

# Chapter 1

## Smart Technologies for Emergency Response and Disaster Management: New Sensing Technologies or/and Devices for Emergency Response and Disaster Management

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### **ABSTRACT**

*Disasters are the convergence of hazards that strikes a vulnerable community which is insufficient to withstand with its adverse effects and impact. Completely avoiding natural or anthropogenic disaster is not possible but its impact can be minimized by generating timely warning. The real-time earth observation is very important for generating such early warning. The earth observation is improving through the advancement in remote sensing technologies. Sensing technology provides real time monitoring and risk assessment. It helps in fast communication of an event occurrence. Disaster detection in urban areas is greatly improved by using remote sensing techniques. This chapter discuss various devices used for real time earth monitoring of disaster events like Flood, Tsunami, Tornadoes, Droughts, Extreme Temperatures, Avalanches and Landslide. These devices gather information by continuous monitoring in their deployed location. The sensor information thus gathered must be communicated and processed to extract the disaster information.*

DOI: 10.4018/978-1-5225-2575-2.ch001

## **INTRODUCTION**

*We cannot stop disasters but we can arm ourselves with knowledge.*

Disasters are the convergence of hazards with vulnerabilities. Disasters occur as a result of a hazard that strikes a vulnerable community which is insufficient to withstand with its adverse effects and impact. Typically, disasters are classifiable into two basic groups: natural and anthropogenic. Among the natural disasters are earthquakes, volcanoes, hurricanes, floods, and fires. Among the anthropogenic disasters are war, pollution, nuclear explosions, fires, hazardous materials exposures, explosions, and transportation accidents.

Countries around the world face threats from both natural and anthropogenic disasters causing enormous destruction which creates human sufferings and producing negative impacts on national economies. Though it is not possible to completely avoid the natural disasters, but the sufferings can be minimized by creating timely awareness of the likely disasters through warning system. Its impact can also be reduced by incorporating disasters management policies and realization through application of information technology tools and devices. The changing trends have opened up a large number of scientific and technological resources and skills to reduce disaster risk.

The effective response to a disaster includes timely information (Farzad, 2015) and early warning of potential hazards. Science and technology plays an increasingly vital role in providing a timely response to manage disasters. Countries are continually improving their disaster detection and early warning capabilities (Rivera, J.Y. 2016). For this a growing number of OECD countries have recently established programmes or incentives to develop and deploy information and communication technologies (ICTs), geographic information systems, Sensing technologies and devices.

When a disaster strikes, remote sensing is often the only way to view what is happening on the ground. Remote sensing is the science of acquiring information about an object or phenomenon without making physical contact with the object using sensing or multivariable sensing (Watanabe et al., 2010) devices and technology in which their output have been assumed to be correct. It is inherently useful for disaster management. The data derived using sensing devices like in wireless sensor network (Devasena & Sowmya 2015 and Rahman et al., 2016) are excellent in mapping the spatial distribution of disaster related data within a relatively short period of time. However decision made by incorrect measurement even leads to disaster. To overcome this problem advanced validation technique (Shen & Wang 2013) also needs to be incorporated.

The rest of the chapter is organized as follows: Section 2 and 3 provides information about Flood and Tsunami. Section 4 and 5 describes Tornadoes and Drought respectively. Section 6 discusses the Extreme temperatures and section 7 is about Avalanches. Finally, section 8 provides the Landslide.

## **FLOOD**

Flood is an overflow of water from water bodies like river, lake, ocean that submerges lands that are not usually covered by water. Countries throughout the world suffer from several floods. These floods cause serious damages to Public property, Private property as well as life. While the countries prepare for flood it still cause's damage. It is essential to have flood warning systems that would provide warning of locations under flood risk. The warning system must continuously monitor, record and collect the

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