

IDENTIFICATION OF THE PHOSPHORUS SOURCES AND THE CRITICAL SOURCE AREAS: YENİÇAĞA WATERSHED CASE STUDY (BOLU, TURKEY)

Kerem GÜNGÖR¹, Nusret KARAKAYA¹, Fatih EVRENDİLEK¹, Duran KARAKAŞ¹, Suat AKGÜL², Oğuz BAŞKAN², Hicrettin CEBEL², Osman SÖNMEZ³

(1) Abant İzzet Baysal University, Department of Environmental Engineering, Gölköy, Bolu, TURKEY

(2) Turkish Ministry of Agriculture and Rural Works; Soil, Fertilizer and Water Resources Central Research Institute, Yenimahalle, Ankara, TURKEY

(3) Harran University, Department of Soil Science, Osmanbey, Şanlıurfa, TURKEY

Objectives of our project are to determine (a) the source contributions to the P load exerted on a shallow eutrophic lake (Lake Yeniçağa), (b) the critical source areas causing the terrestrial diffuse P load in the lake watershed.

Phosphorus budget of the lake is established via mass balance method using the internal and external P loads, P content of the lake water, and the lake's P load output. External P load is determined by monitoring the P influx from the lake tributaries, atmospheric deposition, and the sewage pumping station discharges. Atmospheric P deposition is measured using wet-dry deposition sampling. Downstream creek is monitored to determine the P export from the lake. The lake water is analyzed for its P content. Automatic water sampling and flow rate measurement stations are installed on two major tributaries. The stations have flow-based schemes enabling more frequent water sampling during wet periods. All water samples are analyzed for orthophosphate, total dissolved P and total P using ion chromatography and inductively coupled plasma-mass spectrometry. The monitoring scheme is planned to span 24 months and the P budget is quantified on a monthly basis.

A P index, based on the Pennsylvania index (USA), will be developed to identify the critical source areas in Lake Yeniçağa watershed. An extensive soil sampling campaign is currently underway to assess the plant available P status of the cropland in the watershed. Geographical location of each sample is recorded using a handheld global positioning device. Since Olsen (0.5 M NaHCO₃ extractable) P is typically used as soil test P in Turkey, the samples are analyzed for their Olsen P content using the spectroscopic molybdate-blue method. More than 40 composite samples have been collected and analyzed so far. Target sample size is 200. The results will be used to identify the potential source areas where detailed P index application will be performed.

The presentation will mainly include the digitally mapped Olsen P results. Preliminary P budget results based on September 2011 data will also be presented.