Optimising the Spatial Distribution of Fire Stations in the Urban Sphere, a Case Study of Greater Accra Metropolitan Area, Ghana

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SUMMARY

Instant response to fire events is important for emergency response since delays in arrival can have serious repercussions in terms of cost, damage, and death. However, the growing urban interface in cities poses a difficulty in developing and sustaining efficient emergency response procedures. As a result, one of the primary objectives of planners is to ensure that all service areas are properly covered so that fires may be addressed within an acceptable response time or distance. The goal of this research was to optimize the geographic distribution of existing fire stations in the Greater Accra Metropolitan Area through spatial coverage and network analysis. The spatial coverage area of existing fire stations was analyzed using the buffer and network analyst tool in the ArcGIS environment. By this, the research identified pockets of areas within the study area that are not covered by existing fire stations through the use of international recognized fire standard codes by the National Fire Protection Association (NFPA). Additionally, to optimize the geographic distribution of fire service stations, the study explores the use of multi-criteria analysis by using the weighted overlay tool in ArcMap to find the best locations to cite new fire stations. In summary, Geo-spatial tools have been demonstrated as an efficient tool in optimizing the geographic distribution of fire service stations in the urban environment