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Assessing the impact of Climate Change on flood events in the north of Iberian Peninsula (Basque Country Region)

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Regional projections were simulated by the models developed for the Third Assessment Report of the IPCC and confirmed in the Fourth Report. Extreme short-term precipitation was performed over the Mediterranean area and in central Europe. The simulations indicated an increase in the precipitation due to a rise in the vapour water content of a warmer atmosphere. The outputs also showed a decrease due to a reduction in the number of the days with precipitation and in this case, if they act alone, they would also tend to a less common precipitation during the summer. Recent studies estimate an increase up to 10% for the extreme precipitation for the middle of the XXIst century. For example, in the North of the Iberian Peninsula, in the Basque Country region, recent studies found that the main change was dependent to the seasonal distribution of rainfall with a higher spatial and temporal heterogeneity than for their own percentage decrease in absolute values (taking into account no significant climatic differences in this region). This type of researches plays an important role in the Basque Country territory due to the current potential impacts of the climate change on peak discharge and the assessment of its consequences in flood hazard and human health over the Basque region.

The main aims of this study are to calculate the effects on the local flood risk and to assess the measures to adapt to the impacts as a result of local climate change effects. By means of projections of precipitation, tools for hydrological modelling and a new methodology to assess the hazards to people the principal tasks defined to fulfil the purpose are: (1) assess the effect of climate change on the frequency and intensity of heavy rains; (2) analyze and assess the hydrological response in terms of discharge to these changes in heavy rains (projected 2050); (3) quantify the changes in extent of floodplain and changes in natural phenomena severity (in terms of flood depth and velocity); (4) quantify the changes in hazard to people due to climate change.

This study is focused on the Amurrio case study, located in a basin with complex terrain with frecuent rains. The outputs of several Regional Climate Models for future projections over the XXIst century were analysed for this case study. It was found that for this period, extreme precipitation will increase in 14% with a zonal variation along the basin. These changes will increase the peak discharge in 20% and the percentages extend the flood area in 3% in precipitation, with a return period of 50 years. It is expected that the flood depth and the velocity is going to increase in the study area, raising the hazard to people. In conclusion, the vulnerability due to the climate change is increasing and focused on the changes in flood risk, a meso-scale adaptation strategy is proposed defining the land use model in order to reduce the peak discharge and the flood-prone area. For mountainous small catchments, the adaptation measures consist on promoting a mosaic landscape with patches of plant communities spatially distributed.