Chapter XVII

Modelling and Simulation of Environmental Hazards

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Emergencies are most probably the most important issue at the European and, of course, at the international level, in terms of impact to the economic structures, the ecosystems,and human and environmental resources. A number of emergencies have been identified within the Emergency Management Area and the areas under EMA coverage. These could be summarised as forest fires, chemical fires, structural fires, industrial accidents, oil and chemical spills, explosions, nuclear accidents, radiation, storms, tornadoes, floods, dam ruptures, marine algal blooms, avalanches, landslides, earthquakes, seismic waves, and volcanic eruptions. The modelling and simulation of the environmental hazards in Europe should be harmonised in a way where developments will proceed, through a consensus mechanism, between the industry, the users, and the standardisation organisations, to create a consensus approach by identifying best practice cases in the management (including detection surveillance and monitoring of the emergency), and to plan operational aspects of the emergency situations, identify proper technological breakthroughs, and identify techniques and developments.

INTRODUCTION

The Mediterranean Sea is a well-frequented sea route allowing access to Southern Europe, North Africa, the Middle East and the Black Sea. The result of this extensive marine traffic is a high risk of oil pollution, both intentional and accidental. In addition to the obvious ecological risks associated with such pollution in a closed sea area, it is in the interest of all nations bordering the Mediterranean to protect their coastal zones on which they depend for tourism and other human activities. The oil spills are not the only pollution in the Mediterranean. Forest fires in this area are a major concern. This area is the most bio-diverse area in the European landscape. The damages after these emergencies, in human casualties, property damages, economic

losses, and a degradation of traditional landscapes, are local-scale effects that are becoming increasingly important for all Mediterranean countries. In France, a EU country less severely endangered by fires, an estimation of 190 millions of Euros are spent every year in fire prevention and fighting. Spain, the most affected EU country, incurs losses directly caused by forest fires of more than 525 millions of Euros every year.

As an example provided herein, a short-term estimation of fire risk can significantly contribute to a decreased number of fires, by taking appropriate measures in days and areas prone to fire. For instance, agricultural burning or access of tourists to the forest and other fire sensitive areas may be forbidden or restricted on days of higher risk, consequently reducing the chances of fires caused by human carelessness. Moreover, these estimations could indicate a danger that is not discernible with meteorological indices. Different approaches towards standardisation could improve fire risk estimation's accuracy; when fire danger provision indicates a high danger, the important surveillance disposal could cost several hundreds millions Euros per day. Avaialble techniques can provide extremely low cost solutions, for example, using NOA-AVHRR data and systems to analyse it. Monitoring the evolution of large fires will aid and support our knowledge of fire behaviour for an Integrated Environment Emergency Management System (IEEMS).

Finally, the knowledge of the Telematics support to the sector will provide better methods to map and inventory events, cases, studies, projects, products, services, and service providers, towards further enhancing the resolution of better regulations.

From a European point of view, following the policies established by the EC about prevention of natural disasters, especially forest fires, in the DG VI, oil spills in DG VII (Hazmat and Eurorep Directives as well as IMDG), telecommunications in DG XIII and DG III, task forces on water (DG III and DG XII), etc., all the developments giving access to reliable and homogeneous information over Europe are important and should be emphasised.

BACKGROUND

Oil spills, forest fires, floods, and earthquakes are some of the emergencies that contribute to the changes in our environment and with which our society is forced to cope. These changes are strongly tied with the capabilities of the human resources to mitigate their effects with the use of new technologies, equipment, and methods. The minimization, if not elimination, of the considerable political, economical and environmental repercussion and the need to seriously address these repercussions has been widely recognized for many years now.

Several developments have been undertaken in the last years to provide methods, techniques, tools, etc. to approach the different types of hazards and provide solutions to some of these difficult problems. In addition, the evolution in satellites and, more specifically, in environmental satellites, has provided to the research community a further advantage, which if properly utilized can support some of the countermeasures in these emergencies. Since different types of hazards have different evolution and control times, it is appropriate to fully understand these events: on how they are developed; starting; evolving with time; etc., in order to