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title: **Trans-boundary Groundwater Resources Management in the Azerbaijan Republic: looking for new ways for solving old problems**

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Of the available annual average fresh water quantity of 367 billion m³ in Azerbaijan, roughly 70% are the waters of transboundary rivers of Kura (Turkey and Georgia), Araz (Turkey, Armenia and Iran), Ganykh (Georgia), Saumur (Russia), and Astarachai (Iran). Most of fresh groundwater reserves are also in transboundary aquifers.

In the territories of Turkey and Iran environmental conditions of Kura and Araz Rivers are relatively better. The Kura River in the Georgian Varsiya-Akhalkalaki region and Araz River beginning from Gumru region of Armenia to Azerbaijan territory are polluted. Wastewaters in Armenia and 36–40% of Georgia are discharged in the Kura and Araz Rivers. There is no self-purification process in the rivers here. In connection with that physically, chemically and biologically altered and unsafe waters enter into Azerbaijan territory.

In the current situation, the groundwater play an important role in all fields of endeavor providing Azerbaijan Republic with sustainable development, because it is well known that the level of natural protection of the groundwater in the artesian basins is high. Though, the groundwater's contamination by surface waters from Armenia and Georgia in their hydraulic interaction areas is already registered.

Within the geologic-structural features of the Republic of Azerbaijan, several groundwater basins (aquifers) were recognized: the Greater Caucasus basin, the Kura basin, and the Lesser Caucasus basin. Within these basins, sixteen sub-regions (corresponding to field survey of fresh groundwater) are identified based on the nature of the hydrogeological setting and the geologic-geomorphologic structure. From the 16 identified fields (aquifers) of fresh groundwater resources, seven of them are Transboundary Aquifer Resources — Nakhchivan (with Armenia, Iran, Turkey), Lesser Caucasian, Jebail, Mil-Garabakh, Mugan-Salyan (with Iran), Alazan-Agrichai (with Georgia), and Gusar-Divichi (with Russia). Practically about 90% of the fresh groundwater of the Republic falls in the category of transboundary basins and potentially it can produce over 12 million cubic meters (m³) per day. If we take into consideration that Gyanja-Gazakh (with Armenia), Mountain-Talysh, Lyankaran (with Iran), Ajinour-Jeiranchol (with Georgia) aquifers (fields) of fresh groundwater resources are Transboundary Aquifer Resources for Azerbaijan (i.e., despite the fact that the whole groundwater basin is situated within the Republic, the recharge areas are in other countries), one can readily surmise that 11 out of 16 groundwater basins are in need of individual consideration and assessment. The largest transboundary aquifers with fresh waters are Gyanja-Gazakh, Mil-Garabakh, Alazan-Agrachai and Gusar-Divichi. More than 80% of the existing reserves of fresh groundwater in Azerbaijan are confined to these basins.

Complex analyses of hydrogeological, geological and hydrological data using hydrodynamic, hydrochemical, probabilistic, statistical and water balance methods allow the creation of a conceptual model of the groundwater flow system, schematization of aquifer boundaries, estimation of basic hydrogeological parameters, and show strong interaction between the groundwater and surface waters. The obtained results provide a basis for creation of interactive mathematical models of groundwater movement for use in management and sustainable development. At the same time, to assess of the limits of anthropogenic impacts on the groundwater and the development of predict methods for the definition of possible detrimental impacts on the groundwater and other parts of the environment.

At a first glance it may seem that the problem associated with transboundary water resources is relatively new for Azerbaijan. This is because it is been only 18 years since Azerbaijan has gained independence. Although most of water basins that are transboundary now used to be within the State boundaries during the USSR era, there still existed transboundary water resources issues. This notion that these issues have appeared since the break up of the USSR is basically inaccurate point of view. There existed in the USSR internal boundaries between “autonomous” republics. Even then due to sever contamination of some water resources and the lack of plans for regional use of water resources of Kura and Araz rivers, their inflows from Georgia and Armenia was a great concern for Azerbaijan. With the disintegration of the former USSR and the emergence of the newly independent Commonwealth of Independent States (CIS) countries the issue of the shared water resources within the South Caucasus has attracted the attention of officials at many levels of the new governments as well as former neighboring countries of USSR. Off course, the practical and just solution of this problem requires a multidisciplinary approach that encompasses various expertise and disciplines such as scientific research, legal, socio-economic, institutional, ecological, international relations, etc.

Analysis of situation associated with the use and protection of transboundary water basins of Azerbaijan Republic (where in our view there are major issues to be resolved) can be of great interest and helpful to all parties concerned.



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