When dealing with the simulation of integrated flow systems of surface/subsurface water flow processes for catchment studies of the “high” islands in French Polynesia, the extreme geomorphologic conditions of these islands may be considered as one of the key factors that condition river flow. Steep slopes enhance the build up of great flow speed increasing hence the risks of storm flow hazards and soil and bedrock erosion. Unfortunately, quantitative evaluation, to the necessary accuracy, for predictions of the catchment flow processes and associated recommendations for design or system operation is still elusive. This problem was considered important enough to set off a recent task group in charge of developing a management tool able to reinforce sustainable management of river flow and groundwater supply. This poster describes results obtained with a realistic distributed watershed flow model based on the concepts of “topmodel”. It allows for analyzing the dynamic water balance of the surface/subsurface flow phenomena while taking into account spatial variability and distribution of soil properties, evapotranspiration characteristics, vegetation cover, rain fall patterns, altitude and temperature.

Testing and validation is carried out on data collected at the Punaruu river basin covering 43 km² situated at the west side of Tahiti with a yearly rainfall estimated at 3600 mm/yr, minimum discharge rates of 500 l/sec for the measurement station at the altitude of 50m; during the rainy season the median discharge rates at the same station may increase to 150m³/sec.

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