Brief Report
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Disaster Mitigation: Role of Civil Engineers

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Brief Report

Disaster mitigation is the minimization of suffering experienced by affected individuals after a natural disaster. Civil engineers provide humanitarian and commercial disaster relief by:

- Building new shelters or rebuilding damaged shelters to house people displaced by disasters
- Developing and streamlining logistical strategies for reducing food and water shortages to hard-hit communities
- Dealing with lack of or insufficient communication systems impaired by natural disasters
- Preventing the spread of infectious diseases by ensuring sanitation systems such as sewage and water plants remain operational and accessible by disaster victims
- Facilitating evacuation routes *via* rebuilt transportation equipment to escort individuals to safer, cleaner locations
- Initiating rebuilding of failed dams and levies by utilizing knowledge gained by the failure for preventing similar, future disasters

Civil engineering experts in structural, geotechnical, transportation, water resource, and environmental civil engineering are all needed to mitigate the effects of a natural disaster. Civil engineers continue to improve on the creation of integrated prevention management and measures by thoroughly examining the wide-ranging repercussions of all forms of natural catastrophes. Disaster management is a critical topic for a country like India, which is prone to natural disasters. Capacity building, as well as understanding the topography of the land and adequate municipal structure and planning, are essential for successful administration. Although nonstructural aspects will aid in preparation, the value of structural elements cannot be underestimated. Civil Engineers are involved in the structural part of disaster management [1,2].

The link between catastrophe management and civil engineering is the subject of this paper. This presentation begins with a brief overview of the country's disasters and the role played by specific civil engineers. The 2001 Gujarat earthquake was investigated to see if current technologies, such as base isolation procedures and a greater emphasis on forensic and earthquake engineering, may have mitigated the damage. Structural flood control strategies, as well as the science underpinning them, have been mentioned. Landslide occurrences can also be avoided by using geotechnical and hydraulic engineering research.

The latest innovations in technology that enable civil engineering in disaster management have also been investigated, particularly in terms of analysing the health of structures, which is critical in determining how they would react in catastrophes. The report also includes a case study on the Brahmaputra's flooding, and why the river has yet to be tamed despite over half a century of flood control measures. There have been reasons given for its failure, as well as the tragic circumstances of the land and situation. A feasible remedy has also been suggested. Because dams cannot be erected on the river for a variety of reasons, and most conventional methods are impotent against the enormous river, channelization of the river may be an option [3,4].

Due to recent climate change, an average of 50 million Indians are affected by a disaster each year, with property losses in the millions. Droughts, flash floods, avalanches, and landslides occur on an annual basis in 25 of the 35 states and union territories, making them disaster-prone. According to a recent Ministry of Home Affairs document, disasters cost us roughly 2% of our GDP on average.

"A sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, economic, or environmental losses that exceed the community's or society's ability to cope using its own resources," according to the International Federation of Red Cross and Red Crescent Societies. Despite the fact that they are traditionally categorised as either naturally occurring or man-made, modern technology allows them to be classified as both. The Uttrakhand disaster in 2013, also termed as the "Himalayan Tsunami", was perhaps the most apt example of this new concept [5].

Civil engineer operations during a natural disaster

- When earthquakes cause damage to building foundations or cause structures to collapse, a geotechnical engineer will investigate why and how buildings collapsed in order to construct architecturally better building designs that will considerably lower the danger of future collapse.
- Hydraulic civil engineers are experts in the construction and restoration of flood-control dams. Dam collapses that occur suddenly or unexpectedly require the attention of a hydraulic civil engineer to determine why the dam failed and how to restore it to avoid future structural weaknesses.
- Toxic waste disasters resulting in poisoning of a community's water supplies necessitate the use of environmental civil engineers. Controlling the aftereffects of a hazardous waste event may also require the services of civil engineers who specialise in drainage, air pollution reduction, or worker safety.

Natural disaster civil engineering in the 21st century

- The most immediate threat to America's ageing infrastructure is climate change. The increasing frequency of powerful weather events such as hurricanes, floods, tornadoes, and blizzards has transformed slowly deteriorating roads, bridges, and urban structures into rapidly crumbling, dangerous structures.
- Civil engineers remain critical to minimising the impact of potential disasters by focusing on developing renovated designs and processes based on in-depth analysis of structural, environmental, and humane dilemmas during and after natural disasters.
- Contact the civil engineering consultants at Keck & Wood today for more information about our catastrophe recovery services.

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