon, Metro Manila, and some parts of Central Luzon and Ilocos Region. Resulting in the suspension of school classes, work schedules, and flights in the area, Philippine Institute of Volcanology and Seismology (PHIVOLCS).	The only effective method of risk mitigation before such an eruption is to remove from areas likely to be affected by pyroclastic flow. 5 - Laharas (volcanic mud and debris flow) is a common large volcanic hazard for people and property. The Lahars likewise move very fast and acquire great destructive power.

Cyclone Amphan, Bangladesh-India-2020	Super Cyclonic Storm Amphan, powerful, catastrophic tropical cyclone, massive damage in Eastern India, also Bangladesh in May 2020. Amphan originated from a low-pressure area persisting a couple hundred miles (300 km) east of Colombo, Sri Lanka, on 13 May 2020. Tracking northeastward, the disturbance organized over exceptionally warm sea surface temperatures; the Joint Typhoon Warning Center (JTWC) upgraded the Amphan underwent rapid intensification and became an extremely severe cyclonic storm within 12 hours.	Place people and social media involve as climate change exacerbated extreme weather events in India and its neighboring countries, there was an urgent subjected to look at the plight of millions of people, mostly the poor, and find ways to build resilience.
Forest Fires, Uttarakhand-2020	On 23 May, a 51 hectare forest in Srinagar in Pauri Garhwal district was affected, now 51 hectares of forest has been submerged across several districts of Uttarakhand, killing two civilians and injuring another.	Advanced sensors and protection functionality designed to monitor and operate high-impedance earth faults. Government alive a relief-struggle for the firefighters controlling the growing forest fires in the state.
Assam Floods, India-2020	Assam floods, affected on Brahmaputra River in the Indian north-eastern state of Assam with including the COVID-19 pandemic, Couse by heavy rainfall, affected 30,000 and destroyed crops across 5 districts. It was approximately over five million people, claimed 123 lives, with an additional 26 died due to landslides, 5474 villages were damaged and more than one hundred and fifty thousand people took refuge in relief camps.	Thus, a proper assessment of the damage was not possible and a provisional estimate was provided by the affected districts and divisions. After the floodwaters receded. Recovery and protection by Assam State Disaster Management Authority (ASDMA). Social medial lead a major role.

3. Major Contains of Disaster in India

Natural disaster for major contains in India, many of them basis of the climate of India, make in losses of life and properties. Some natural disaster as droughts, flash floods, cyclones, avalanches, landslides brought by torrential rains, and snowstorms made in major threats. In dangers of disaster classified their profound environmental effect and human loss and frequency in sense of financial loss (Chakraborty and Joshi, 2016). Frequent summer dust storms, which usually happing from north to south, make

in properties damage in north India and deposit large dust and dirt from arid regions. The essential responsibility of disaster management towards mitigates or recovery, which state make its concerns. However, spread in the central Government could require approximate on relief, rescue and preparedness. The National Crisis Management Committee (NCMC) at central level of convey about disaster with extremely effort. The nodal ministry are justified and supporting certainty to recovery associate with NCMC ("Deep Depression in Bay of Bengal," n.d.).

Last decades of India, the government responsibility about natural disaster has elongated in terms of effectiveness, leads to well-organized at administrative level, privileges of Relief Manuals with public-private partnerships. In the federal of India, the responsible for shaping the government's response for natural calamity in primarily concern on the state government (Brenkert and Malone, 2005; Gupta and Sah, 2008; "Kedarnath disaster: facts and plausible causes.," n.d.). However, the central government as their resources, physical and financial support, provides the necessary assistance and support to reduce relief efforts in the event of a major natural disaster. The level of response at the central government level determines the existing policy of financing relief and considering existing factors: (i) Gravity of a disaster (ii) The amount of relief activities required, (ii) the need for central assistance to increase financial resources during the allocation to the State Government. Since its enactment in 2005, India's Disaster Management Act are described as a paradigm shift in disaster management, disaster prevention and risk reduction, and a move away from a new relief government. The conversational framework this Act obliges the National Disaster Management Authority and the State Disaster Management Authority to act as agencies subjected as disaster preparedness and risk decreases at the respective levels ("Disaster Management Act, 2005," 2020). Combined with three specified organizations should address the full magnitude of the disaster management cycle. The disaster management cycle as described in India's National Disaster Management Policy are exhibited in Figure 1.

