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## A Review on Government's role in communicating science about disasters

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### Abstract

This review compiles established work on science communication for emergency risk reduction as well as science communication for disaster management and capacity building. The literature will deliver rationales regarding the significance of science communication in disaster management. Explanations of practical uses of science communication and the issues in the way of implementing in the area of disaster risk reductions have been studied before.

Communicating science to the public improves their scientific understanding about natural disasters which benefits them in acting right during, pre and post disaster situation. Additionally, science communication for disaster management also benefits the government in building better strategies and improved infrastructure to safeguard more life and property, thus reducing the mortality rate. Presently, the government of India has recognized the importance of science communication in disaster management and is carrying various projects to ensure the applicability of it. India has also been participating in the projects of Sendai Framework for disaster risk reduction. Media channels including newspapers, television, radio or the new media are being used intensely for this purpose and more organizations are adopting the concept of science communication in disaster management because of its dynamic use.

**Keywords:** science communication, natural disaster, risk reduction, review

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### Introduction

Literature review is a vital starting point for the research as it gives an insight of the studies carried in the past and the researcher gets to know the issues and challenges that might come in the way of this study. This paper is an overview of the meaning of disaster, disaster mitigation, preparedness, and the progress in disaster management practices. Besides, it will discuss prior research activities on disaster management monitoring and awareness practices. It will also identify the gaps in literature devoting deliberations on the domain of the role of Science Communication in Disaster Management awareness and mitigation and also the use of modern technological tools and their influence on the performance of Disaster Management. A number of sources have been consulted to develop a strong literature review to study the role of government in communicating science for disasters.

### Government's role in Communicating Science about Disasters

#### Use of Media in communicating disasters

Disaster management in India mainly concentrates on preparedness, response and recovery arrangement. Preparedness is viewed as "actions taken in advance of an emergency to develop operational capabilities and to facilitate an effective response in the event an emergency occurs" (Godschalk, 1991, p. 136) <sup>[6]</sup>. Mileti (1991, p. 215) states, "preparedness includes such activities as formulating, testing, and exercising disaster plans; providing training for disaster responders and the general public; and communicating with the public and others about disaster vulnerability and what to do to reduce it." However, 'people do not have extensive knowledge about the hazards in there are' due to which they lack interest or concern in the planning and preparedness activities. (Kreps, 1991) <sup>[9]</sup> Concentrating on the tourism industry, Brent W. Ritchie (2004) in "Chaos, Crises and Disasters – A Strategic Approach to Crisis Management in the Tourism Industry" concludes the requirement of strategic, holistic and proactive approach to crisis management through developing proactive scanning and planning, implementing strategies when crises or disasters occur, and evaluating the effectiveness of these strategies to ensure continual refinement of crisis management strategies.

According to Ritchie, understanding and subsequently dealing with the disaster in a holistic manner may improve the disaster management theory and benefit the mitigation process. In India, the process of disaster management, mitigation tends to be an implicit requirement. To achieve successful mitigation practices in India, Bhimaraya A Metri (2006) discusses the concept of Quality Circles. 'A QC is a small group of individuals working in an organization or living in the same area coming together voluntarily to solve their work-related problems or improvement of their work environment, relations or even their personal problems inside their organizations.'

QC, in the context of disaster mitigation is a small group of 15-30 villagers who voluntarily meet together on a regular basis to identify improvements in their respective disaster areas using proven techniques for analysing and solving disaster related problems coming in way of achieving and sustaining excellence leading to mutual upliftment of villagers as well as the country. It is 'a way of capturing the creative and innovative power that lies within the villagers or rural community.' With the frequency of disasters striking India, Daya Kaul in his article Disaster Management in India suggests that there is need continued vigilance, preparedness and conscious efforts to reduce the occurrence. Quick response, strategic thinking, greater participation of the people and a new culture of preparedness needs to be streamlined to manage the various disasters in the country. Immediate responsibility should be taken by the national, state and districts and village level disaster management organization through a proper multi-tier organizational structure. Expert experiences should be shared to train personnel likely to face natural disaster and those dealing with the relief operations.

Nambiar suggests two essential disaster planning elements including: (1) Integrating the panchayati raj institutions and urban local bodies in disaster risk planning and management, and (2) augmenting the capacity by training the individuals. According to her, awareness building and communication in a pre-disaster phase must include, preparedness messages through multimedia (newspaper, radio, television, mobile phones and internet), training in disaster response for community groups and institutions, early warning systems, evacuation routes, demarcation of safety zones, as well as conducting public information campaigns. She coined the phrase 'safety culture' which shall be inbuilt within the community to aware the onset of the disaster, through a robust communication strategy.

