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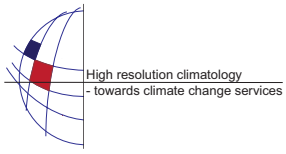

Spatial analysis of climate hazards in relation to urban environments in Iran by using AHP and Kriging methods

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Abstract

Due to the geographical location of Iran its climate is very variable and in most of the times it becomes as an environmental hazard for the people. Among the climate elements, temperature and precipitation are very important. Urban torrential floods or heat island are some examples of these climatic hazards. Due to widespread development and expansion of urban areas all over the country, it is important to define and analyze these climatic hazards over the country. So that, the urban planners and designers can use these information in their planning and designing projects.

In order to study these climatic hazards, daily rainfall and temperature data of the weather stations over the country were obtained from the Meteorological Organization of Iran for the 1960- 2007 period. From these stations, sixty stations with complete and correct data were selected. The following indices were defined as an indication of the climate hazards: sultriness of the air, cold days with minimum temperature below -5° C, icy days with maximum temperature below 0° C, warm days with maximum temperature above 32° C, warm nights with minimum temperature above 20°C, number of extreme rainfall days with precipitation exceeding 90th percentile of the annual rainfall. The station data were extracted and divided into different hazard groups by using Analytic Hierarchical Process (AHP) method. In this method the sultriness was given the highest score, and the percentage of the extreme daily rainfall was the second important factor. The warm nights was treated as the least important index. The final hazard index for each station was calculated from these computed data. The stations' hazard indices were mapped over the country in the GIS environment using the Ordinary Kriging interpolation.

The results showed that the southern coastal areas and internal deserts are the most hazardous part of the country. Whereas, the northern Caspian coastal lands and mountainous regions experience the lower values. The highest value of this hazard index is between 36 and 40 percent in the southern coastal areas and the lowest value was below 10 percent in the northern parts of the country. We also found that the AHP method is suitable for grouping and identifying hazard indices and the Ordinary Kriging interpolation method was able to provide relatively precise spatial information over the very diverse land of Iran. We hope that the findings of this research will help the urban planners and designers in improving the urban life over the country especially in the hazardous areas of the South where, both torrential floods and sultry weather prevail.

Key words: climate hazards, urban environment, urban designing, climate and urban environment, spatial analysis, urban planning. AHP and Kriging methods.