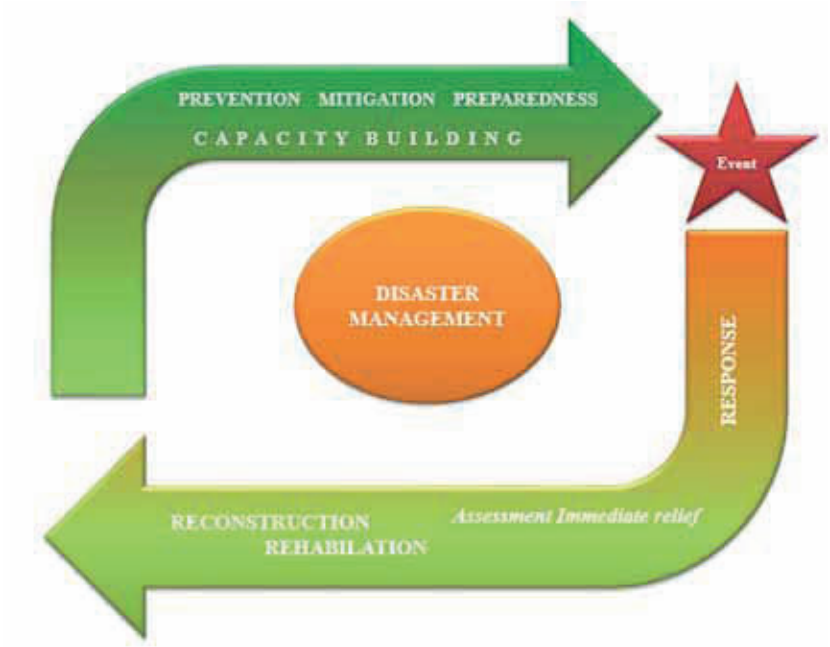

Figure 1: Disaster Management Cycles

4. Social Media as Risk Potential Tools

As social media is a great tool for disaster mitigation, it can help in the news or awareness circulated now a days. It ranges from hotspot news massaging to applicability of social networking sites, these virtual provider could be connected to their mutual friends, or affected families. This application as the purpose of communication is to encourage and promote new for emerging sources of information online, and visitors about the achieving experience among respective concern, i.e., "post", "tag" "digg" or "blog" (NW et al., 2010; Sandra, 2015).

Recent trends in social media not only effectiveness of communication perspective, but also it concerns about application that could benefit (Giri and Vats, 2019). Further application on basis of media tools that has been remarkable benefitted like an Aarogya Setu app, is a mobile application tools, and developed by the Government of India, which connected health status and concern to peoples at COVID-19 pandemic disaster.

Although, 21 most popular of social media in 2019, where are more applicable as disaster recovery like as Facebook (2.23 billion MAUs), Youtube (1.9 billion MAUs), WhatsApp (1.5 billion MAUs), and Messenger (1.3 billion MAUs). Pervious applied traditional medial such as TV, radio and newspaper but more focus on the social media as an additional mode of communication, when information sharing is important such as disaster mitigation (Jamali et al., 2019). Furthermore, surveillance under disasters (e.g., cyclones, volcanic eruptions/earthquakes), where does not reach any communication like the internet, their communication conduct through mic campaigning and radio broadcasts.

4.1 Strategies of Resilience to Natural Disaster

Different strategies using different availability of management tools and improvement plan was decided basis of risk types. Disaster are associated with hazards, possible conditions of vulnerability and insufficient capacity, when disaster coincides with a vulnerability aspect (Jayakody et al., 2018). Thus according to common connotation defined as: Hazard (H) × Vulnerability (V). Risk assessment is an uncompromising process arising from risky areas, which assesses existing vulnerabilities that can harm people, property, services, livelihoods and the environment that are exposed to them together. Aspect on strategies of disaster resilience aspredict, and forecast of all hazards faced by the community such as: floods, cyclones, earthquakes, tornadoes, high winds and fires, to emphasis on the long term which could reduce risk as future aspect, instead of returning the community to a pre-disaster situation (Oldham and Astbury, 2018). The multifaceted goal of sustainability is to create more living communities, protect open spaces, increase economic vitality, promote social values and provide for future generations (Read “Facing Hazards and Disasters, n.d.). Previously act as screening process of disaster such as risk certainty, which able to following progress as sort out in Figure 2. Corresponding develop of building strategies and recovery process, assessing hazards problems and adhoc evaluation of the problem. As mitigation progress applies as an alternative protocols, setting goals and objective for failure perspective, which should implementation.

