

Developing a framework to enhance early warning response capabilities of disaster resilience in the UAE

A. Al Hmoudi & Z. Aziz

*Department College of Science and Technology,
School of the Built Environment, Salford University, UK*

Abstract

Early warning systems (EWSs) are a major element of disaster reduction. They provide resilience to natural hazards; protect economic assets and development gains. The main objective of this paper is to identify and study seven countries highlighted by the United Nations as effective, with a detailed focus on Japan, the United States and Germany, in order to develop an early warning system for the United Arab Emirates and benefit from the experiences of those countries. The research will take into account the culture of UAE society and the multiplicity of communities, as well as the socio-economic and political environment, which can emerge from the experience of the researcher in the environment in which they live. In order to ensure the effectiveness of the system before it is applied, the study will examine the current situation of the early warning system in the UAE, focusing on the level of cooperation and coordination between the institutions in the UAE community and impacts of future natural disasters.

Keywords: early warning, multi-hazard, practices, preparedness, risk knowledge, designs, sustainability.

1 Introduction

In recent years, many fatalities in disasters have been attributed to the lack of an effective EWS. Natural disasters take on a whole other meaning when living in a developing country (Raimondi [15]). For instance, in Sri Lanka over 34,000 people lost their lives in the 2004 tsunami. Research has identified that this, at least in part, is due to the lack of a tsunami early warning system (Bogardi and



Villagran de León [3]). Furthermore, the disaster caused by Hurricane Katrina in 2005 serves as one of the best examples that information available for preventing and limiting damage from hazards is useless if the information is not correctly applied and broadly shared. This disaster was not caused merely by natural hazards, but also by institutional failure, lack of coordination between authorities and ineffective communication among all stakeholders, including the people exposed (De Marchi *et al.* [5]). EWS are designed to reduce the impact of a hazardous event and, if effective, can substantially increase the numbers of survivors. An example of how beneficial EWS can be is outlined in a review of the fatalities on the east coast of India from cyclones (ISDR [9]). Following a major cyclone in 1977, over 20,000 deaths occurred, resulting in the development of an EWS including meteorological radars and emergency plans, so that when the same area was hit by similar cyclones in 1996 and 2005, the death tolls were just 100 and 27 respectively (Carolina [4]). It is therefore no surprise that in 2005, EWS were identified as key to 'identify, assess and monitor disaster risks and enhance early warning' in the UN Hyogo Framework (ISDR [10]). In March 2005, the United Nations International Strategy for Disaster Reduction (UNISDR) conducted a global survey in over 23 countries with 20 international agencies to identify existing capacities and gaps in EWS with the intention of providing a wake-up call to governments and other agencies about the role of early warnings in reducing human and economic loss from natural hazards (UNISDR [18]). To be effective, the report suggests that EWS must be people-centred (i.e. community based) and should be composed of the following four elements (or subsystems):

1. Knowledge of the risks faced.
2. Technical monitoring and warning service.
3. Dissemination and communication of meaningful warnings to those at risk.
4. Response capability (Carolina [4]).

EWS within the UAE faces various socio-technical challenges. The Federal Plan to face disasters in the UAE, which is the prerogative of the Civil Defence and which follows the Ministry of Interior, included early warning, but was not limited to the unclear role of community involvement in early warning. Members of the community are uninformed and unaware of such a plan, and as a result they do not know the procedures carried out in the event of the arrival of early warning signals. There are also shortcomings in the training process and scenarios with individuals and institutions of civil society (Al-Tamimi [2]). Moreover, there are deficiencies in the use of technology in the exchange of information and it relies on the National Centre for Meteorology and Seismology monitoring and Warning. Herein lays the importance of the presence of an early warning system for natural disasters in the UAE (Al-Tamimi [2]).

2 Literature review in early warning systems for natural disasters

In this thesis, we will discuss natural disasters within the scope of the United Arab Emirates (UAE) and by assessing the existing plan for natural disasters, which requires us initially to identify the kinds of natural disasters and how they should be appropriately addressed. There are no natural disasters, just natural hazards; disasters occur when people are in harm's way and preparation is insufficient. It can be seen that all individuals and communities are, to varying degrees, vulnerable to hazards and all have intrinsic capacities to reduce their vulnerability. Over the last decade, disasters have affected approximately 2.5 billion people and claimed the lives of nearly 900,000 (Global survey of EWS [17]). Frequent and catastrophic disasters have increased the role of the public sector in managing disasters and emergencies (Kapucu and Van Wart [12]) and the major responsibility of managing disasters and emergencies, including informing and alerting the public, rests with local government (Caruson and MacManus [14]). For example, in the December 26, 2004 earthquake and tsunami that killed over 200,000 people and caused billions of dollars of damage in 12 countries around the Indian Ocean (UNISDR [18]) many lives could have been saved if there had been an effective tsunami warning system in this part of the world (Di Jin and Jian Lin [6]). Early warning systems are an important strategy to save lives. However, the magnitude of the task of designing, implementing, and sustaining early warning systems in communities is enormous (Collins and Kapucu [13]).

3 International best practices in multi-hazard early warning system

3.1 The Warning Management System of the Deutscher Wetterdienst

The early warning management in Germany (the Deutscher Wetterdienst) is designed as a three-tier time-orientated warning system which defines 5 levels of risks. There are specific legal provisions for the DWD mandating warnings definitions, structures, communication, co-operation and resourcing (Steinhorst and Vogelgesang [16]). Disaster management authorities across all states in Germany assume responsibility for the management of the system. Communication is underpinned by a commitment to a single-voice principle where warnings originate solely from the country's National Meteorological Service and are legitimised for disaster management responses (Steinhorst and Vogelgesang [16]).