### **Use of local response team for disaster communication**

Based on a field study conducted on response activity concerning the 2004 tsunami disaster within the context of local-nation-led, holistic and inclusive natural disaster planning, Marcia Perry (2007) suggests that the natural disaster response activity needs to be viewed holistically in the context of a disaster management planning continuum that should start in the inclusiveness of the local-led response action team. During disasters, the best way to manage the crisis is to provide efficient and timely information that can be beneficial in identifying the threats and competently responding to it. Gao H., Barbier G. & Goolsby R. (2011) <sup>[4]</sup> write about the importance of crowdsourcing that allows people to participate people in various tasks for disaster management, "from simply validating a piece of information or photograph as worthwhile to complicated editing and management". Discussing the pros and cons of crowdsourcing, the researchers explain that leveraging crowdsourcing for disaster relief can aid in gathering reports immediately after the disaster, using social media. The data collected can be used in creating tag clouds, trends, and other filters. These data can be then categorized according to the urgency and help relief agencies to concentrate on the issues and events that are most important to the relief effort. Providers of the data can include geo-tag information for messages sent from some platforms (such as Twitter) and devices (including handheld smartphones). The data acquired can help the relief organisations accurately to locate specific requests for help. However, crowdsourced applications do not provide a common mechanism for collaboration and coordination between disparate relief organizations and hence multiple organization may provide help to an individual request at the same time. Also, all information provided on crowdsourced applications may not be accurate. Fraud reports from malicious persons might appear as normal requests on crisis map. The current crowdsourcing applications (e.g. Ushahidi) do not have adequate security features which may endanger relief workers in publicizing details about relief efforts as they might be targeted by nefarious groups.

Robert L. Zimmerman (2015) <sup>[21]</sup> in his article Building Codes and Resilience to Natural Disasters in Asia-Pacific stated that the two major challenges that the Asia-Pacific Economic Commission (APEC) faces in increasing disaster resilience are poverty and corruption. To improve disaster resiliency in these areas a second-party or a third-party inspection system should be instituted to ensure code enforcement. This will help in reducing corruption in code enforcement and ensure building structures that are disaster resilient. Another recommendation to increase the resilience of buildings against natural disasters is to provide financial assistance to owners in poor communities to enable their homes and workplaces to meet building codes. For this not only the APEC nations but other nations too may institute financial assistance programs.

The Government of India have adopted mitigation and prevention as essential components of their development strategies. The Tenth Five Year Plan has a detailed chapter on Disaster Management. The plan emphasizes the fact that development cannot be a sustainable one without mitigation being built into development process. Each state is supposed to prepare a planned scheme for disaster mitigation in accordance with the approach outlined in the plan. A multidisciplinary approach within physical science needs a broader scope to include sociological knowledge and techniques which might be applied in areas of understanding the incentives that make governments and communities act to reduce volcanic risk, and improving the communication of volcanic uncertainties in volcanic emergency management and long-term planning and development. (Barclay, Hayness *et al*, 2016). Recently, the Intelligent Disaster Decision Support System (IDDSS) was developed to support homogenous data aggregation, manipulation and visualization which can be used by to resolve disaster management issues. The IDDSS provided a platform for integrating a wide range of road network, traffic, geographic, economic and meteorological data as well as dynamic disaster and transport models (Anbarasi and Mayilvahanan, 2016) <sup>[1]</sup>. There is much need for such techniques to efficiently collect data, organize and disseminate appropriate data for efficient disaster management and disaster recovery tasks.

To reduce any kind of disaster vulnerability, it is important to increase knowledge about the presence and consequences of natural and technological hazards, and empowering individuals, communities and public agencies with the knowledge of reducing the risk of the hazards and responding effectively after any disaster. After an earthquake in Lima in October 1746, the Viceroy of Peru hired a French mathematician, Louis Godin to rebuild the city. In response to this, Godin proposed to reduce vulnerability by widening streets and lowering building height. Though the plan was not implemented due to political purposes but this plan was considered as an 'early example of weak risk governance interacting with vested interests to sabotage good urban planning and compliance with a reasonable building code in a disaster-prone urban setting.' (Glasser, 2016)

### **Science and Technology in disaster communication**

Science and technology are put at the service to reduce disaster risk in the world where natural and technological disasters affect the lives of an average of 174 million people annually between 2004 and 2014. The concept of the 'greenhouse effect' was presented by a French physicist, Jean Baptiste Joseph Fourier in an essay to the Academie Royale des Sciences in Paris; wherein humankind could alter the regional climates through technology. It was first aired by scientists and philosophers in the 18th century.

