

Preface

In different countries around the world, the occurrence of natural hazards has become more frequent and also more widespread in recent years, resulting in severe damage and catastrophic impact on both the environment and on human beings. Several hundreds and in some instances several thousands of people have lost their lives, and affected countries have been compelled to ask for external aid.

The aspects and magnitude of natural hazards differ by region; however, the level of damage is greatest in areas where dense human settlements exist, notably due to lack of strategic planning based on scientific information. Earthquakes and floods are considered to be the most catastrophic natural disasters. These occur as “*flash events*” that take place within a short time period and extend geographically to affect hundreds of thousands of square kilometers in some regions. The impact is greatest in underdeveloped countries and less in developed countries, since in the latter control measures have been implemented that act in reducing or mitigating the damage.

Many natural catastrophic events have taken place in the history of the Arabian Peninsula, and these events have had a very severe impact. The territory of the Kingdom of Saudi Arabia represents the largest part of the Arabian Peninsula, and it has witnessed a recurrence of earthquakes, volcanoes, floods, dust storms, and many types of mass movements, seawater flooding, and many other natural disasters which have caused great damage to humans and the environment. This has been exacerbated by changing climatic conditions and dramatic population growth. In addition, the Saudi Kingdom is a unique Islamic country and many people gather at the holy Islamic sites, especially in the pilgrimage seasons. This influx of people, as well as the importance of conserving the region as a religious centre, makes it even more necessary to implement protective measures against probable natural disasters such as the floods that occurred in Jeddah city and the surrounding area on 25th November 2009 and 26th January 2011.

The damage that has been caused by floods and torrents in the area has demonstrated that the existing protection measures still need to be improved. Before the two flood events of 2009 and 2011, several constructions were already in place to reduce the impact of floods and torrents, such as dams, bridges, and man-made channels, but they did not serve the purpose very well. Also, many urban settlements

and roads had been built in valley courses. While urban expansion may have been necessary given the dramatic population growth, it impacts on the occurrence of floods and torrents, indicating that the infrastructure needs to be better planned with such events in mind.

The lack of studies on natural hazards in the Saudi Kingdom compared with studies carried out in other regions, resulted in insufficient knowledge of the natural processes that relate to floods and torrents events, and about how to prepare for these processes. Hence, it is urgent to set up “Early Warning Systems” and to implement the correct controls for protection and for risk reduction. It is essential for researchers and experts to investigate these matters and highlight the key issues, thereby extending the scientific concepts that can be considered by decision makers.

After the first flood disaster in Jeddah in November 2009, several local concerned communities were mobilized, and they immediately sought to extend general awareness of natural hazards and their causes. Consequently, I realized that the factors influencing this type of natural disaster continued to exist, and that there is a need for a rapid and radical solution. Concerned institutions have taken several measures to reduce flood and torrent impact, and thereby conserve human life and the environment. Moreover, the Custodian of the Two Holy Mosques, King Abdullah Bin Abdulaziz, has given this issue special attention, both in terms of identifying the causes of these events and in terms of the measures that can be taken to protect the people.

As a scientific researcher, I realized that it was imperative to undertake the present study, which examines all aspects of this natural phenomenon, including the identification of areas at risk of floods and the proposal of suitable controls that can help in reducing the impact of these disastrous events. For this purpose, I utilized satellite images and geo-information systems as tools for identifying surface features and existing terrain processes, and also for data manipulation. In this respect, processed satellite images with high spatial resolution were of great importance in extracting valuable data and information for the consideration of decision makers.

Now is the crucial time to take the initiative and mobilize all scientific skills and resources, of which there are many in the Saudi Kingdom, and to take action not only to mitigate flood impact, but also in preparation for other natural hazards that may occur in the many regions of the Kingdom.

May God bless my country.

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