# Submitted Abstract

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| **Title** | Impacts On Reservoir Management And Impacts Downstream Under Climate Change Scenarios In A Semi-Arid Snowmelt-Driven Basin. |
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## Abstract

The IPCC have declared Mediterranean regions as ‘hotspots’, due the severe consequences expected from climate change projections. Besides, high mountains basins in these environments, are highly required to be studied as observatories of hydrological changes and their associated impacts. The Guadalfeo’s river basin, (southern, Spain) is characterized by the influence of snow dynamics on fluvial regime and by the presence of hydraulic infrastructures with important regulating effects downstream. The sensitive hydrological response to changes on meteorological forcings shown in these areas, pointed to scenarios with low-to-no snow contributions, which will have important repercussion downstream such as on the availability of water resources or regulating floods. This work proposed to analyze the effect of climate changes scenarios from Coupled Model Intercomparison Project 5 (CMIP5), on Rules dam's regulation strategies, situated downstream the headwaters of Guadalfeo’s river basin. Climate projections are first statistical downscaled to remove systematic modelled biases and attend the local inter-annual observed variability. The post-process projections of precipitation and temperature were subsequently used as inputs for physically based and distributed model which reproduce the spatial and temporal variability of the forcing agents and processes. that are particularly relevant in mountainous semiarid environments. This model was configured and calibrated for Mediterranean mountain areas and specifically for nival dynamics and hillslope sediment generation and transport after up to twenty years of monitoring works in the study site. Besides, the information related to soil loss enables to considerate the reservoir retention of sediment in future scenarios and the consequences on water storage capacity and flood risk assessment. To evaluate the implication on reservoir management in future scenarios, it is characterized by the water discharge since the dam started to operate in 2004, considering multiple factors (time of the year, level of water storage, ecological flow...) in the decision process. Under this actual dam’s operative characterization, it was analyzed the repercussions on water demand supply and the regulation capacity of extreme events. The results point to a reduction expected in the availability of water for the end of this century, linked to the predicted reduction of snowmelt resources and the loss of volume due to sedimentation processes. Furthermore, the probability of exceed the threshold for attenuate flooding downstream increase considerably. These results highlight the need to urgently implement adaptation and mitigation strategies in the headwater and high mountain basin. This work is part of Smart EcoMountains, the Thematic Center on Mountain Ecosystems of LifeWatch-ERIC.