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Flash floods: assessment and vulnerability analysis of small-scale drainage basins in the northern Eastern Desert of Egypt

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In response to development of the Egyptian Red Sea coast, 12 small-scale drainage basins in the area extending between Safaga and El Quseir in the northern Red Sea have been studied to clarify the socio-economic impacts of flash floods which may hamper the development process. Although the study area is span from hyper-arid region, it is frequently prone to flash floods.

The main objectives of the study are to clarify the synoptic weather pattern leads to such torrential rain, analyzing probability of annual occurrence and return period and finally determining flood magnitudes and vulnerable sites.

The study revealed that under very specific conditions the Red Sea coast is exposed to thunderstorms especially during October and November owing to movements of the Sudan monsoon depression (Red Sea trough) towards the north which is accompanied by heavy precipitation.

Flood events were studied in a historical framework since 1925. Accordingly, probability of annual occurrence is high (92.3%) for lesser flood events and very low 2.9% for larger events. Rain deep over the Red Sea Terrain is estimated using the inverse distance weighted method (IDW) for 37 climatic stations covering the central Eastern Desert and the Nile Valley. The results were involved in calculating peak discharge and time of concentration.

Thereafter, flood magnitude is assessed as a community of relationships among the hydro-morphometric parameters, runoff and human interferences. Vulnerable sites were determined using topographic maps and satellite images and therefore, the study

concluded that Safaga and El Quseir cities are of high risk potentiality.