Figure 2: Conceptual Framework for Disaster M`itigation

Relevant Concepts	Description
Hazards	Physical events, a major loss of human activity, which can result in loss of property and damage over a period of time and within a specified period of time, social and economic disruption or efficacy of the environment
Disaster	Severe disruption of society's activities resulting in massive human, material or environmental degradation beyond the ability of the affected society to cope with its own resources
Risk	The probability of harmful consequence or expected losses (deaths, injuries, property, livelihoods, economic activity disruption or environmental damaged) resulting from interaction between natural and human induced hazards and vulnerable condition
Vulnerability	It is a measure of the tendency (natural phenomena) to carry the consequences of danger to an object, field, person, group, community, country or other entity. This limits the community to a disaster.
Specific Risk	Expected degree of damage due to a specific natural phenomenon
Elements at Risk	All objects, persons, animals, activities, and processes may be adversely affected by hazardous events, directly or indirectly, in a particular region.

Figure 3: Relevant Idea for Disaster Potentiality

5. Conclusion

This paper aims to explore the potential of disaster management with global policy, and social media effectiveness whether of adhoc disasters like floods, earthquakes, tsunami, landslides, wildfires, drought, cyclones, different epidemics diseases, needs of the different scheme for proper implementation. This article is mini review towards disaster mitigation strategies. In addition, the role of communication during mitigation, response, and recovery stages is also reported in the above sections. Needs separate to vulnerable zone possible selection which mays leads to, effectiveness ability. Explore the operational needs of disaster management agencies to liaise with other agencies and communities during the mitigation, response and recovery phase basis of India.

References

1. Alexander, D.E., 2008. A brief survey of GIS in mass-movement studies, with reflections on theory and methods. Geomorphology, GIS technology and models for assessing landslide hazard and risk 94, 261–267. https://doi.org/10.1016/j.geomorph.2006.09.022
2. Brenkert, A.L., Malone, E.L., 2005. Modeling Vulnerability and Resilience to Climate Change: A Case Study of India and Indian States. Climatic Change 72, 57–102. https://doi.org/10.1007/s10584-005-5930-3
3. Chakraborty, A., Joshi, P.K., 2016. Mapping disaster vulnerability in India using analytical hierarchy process. Geomatics, Natural Hazards and Risk 7, 308–325. https://doi.org/10.1080/19475705.2014.897656
4. Deep Depression in Bay of Bengal : National Crisis Management Committee (NCMC) meeting held [WWW Document], n.d. URL http://newsonair.com/Main-News-Details.aspx?title=Deep-Depression-in-Bay-of-Bengal-%3A-National-Crisis-Management-Committee-(NCMC)-meeting-held&id=405324 (accessed 12.14.20).
5. Disaster Management Act, 2005, 2020. . Wikipedia.
6. Fraser, T., 2021. Japanese social capital and social vulnerability indices: Measuring drivers of community resilience 2000–2017. International Journal of Disaster Risk Reduction 52, 101965. https://doi.org/10.1016/j.ijdrr.2020.101965
7. Gill, J.C., Malamud, B.D., 2017. Anthropogenic processes, natural hazards, and interactions in a multi-hazard framework. Earth-Science Reviews 166, 246–269. https://doi.org/10.1016/j.earscirev.2017.01.002
8. Giri, D., Vats, A., 2019. Social Media and Disaster Management in India: Scope and Limitations, in: Al-Masri, A., Curran, K. (Eds.), Smart Technologies and Innovation for a Sustainable Future, Advances in Science, Technology & Innovation. Springer International Publishing, Cham, pp. 349–356. https://doi.org/10.1007/978-3-030-01659-3_41
9. Gupta, V., Sah, M.P., 2008. Impact of the Trans-Himalayan Landslide Lake Outburst Flood (LLOF) in the Satluj catchment, Himachal Pradesh, India. Nat Hazards 45, 379–390. https://doi.org/10.1007/s11069-007-9174-6
10. Izumi, T., Shaw, R., Djalante, R., Ishiwatari, M., Komino, T., 2019. Disaster risk reduction and innovations. Progress in Disaster Science 2, 100033. https://doi.org/10.1016/j.pdisas.2019.100033
11. Jamali, M., Nejat, A., Ghosh, S., Jin, F., Cao, G., 2019. Social media data and post-disaster recovery. International Journal of Information Management 44, 25–37. https://doi.org/10.1016/j.ijinfomgt.2018.09.005
12. Jaman, T., Dharanirajan, K., Shivaprasad Sharma, S.V., 2021. Assessment of impact of cyclone hazard on social vulnerability of Bhadrak District of Odisha State during Phailin Cyclone in 2013 and Titli Cyclone in 2018 using multi-criteria analysis and geospatial techniques. International Journal of Disaster Risk Reduction 53, 101997. https://doi.org/10.1016/j.ijdrr.2020.101997
13. Jayakody, R.R.J.C., Amarathunga, D., Haigh, R., 2018. Integration of disaster management strategies with planning and designing public open spaces. Procedia Engineering, 7th International Conference on Building Resilience: Using scientific knowledge to inform policy and practice in disaster risk reduction 212, 954–961. https://doi.org/10.1016/j.proeng.2018.01.123
14. Jones, S., Oven, K.J., Manyena, B., Aryal, K., 2014. Governance struggles and policy processes in disaster risk reduction: A case study from Nepal. Geoforum 57, 78–90. https://doi.org/10.1016/j.geoforum.2014.07.011
15. Kanji, R., Agrawal, R., 2020. Exploring the use of corporate social responsibility in building disaster resilience

