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Flood frequency analysis and generation of flood hazard indicator maps in a semi-arid environment, case of Ourika watershed (western High Atlas, Morocco)

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1   **Flood frequency analysis and generation of flood hazard indicator maps in a semi-arid**

2   **environment, Case of Ourika watershed (Western High Atlas, Morocco)**

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9   **Abstract**

10   The development of the statistical models and flood risk modeling approaches have seen remarkable

11   improvements in their productivities. Their application in arid and semi-arid regions, particularly in

12   developing countries, can be extremely useful for better assessment and planning of flood risk in

13   order to reduce the catastrophic impacts of this phenomenon.

14   This study focuses on the Setti Fadma region (Ourika basin, Morocco) which is potentially threatened

15   by floods and is subject to climatic and anthropogenic forcing. The study is based on two main axes:

16   (i) the extreme flow frequency analysis, using 12 probability laws adjusted by Maximum Likelihood

17   method and (ii) the generation of the flood risk indicator maps are based on the solution proposed

18   by the Nays2DFlood solver of the Hydrodynamic model of two-dimensional Saint-Venant equations.

19   The study is used as a spatial high-resolution digital model (Lidar) in order to get the nearest

20   hydrological simulation of the reality.

21   The results showed that the *GEV* is the most appropriate law of the extreme flows estimation for

22   different return periods. Taking into consideration the mapping of 100-year flood area, the study

23   revealed that the fluvial overflows extent towards the banks of Ourika and consequently, affects

24   some living areas, cultivated fields and the roads that connects the valley to the city of Marrakech.

25   The aim of this study is to propose new technics of the flood risk management allowing a better

26   planning of the flooded areas.

27   **Keywords:** flood, semi-arid, Frequency analysis, law, two-dimensional, risk.

28   **Introduction**

29   Floods are the most frequent natural climate hazards, the most damaging and the most deadly in the

30   world (Pulvirenti *et al.*, 2011, Disaster, 2010). The economic losses resulting from major floods have