



## **Modelling Nutrient Loads to northern Adriatic**

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The northern Adriatic Sea is one of the most productive parts of the Mediterranean Sea, due to the nutrient discharges of the surrounding rivers. The catchment area measures approximately 110.600 km<sup>2</sup> and is spread over three neighboring countries, Italy, Slovenia and Croatia. While up to date research includes mainly the nutrient load estimations from the biggest nutrient sources like the Po River basin (Italian part), this research aims to estimate the loads from the entire contributing area, including the contributing areas from the Italian, Slovenian and Croatian part.

The model AVGWLF (ArcView Generalized Watershed Loading Function) was applied to simulate nutrient loads from northern Adriatic watershed (NAW), using the data from the past 39 years (1970.–2008.). The AVGWLF model provides the ability to simulate the runoff, sediment, and nutrient (N and P) loadings from a watershed. It also includes an algorithm for calculating septic system loads, and thus allows for the consideration of point sources' discharge data such as wastewater treatment plant's effluents.

River network map with all major rivers and their basins, soil map, land use map and elevation map together with precipitation and air temperature data were used to set up the model of NA watershed. Using the model, dissolved nitrogen, total nitrogen, dissolved phosphorous, and total phosphorous loadings were simulated over a period of 39 years. Comparison between the simulated and measured loads in the Po river shows a good match and thus high reliability of the model.

As expected, the Po River is dominant in nutrient loadings for northern Adriatic. However, other contributing areas are not negligible and have to be considered as well. The model also shows that the major sources of nutrients are agricultural as well as urban areas, without proper wastewater treatment. Proper management of these areas, such as introducing suitable wastewater treatment, shall reduce the nutrient loadings to northern Adriatic.

Further work will be focused to integrate these results in a reliable model for estimating the trophic state in NA as well as to use the model for controlling and managing the activities in the contributing areas.

**Key words:** Nutrient loads, northern Adriatic, AVGWLF model, watershed modelling