Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 107 (2015) 73 – 80

Procedia Engineering

www.elsevier.com/locate/procedia

Humanitarian Technology: Science, Systems and Global Impact 2015, HumTech2015

Technology in Times of Disaster: An Indian Step towards Resource Management

Repaul Kanji[a]*, Purvishkumar Patel[b]

[a]*Ph.D. Scholar, Indian Institute of Technology Roorkee, Roorkee – 247667, India*
[b]*M.Tech Scholar, Indian Institute of Technology Roorkee – 247667, India*

Abstract

Computer science is a very broad field of knowledge which knows no boundary and with every passing day it seems only legitimate that we consider it as the next stage of social and human evolution. However, evolution is only possible if the knowledge in hand can contribute towards prosperous development or somehow manages to mitigate any sort of impending negativity. In India, one of the major drawbacks, which affect not only the social but also the economical backbone of the country, are the natural and man-made disasters. In time of dire catastrophe one needs simple and cheap solutions rather than expensive alternatives. Keeping this in focus, the paper presents certain modified algorithms which, if implemented correctly and in time, can prove to be a real boon in time of disasters and catastrophes.

Peer-review under responsibility of the Organizing Committee of HumTech2015

Keywords: Zonation; Resource Management; Resource Categorization; Disaster Management Authority; Intelligent Distribution Algorithm; Grab and Give Algorithm; U Continue Algorithm.

1. Introduction

India experiences, witnesses and is affected by various disasters very often but never does the same disaster repeat itself within a small return period. This might appear to be a good factor but actually it is just the opposite. India has a vast geographical expanse and being prepared for a particular disaster in a particular prone zone, is a little impractical, considering the fact that a major earthquake would strike India after a decade's interval, that too at places which are thousands of kilometers apart. Had India witnessed disaster more regularly, India would have had

* Corresponding author.
E-mail address: repaul23@gmail.com

Peer-review under responsibility of the Organizing Committee of HumTech2015
doi:10.1016/j.proeng.2015.06.060

more preparedness and more awareness amongst the ever-increasing population. However, things cannot be left to rest at this. Efforts are to be made to ensure that each and every aspect of the disaster management cycle, post the Impact phase, functions as efficiently as possible.

Fig 1. Disaster Management Cycle.

Figure 1 explains the relevance of humanitarian logistics in the field of disaster mitigation and management. The Emergency Phase i.e. the Response Phase demands a very high attention and it is on these grounds that one can infer that these are the phases when handling and managing resources becomes a prime concern. It is often seen that distribution of resources, be it by the governmental authorities or non-governmental ones, are very inefficient. First of all, the selection of necessary items that is to be sent becomes a problem due to the lack of categorization, co-ordination and logistic evaluation. Secondly, the quantity of items is also an issue as there has been many an instance where the quantity of necessary items was much lesser than those items which were not predominantly necessary. Thus, the lack of field knowledge and communication amongst the field workers and the rescue and relief operation organizations cause havoc and tunes down the impulse of relief and rescue to a meager zero. Disasters are obvious, and thus preparedness becomes more obvious and talking about preparedness, it is important to be prepared and respond accordingly. And herein lies the applicability of the paper and hence Computer Science.

2. Methodology

India has a fine network of Disaster Management Authorities across the states, within the districts with the pivotal National Disaster Management Authority at the center. On account of the political and mental diversity the activeness of all these authorities are not same; some of them have proved to be phenomenal while few still strive for proper functioning. However, the fact remains that all these authorities are well knit and can be exploited to the maximum in times of need. The proposed models and algorithms stand upon certain prerequisites and they are to be understood even before the models are proposed because it is not a system on which these algorithms would be implemented but a nation with billions of life at stake during a catastrophic disaster.

2.1 Prerequisite

India already has hazard zonation maps for various disasters. For example, India has been categorized into Seismic Zones II to V. The hazard and seismicity increases with each zone. However, this paper adopts a very different nomenclature when it comes to hazard zonation. The paper proposes dynamic zonations after the Impact Phase. The area which is affected the most, say the epicenter during the earthquake or the immediate coastline during a flood is to be named Zone 5. Moving out from Zone 5, the immediate next area with relatively less devastation is to be regarded as Zone 4. Moving further out towards zones of still less devastation, where damages