

# Investigation of Channel Change of Aras River by Using Transect Method from 1987 to 2014 and the Effects of Built Structures on the Modification of River Route (Case Study: From Aslandoz to Parsabad)

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## 1. Introduction

Rivers through production, movement and storage of sediments are one of the most important factors that modify the earth's surface. Historically, some rivers have been selected as the boundary lines between the countries and have acquired additional importance. River channels, particularly alluvial bed rivers are continuously changing and this can cause many problems. In this study, lateral movement of the Aras River, 15 km away from west of Aslanduz city to exit of the river in Iran's border, are investigated in three time periods, 1987, 2000 and 2014. This river has a great importance in relation to water supply in the northwestern parts of the country. Moreover, in the large distances, it forms Iran boundary line with the countries of Armenia and Azerbaijan. Therefore, research on the lateral changes of river becomes necessary.

## 2. Material and Methods

Topographic maps with scale of 1: 50,000, digital elevation model (DEM) with 27 m resolution, and satellite imagery (Landsat 7 ETM+ satellite sensor & Landsat 8 OLI satellite sensor) are most important materials in this research. Studied channel reach of the Aras River for three time periods, 1987, 2000 and 2014 were extracted by processing satellite images. Then, channel based on morphology and changes trend was divided into 17 transects, and quantitative indicators were calculated for each transect.

## 3. Results and Discussion

The Aras river planform in the study is mainly meandering. According to the studies, meanders of the river channel are active, and the formation of new meanders, meanders

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migration as a result of erosion and creation of cutoff frequently occurs with a relatively high rate. Study of lateral migration of the Aras River have shown high change in late 26 years. Even lateral migration in some parts of the third reach has been 1.7 km. The average of channel migration rate in the study reach of the Aras River is about 8 meters per year, which is a significant value. By comparing the mean values of the central angle and rate of channel migration can be said, in transects that planform is the developed meandering river, the rate of channel migration is higher. But in a few transects where the river tends to be a straight pattern, in other words the central angle and sinuosity coefficient values are smaller, the amounts of movement was lower. In the study area, according to the past changes trend, channel changes have occurred due to three major reasons: (1) channel migration in the floodplain due to the erosion of concave banks of meander loops, (2) occur cutoffs through development and near the base of meanders, which its effects can be seen as an abandoned channel, and (3) occur avulsion in the parts of the river channel. In fact, large quantities and unusual migration rate in some transects were related to the avulsion. Most likely, the avulsion caused by the river flooding, especially in the spring and disturbances are due to the confluences. In some cases, the combination of these factors associated with intervening variables such as the effects of confluences have caused the channel movement to be very significant and unusual.

#### 4. Conclusion

The modification of the Aras River route in the study area (From Aslandoz to Parsabad) in 11 different reach has been done in Ardabil regional water authority. These actions in reaches: old dyke, Muhammad Rezalvo reach, Ghara Daghrou reach, Salamn Kandi reach, Alireza Abad reach, Topraq Kandy reach, West Sarband reach, Haj Hassan Kandy reach, Ozone Tape Reach, 1/53 reach, Maghsoudlou reach which trigger the release of more than 420 hectares of coastal land in Iran and have a very important role in the modification of the Aras River route and prevent lateral movement of the Aras river during the past years.

**Key words:** Morphology, Channel, Lateral migration, Meander, Avulsion, The Aras River

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