Research on science communication and disaster management also reveals that there are still gaps in the communication strategies or awareness plans. Medical advances across the world have developed vaccines which have helped in reducing major diseases like cancer and AIDs, reduced mortality rates and have cured various pandemic diseases. However, the world is still a petri dish for some new viruses like Ebola, H1N1 and SARS which have caused huge human loss. The foremost role of science communication through any media is to inform the public and ensure that lessons learned by the past disasters or crisis are applied; new technologies are being developed to avoid repeating the synchronized failure. Inadequate science information during the Indian Ocean tsunamis caused higher risk from the disaster. The incident is a powerful reminder of the vital role that modern scientific technologies can play in mitigating the impact of natural disasters. Mobile phones became an essential component in a large number of rescue efforts. Later, a large number of national and international schemes were promoted for establishing detection systems to provide early warning of similar threats in the future. Early detection and warning can help the government and communities in taking adequate measures to save lives and property.

Science journalism is not only concerned with reporting on the research laboratories progress but also to identify and inform the potential impact of those development in the lives off the readers. In case of climate change and geophysical changes on the earth, there is need to communicate about the understanding of phenomena to the communities that are likely to be affected, and to explore the implications of this information for these communities. Science coverage plays an essential role in sensitizing the community and the decision makers towards the areas of concern if they are provided with sound scientific knowledge and reasonable speculation. In way of making news and increase readership, there are times when journalists tend to provide information which attracts the readers' attention. But inaccurate information during crisis threatens the population and individuals. Problems in the communication process between disaster agencies and the public can spread dysfunctional dynamics with destructive consequences (Comfort, Dunn, Johnson, Skertich & Zagoreci, 2004).

Human health studies are conducted in public forums and therefore, earning community trust is critical in disaster situations. Post-disaster research teams should build strategies to sustain and grow community assets. An upstream, collaborative community-based participatory approach is required to achieve the interactive nature of health risk communication as defined by the National Research Council. (Lichtveld & Wickliffe, 2014) [12].

In order to manage the risks from any disaster, it is important to understand the science behind the disaster. When a disaster occurs, it destroys the local information technology infrastructure disconnecting the disaster hit area from the rest of the world. In such situation, the media including the communicators and the reporters present at the area play a vital role in linking the disaster hit region and the world. The media help in disseminating the news about the disaster in the world trying to deal with the situation and warn people about the risk. During these times, the role of science communicators is to understand the science behind the disaster and inform the public about the realistic situation in order to reduce unnecessary apprehensions about the disaster. Scientists provide accurate cause of the disaster and its impacts. Scientists and other experts in the field of science and technology should provide accurate information to the organizational communicators who shall further enable access to accurate scientific information as well as credible experts. The risk communication by science experts will help the public in being better prepared for the future events and can reduce sufferings. The new media or the online media helps in prompt coverage of the disaster and in quick flow of information. Researchers Kris Kodrich and Melinda Laituri found that the internet raised the awareness of the Gujarat earthquake and helped create a global community transcending national boundaries and enabling multiple lines of communication. Nalaka Gunawardene and Frederick Noronha in 'Communicating Disasters – An Asia Pacific Research Book' explains the importance of information and communication in disaster situations. For dealing with any disaster or crisis, media based communication is vital but not sufficient in meeting the multiple information needs of disaster risk reduction and disaster management. Participatory communication including local groups, non-media communicators need to create communities that are better prepared and more resilient to disasters.

Susanna Hornig Priest in her book 'Encyclopaedia of Science and Technology communication' suggests that experts and media should assist the media to understand the issues, without inappropriately promoting their

organization. It is also wise to put forward only those spokespeople who have a strong reputation, have had media training and experience, and are experts in the particular field. Another consideration is to be cautious of the tone of the messages being delivered, as poorly framed pessimism could cause additional alarm unnecessarily.

Objective explanations for the occurrence of the disaster can help calm those wondering if it will happen again soon and can also assist with the healing process for those affected.

As Miles and Morse quotes Anderson (1997): the intersection of complex social, political, economic, and environmental issues “require journalists to transform technical jargon into laypersons' language; this itself may involve processes of interpretation and selection.” The dissemination of information in media is framed by many factors including its journalistic and editorial practices of the media organisation.

The National Science and Technology Council (2003) <sup>[18]</sup> suggested a framework for disaster reduction which included development of a national risk communication plan that shall fully leverage advances in science and technology to expand the effectiveness of public warnings during disaster response and pre-disaster public education regarding techniques for preparedness and mitigation. This effort would include an investment in the social and behavioural science dimensions of public response to information and education campaigns, public health and emergency preparedness campaigns, and public warnings.

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