

## **Abstract**

Correct estimation of suspended sediments volume in rivers is one of important issues in river engineering, water resources and environment projects. *Helmand* river is main source of water supply to approximately 1070 km of *Baba yaghma* mountains originated in *Afghanistan*. *Sistan* river is one of split main branch of *Helmand* river, which task of irrigate 70% agricultural plain and is responsible for providing part of *Hamoon* water in *Helmand*. Given the many problems caused by sediment in rivers, sediment science researchers have done many effort to achieve sediment transport relations according laboratory and field studies. Because of multiplicity parameters involved in sediment transport and complexity process of erosion and transport particles, most of the sediment relationships need to solution complex mathematical equations, however ,it aren't accurate results. Also regression relations between water discharge and sediment discharge aren't good correlation. The recent years using of smart systems in order to increase accuracy of estimating of river sediments are common. In this study were used the empirical relations of sediment transport and smart systems including Artificial Neural Networks (ANNs), Adaptive Neural - Fuzzy Inference System (ANFIS) and Genetic Expression Programming (GEP) in order to estimation of suspended sediment load in *Sistan* River. Between empirical relations, Toffaleti with 66557.8 RMSE and 0.705 correlation coefficient is the best result. All smart ways estimate suspended sediment load better than empirical relations. The third scenario of ANFIS from artificial intelligence (AI) methods with 0.001 RMSE and 0.99 correlation coefficient is the best result in estimation suspended sediment load. Also AI methods obtained at 95% absent aren't significant difference between results and according to error rates all AI methods are highly accurate. Therefore suggest estimation of suspended sediment load is suggested using AI methods in *Sistan* River.

**Keywords** : Artificial intelligence methods, Sediment transport relations, Suspended load, *Sistan* river



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**Comparison of artificial intelligence  
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