



Impacts of climate change on water resources in watersheds of four European lagoons

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The hydrologic impacts of projected climate change were assessed for the drainage areas of four European lagoons: the Ria de Aveiro lagoon in Portugal, the Mar Menor lagoon in Spain, the Vistula lagoon in Poland and Kaliningrad region and the Tyligulski lagoon in Ukraine. The eco-hydrological model SWIM (Soil and Water Integrated Model) was applied to each of the four case study areas individually, considering basin-specific characteristics and management settings. All four watersheds were calibrated and validated towards river discharge at one or more gauges, reaching satisfactory to very good modelling results, depending on the quality and availability of input data (i.e. observed climate and discharge data). For the assessment of climate change impacts we forced the four model set-ups with scenario data from the ENSEMBLES project. Therefore a set of 15 climate scenarios, all running until the end of the 21st century, was applied to SWIM for one reference and three future periods of 30 years each. We evaluated the long-term changes of total freshwater inflow to the four lagoons and compared the results considering average trends and uncertainties induced by the different climate scenarios. The comparison not only shows differences in the magnitude of potential impacts among the four regions but also differences in the direction of change. In Spain and Portugal an average decrease in discharge of about -5% and -15% can be expected, while at the same time the total inflow to the Vistula and the Tyligulski lagoon is projected to increase by 18% and 20% on average by the end of the century. The agreement of climate projections among scenarios varies between regions and in consequence the uncertainty in model outputs also differs between the four case studies. In the watershed of the Tyligulski lagoon the projected changes in river discharge vary between -70% and 120%, whereas the results for the Ria de Aveiro lagoon range between -1% and -27% for the last three decades of the century. We concluded that the outputs of such kind of impacts intercomparison can add a very valuable contribution to integrated lagoons management in a pan-European context.