

Climate change impacts on nutrients loadings in coastal watersheds: comparing deterministic and probabilistic approaches

Sperotto Anna^{1,2}, Pesce Marco¹, Critto Andrea^{1,2,*}, Torresan Silvia², Zirino Alberto³, Molina Jose Luis⁴, Marcomini Antonio^{1,2}

¹ University Ca' Foscari of Venice, Venice, Italy

² Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici, Lecce, Italy

³ Scripps Institution of Oceanography, CA, USA

⁴ High Polytechnic School of Engineering, University of Salamanca, Salamanca, Spain

Coastal waterbodies such as estuaries, bays and lagoons together with the ecological and socio-economic services they provide, are likely to be strongly affected by climate change. Particularly, climate change is expected to alter water quality by changing climate and environmental drivers and to exacerbate the symptoms of eutrophication events. A better understanding of the links between climatic, environmental and socio-economic drivers is therefore necessary for predicting climate change impacts on coastal waterbodies and promoting the implementation of targeted adaptation measures.

Here we present the case study of the Zero river basin in Italy, one of the main contributors of freshwater and nutrients loadings to the salt-marsh “Palude di Cona”, a waterbody belonging to the lagoon of Venice. To predict the effects of climate changes on nutrient loadings and their impacts on the phytoplankton community of the receiving waterbody, two modelling approaches have been applied and compared.

Firstly, an integrated modelling approach based on the sequential integration of an ensemble of GCM-RCM climate projections, the hydrological model SWAT and the ecological model AQUATOX was applied to obtain physically-based projections of freshwater flows and nutrient loads generating from the Zero river basin that are discharged into the lagoon of Venice.

Subsequently, a stochastic Bayesian Networks approach was built integrating the information produced by model simulations with future land use projections to test the effectiveness of available adaption options in coping against predicted changes.

Drawing upon the case study results strengths and weaknesses among the proposed approaches will be presented and discusses.

Keywords: climate change, nutrient loadings, integrated modelling, Bayesian Networks.

*Presenter: E-mail: critto@unive.it