



Impact analysis on hydrological services under future prediction of global climate change: a case in eastern Taiwan

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This study aims at the analysis on impacts for the hydrological service for an area, where is undertaking the climate change as predicted by both of the reports AR4 and AR5 by IPCC. The published tool InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) is applied to a small drainage system located in eastern Taiwan. InVEST has been approved being able to diagnose hydrological services by quantitative proxy indices. In this study four of service indices are chosen: (1) Water Yield (2) Nitrogen Nutrient (3) Phosphorus Nutrient (4) Sediment Output. The adopted scenarios are two representative concentration pathways (RCP), 2.6 and 8.5, under five global circulation models: CCSM4, CESM1-CAM5, GISS-E2-R, HadGEM2-AO, MIROC5. The anticipated future in this study is to 2035. The baseline to compare is computed by the observation data from 1960 to 2009. Our preliminary results show minor variation inter-annually; however, significant blow-up can be detected while looking into inter-monthly. The modeled annual water yields are distributed in between +8% to -17%, while the maximum increase and decrease of monthly yields are 66% and 88.4% respectively. The annual variation of modeled sediment outputs show similar pattern as the water yields; however, monthly data show the maximum increase and decrease are 110% and 85% respectively. Two indices above have already given us a warning that we may need to reconsider the existing water conservancy capacity. For Nitrogen and Phosphorus nutrients, the annual data also vary within a few percentages. Likewise, among monthly data maximum increase 24% and 34% are found for Nitrogen and Phosphorus respectively. Based on modeled data above, we further conduct spatial analysis by using the software LISA to find the spatial hot spots for the discussion.