through sustainable development in India: An interpretive structural modelling approach. Progress in Disaster Science 6, 100089. https://doi.org/10.1016/j.pdisas.2020.100089
16. Kedarnath disaster: facts and plausible causes. [WWW Document], n.d. URL https://www.cabdirect.org/cabdirect/abstract/20133312000 (accessed 12.14.20).
17. NW, 1615 L. St, Washington, S. 800, Inquiries, D. 20036 U.-419-4300 | M.-419-4349 | F.-419-4372 | M., 2010. Social Media Aid the Haiti Relief Effort. Pew Research Center's Journalism Project. URL https://www.journalism.org/2010/01/21/social-media-aid-haiti-relief-effort/ (accessed 12.14.20).
18. Oldham, K., Astbury, K., 2018. Evolution of disaster risk governance in Greater Manchester: a case study from the UK. Procedia Engineering, 7th International Conference on Building Resilience: Using scientific knowledge to inform policy and practice in disaster risk reduction 212, 7–14. https://doi.org/10.1016/j.proeng.2018.01.002
19. Read "Facing Hazards and Disasters: Understanding Human Dimensions" at NAP.edu, n.d. https://doi.org/10.17226/11671
20. Sandra, 2015. Chennai floods: How social media and crowdsourcing helps people on ground [WWW Document]. https://www.oneindia.com. URL https://www.oneindia.com/india/chennai-floods-rescue-operations-social-media-technology-twitter-1947228.html (accessed 12.14.20).
21. Shahbazi, P., Mansouri, B., Ghafory-Ashtiany, M., Käser, M., 2020. Introducing loss transfer functions to model seismic financial loss: A case study of Iran. International Journal of Disaster Risk Reduction 51, 101883. https://doi.org/10.1016/j.ijdrr.2020.101883
22. The Australian Bushfire Mitigation Strategy [WWW Document], 2018. . T&D World. URL https://www.tdworld.com/vegetation-management/tools-technology/article/20970685/the-australian-bushfire-mitigation-strategy (accessed 12.13.20).
23. Yu, X.-Y., Xu, C., Wang, H.-W., Chang, R.-J., Dong, Y.-Q., Tsamlag, L., Zhang, S.-X., Yu, Y.-L., Long, R.-S., Wang, H., Cai, Y., 2020. Effective mitigation strategy in early stage of COVID-19 pandemic in China. Infectious Diseases of Poverty 9, 141. https://doi.org/10.1186/s40249-020-00759-3