Title:

Analyzing impacts of multiple factors on water inflow to the Aral Sea

Abstract:

The Aral Sea, located in Central Asia, is formerly one of the four largest lakes in the world. Amu Darya River and Syr Darya River are two major rivers that flow into the Aral Sea. However, the Aral Sea has suffered from an unprecedented shrinkage over the past decades. Since 1960, water inflow into the Aral Sea has sharply decreased and nearly 90% of the Aral Sea area has disappeared.
Moreover, the shrinkage of the Aral Sea aggravated the destruction of oasis, the salinization of farmland, the deterioration of regional climate, and the pollution of water body, which posed great threats to human health, ecological environment, and social economy. What has caused the dramatic decrease in the amount of water flowing into the Aral Sea? In this study, some integrated methods (e.g., BNN-FA and B-LSVM-FA) are developed for quantifying the individual and interactive effects of multiple factors (e.g., human-activity, hydrological and ecological) on inflow (from Amu Darya River and Syr Darya River) to the Aral Sea. The proposed methods can also reflect nonlinear and uncertain relationships between multiple factors and river inflow. Results obtained can help (i) identify key factors affecting variation of inflow to the Aral Sea, (ii) seek the effective ways to recover the water inflow, and (iii) restore the ecological environment of the Aral Sea.