

EGU2020-8635

<https://doi.org/10.5194/egusphere-egu2020-8635>

EGU General Assembly 2020

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## Surface Water Management and Modelling in the Sakia El Hamra Hydraulic Basin (Southern Morocco)

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Due to its arid to semi-arid climate, Morocco often faces significant intense rainfall periods that can generate flash floods and raging torrents causing serious damage in a very short period of time. In this context, these recent years, the watershed corresponding to the SAKIA EL HAMRA wadi has known devastating downpours and excessive heavy rains that caused severe floods in Laayoune city and its regions.

The watershed of Sakia El Hamra covers an area of 82000 km<sup>2</sup>, that drains to Sakia El Hamra wadi, a stream of about 447 km long, crosses the basin in its northern part in the East-to-West direction, to discharge into the Atlantic Ocean at the outlet called Foum El Oued. This zone often experiences dangerous torrents of water and violent flash floods, specifically in the northern part of Laayoune city. For example, a flash flood has occurred at the end of October 2016. The peak flow was far in excess of the average (3000 m<sup>3</sup>/s against 410m<sup>3</sup>/s). This river flood, lasted for about 10 h, caused damage to the infrastructure and destruction of agricultural lands near Foum El Oued.

The objective of this study is to investigate, through modelling, the hydrological regime of SAKIA EL HAMRA watershed to prevent the floods in the future and improve warning systems. The hydrological parameters of the watershed were determined by WMS software, namely: zone extent, perimeter, slope, basin's average elevation, Gravelius compactness index, Horton shape index, average altitude, drainage density and concentration time.

Flood flow return was simulated using the Log-normal distribution, using a long time-series of flow and maximum daily and annual precipitation data, recorded between 1985 and 2016, at the Airport station in Laayoune city. The results showed that during flash floods with known flows, water level can reach up to 13 meters, with high flow velocities flooding hundreds of hectares of surrounding plains at the northern part of the city of Laayoune and agricultural lands near Foum El Oued.