3.2 Multi-hazard early warning system of the United States National Weather Service

The United States created a multi-hazard national early warning system in response to a range of natural hazards including tornadoes, flooding, storms,



hurricanes, drought and tsunamis. Initial steps comprised the establishment of a National Response Framework, an Incident Command System and an Emergency Alert System functional across multiple channels. Policies were instituted to reduce risk, create hazard awareness and emergency preparedness at federal, state, and local level (Keeney *et al.* [11]). The framework established coordinating structures, which were adaptable, flexible and scalable to ensure nationwide alignment of roles and responsibilities at all levels of government and non-government organizations and the private sector. Extensive legal mandate was incorporated in statutes, regulations, executive orders and directives (Keeney *et al.* [11]).

3.3 Multi-hazard Early Warning System in Japan

Japan's vulnerability to volcanoes and earthquakes as well as meteorological events such as typhoons and heavy snow has led to extensive experience of a range of natural disasters (Hasegawa *et al.* [8]). As a result, a disaster prevention scheme is focused on early protection against the destructive effects of uncontrollable severe events (Hasegawa *et al.* [8]). The scheme relies on strong meteorological forecast technologies and an extensive communications infrastructure to transmit disaster prevention information. A central pillar is enhanced observation systems, which serve to precisely identify real-time disaster risks and provide early warnings. This in turn expedites prompt evacuation and triggers response actions from disaster management agencies, which diminish the damage from calamities (Hasegawa *et al.* [8]).

4 The current status of early warning in the UAE

In the UAE, the government takes great interest in preparing for natural disasters, and spends a large amount of money in order to protect lives and property. They try to keep this in parallel with economic growth and urbanization and other technological developments witnessed by the Emirates. According to the four elements of early warning (Risk Knowledge, Monitoring and Warning Service, Dissemination and Communication, and Response Capability) (UNISDR [18]), the application of those elements to the UAE is as follows:

4.1 Risk knowledge

The Ministry of the Interior is responsible for disaster management in the country through the Civil Defence, as stated in the Federal Plan for Disaster; the Civil Defence is an integral part of the Ministry of the Interior, and is under the responsibility of the ministry (Dhanhani [7]). As the UAE is exposed because of its geographical location and owing to the number of previous geological disasters, the researcher can determine that the natural disasters that occur in the United Arab Emirates are of four varieties (see Figure 1).



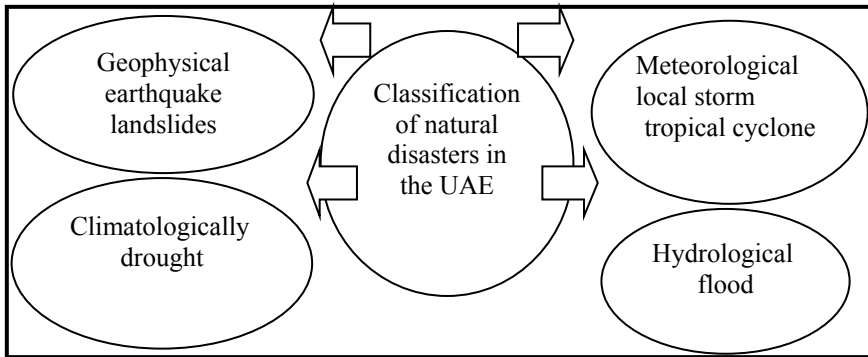


Figure 1: Classification of natural disasters in the UAE.

4.2 Monitoring and Warning Service

In the UAE and at the federal level, the body responsible for monitoring natural disasters and issuing their own warnings would be through the National Centre of Meteorology and Seismology (NCMS). The NCMS carries out its responsibilities in the frame of WMO activities and through regional and worldwide cooperation with the WMO members.

4.3 Challenges facing dissemination and communications in the UAE

Of the biggest challenges facing the communication is the language factor, where Arabic is the official language, but the presence of other languages such as English, Persian, Hindi and Urdu and the existence of different cultures and nationalities brings economic benefits, but at the same time causes a challenge during disasters. The UAE is a diversified country and its native citizens only constitute 20% of the total population (Al Ameri [1]). The geographical nature of the UAE plays an important role in the difficulty of connecting information; where each emirate has its own character in terms of terrain, such as mountains and hills; the Principality of Abu Dhabi does not contain mountains while the Emirate of Fujairah is quite mountainous, and herein lies the difficulty in warning the population. In addition, there is a large distance between the two emirates.

4.4 Response capability

It is essential that communities understand their risks in respect of the warning service and knowing how to react. Education and preparedness programmes play a key role and it is also essential that disaster management plans are in place and are well practiced and tested (Third International Conference on Early Warning [18]). In addition, there is poor coordination between local partners, where it is believed that some of them face the risk of natural disasters and early

warning is the work of the police and civil defense only. Also, members of the local community are not ready, and the reason is simple: lack of access warning to them in a timely manner and that evidence of a lack of early warning system in the state, as well as weaknesses, exist in educating community members on how to behave in the event of the arrival of the warning.

5 Conclusion

Early warning in the United Arab Emirates is weak and needs to be consolidated and placed in a framework and therefore benefit from the experiences of countries that have been mentioned above. The writer suggests that there will be a comprehensive development in education and an increase in community awareness of natural disasters during exercises and scenarios common with government institutions and non-governmental organizations. This will strengthen institutional cooperation in the UAE and strengthen the role of the media, by disseminating warnings modern methods, such as the internet, television and in various languages in order to benefit the largest possible audience.

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