



Index-based framework for assessing climate change impact on wetlands in Poland

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Climate change is expected to impact the water cycle through changing the precipitation levels, river streamflows, soil moisture dynamics and therefore pose a threat to groundwater and surface-water fed wetlands and their biodiversity. We examined the past trends and future impacts of climate change on streamflow and soil water content. Simulation results from 1971 to 2000 (historical period) and from 2021 to 2100 (future period) were obtained with the use of the Soil and Water Assessment Tool (SWAT). Hydrological modelling was driven by a set of nine EUROCORDEX Regional Climate Models under two Representative Concentration Pathways (RCP’s) of greenhouse gas concentration trajectories: 4.5 and 8.5. A special focus was made on water dependent habitats within the Special Areas of Conservation (SAC’s) of the Natura 2000 network located within Odra and Vistula River basins in Poland. A habitat assessment was carried out to distinguish groundwater and surface water fed wetlands. By establishing threshold values of streamflow at bankfull flow we were able to identify flood events. Changes in frequency of the floods informed about the alteration to the water supply for wetlands reliant on inundation. The groundwater-fed wetlands were assessed on the basis of the soil water content. The model outputs were used to develop indices which were calculated for the climate change scenarios. Comparisons of simulated trends in soil water content and streamflow dynamics with average annual precipitation showed largely consistent patterns. The developed indicators are sensitive to projected changes in hydrologic regime in the conditions of changing climate. The results show influence of climate change on floodplain and groundwater-fed wetlands and show the number and kind of wetlands threatened in different regions of Poland. SAC’s will play an important role of buffers and water regulators as soil water content in SAC’s is projected to be higher than average for the future scenarios.