

# Chapter 96

## Global Emergency–Response System Using GIS

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### ABSTRACT

*Emergency needs occur naturally, manually (error and terror) and accidentally in addition to world-wide death by hunger and poverty. These situations can arise anytime, any place and thus globally, people are in need of any emergency help by every second. This paper proposes a model for Disaster Classification system of Natural Disasters and Catastrophic Failures activity. This model also proposes the use of emerging technologies such as ubiquitous computing and wireless communications systems that are used by people in recent years to communicate in event of any disaster. The use of emerging technologies also depends on the role of the people and their culture and global support. Furthermore, the paper will propose the deployment of Global Information Systems (GIS) as an aid to emergency management by identifying the related areas pertaining to disaster and thus to help the personnel involved to analyze disasters more accurately by developing a tool. The aim of this tool is to determine potential and affected disaster areas using the GIS technology and to provide support for decision makers during emergencies. Due to the significant development of computerization, networking and mobile systems, reporting a disaster, nowadays, is only a matter of seconds whereas, in the past it would take days or even weeks for the news to reach the people.*

### INTRODUCTION

Disasters are the most destructive phenomena that can occur in natural or technological processes. It is defined as threats to life, well-being, material

goods and environment. It is for sure that each type of a disaster has a different impact and each country and government has a different way to deal with such incidents. Therefore, it is essential to design an appropriate policy and apply successful strategy that can minimize the threat of disasters. Developing a global emergency management in-

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formation network that provides electronic access to emergency management knowledge would be crucial. Disasters are of a national interest however; dealing with disaster is the responsibility of emergency management in the organization. The emergency management is expected to be well prepared in order to decrease the impacts of disaster on human lives as well as properties and have to have effective policies for response and recovery. However, the emergency management suffers from very limited manpower resources as well as equipments. Therefore, they need help to successfully accomplish their mission (Auf der Heide 2004).

World economy faced destruction, people lives were taking by many natural disasters, other events happened in the last recent years such as Hurricane Katrina in USA during 2006, the Tsunami in Asia during 2004, the September 11 attacks, and other information technologies related failures. Such incidents showed that people lives along with both technical and constructed infrastructure can be easily damaged. It is observed that the increasing use of technology put more stress and uncertainties when disasters happen. According to a report by the secretariat of the International Strategy for Disaster Reduction (ISDR, 2004), over than 478,100 people were killed, more than 2.5 billion people were affected and about \$ 690 billion losses in economy caused by natural and man-made disasters. In addition, in Asia tsunami earthquake during 2004, around three hundred thousand people were killed in eleven countries and a whole area and infrastructure was destroyed in the disaster (Aljazeera, 2005). Disasters triggered by hydro-meteorological hazards amounted for 97% of the total people affected by disasters, and 60% of the total economic losses (Shaw 2006). According to the International Federation of Red Cross and Red Crescent Societies (IFRCRCS), World Disasters Report 2004; the number of natural and technological disasters in the last decade has increased by 67 percent reaching 707 disasters each year (IFRCRCS 2004). Therefore,

as Lavell (1999) said the risks and disasters are dynamic and changing rapidly. This risk differs from person to person regardless being in the same or different organization.

Moreover, the most advanced information systems and technologies did even contribute to relief the affected populations. The information technologies manager should be ready all times for such kind of disaster by taking on this consideration the provisions by pre-disaster planning which guarantee the business continuity and less damage (Christoplos et al 2001). These tools must have the capacity to facilitate the end users with geographical, geophysical, and socioeconomic information as well as the functionality to determine, visualize and analyse the likely extent of disasters. It is essential for emergency managers to be aware of the possible risks to contain the impacts of disasters. By using a geographic information system (GIS), such tools can be developed as a decision support aid to help decision makers at emergency management agencies. Disaster management consists of different phases: mitigation, preparedness, response, and recovery (Auf der Heide 2004). GIS is a significant tool in analysing each phase of disaster management.

The GIS technology has become more affordable. Emergency management personnel are able to enhance their efforts to understand and manage the magnitude of and mitigate the potential damage of natural and artificial disasters (Johnson, et al. 2007). The Emergency managers can achieve a variety of efficiencies and gains in productivity by employing GIS technology. Some of the major categories are

- Efficiencies gained from automating tasks previously done manually.
- Efficiencies realized through the reduction, elimination, and/or coordination of tasks previously done that currently are duplicated by multiple individuals in different organization units.

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