

Interbasin water transfer in the Çoruh and Kura-Araks river basins in the South Caucasus: an assessment of transboundary and local impacts

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Abstract: The literature on inter-basin water transfers (IBWT) draw attention to environmental, social, hydrological, engineering, and management challenges for water transfer projects in various parts of the globe. Based on established criteria for IBWT in the literature, this paper evaluates the local and transboundary impacts of the Kura-Çoruh transfer project in the northeast of Turkey.

Keywords: inter-basin water transfer, Kura-Araks basin, Çoruh basin, Turkey, Georgia

1. Introduction and literature review

As described by Davies, et al. (1992, p. 327), IBWT is “the transfer of water from one geographically distinct river catchment or basin to another, or from one river reach to another.” The Kura-Çoruh diversion project, the main subject of this paper, is intended for boosting the hydropower capacity of the mainstream of the Çoruh river. The aim of this paper is evaluating the impacts of this project against the criteria established in the literature.

The literature focuses on the potential impacts of the large IBWT projects on environmental, social, and political structures in donor (sending) and receiving river catchments. Mostly, these impacts are adverse (see, e.g. Cabo, et al., 2014; Davies, et al., 1992; Emanuel, et al., 2015; Gallardo and Aldridge, 2018; Meador, 1992; Pittock, et al., 2009). The IBWT projects are considered “supply-oriented” (Gupta and Van der Zaag, 2008) and “hard-path” methods for solving water demand problems (Prichard and Scott, 2014). Based on this conceptualization alternatives to the IBWT projects are proposed (Pittock, et al., 2009, pp. 41-49).

Most of the sizable IBWT projects are undergone by the governments of large economies such as the US (Davies, et al., 1992; Prichard and Scott, 2014; Emanuel, et al., 2015), China (Wang, et al., 2015; Yang and Zehnder, 2005; Ma, et al., 2016; Shao, et al., 2003), India (Thatte, 2007), or Brazil (Roman, 2017). The literature sets the scene for hypothetical approaches to IBWT projects in varying scales and establishes criteria for them. Resting on this existing work, this paper contributes to the literature on IBWTs in Turkey’s river basins (see, e.g. Islar and Boda, 2014; Öktem, 2016; Yıldız, 2014; Karakaya, et al., 2014) by focusing on the Kura-Çoruh IBWT project in northeast Turkey. The main research question here is whether the criteria in the literature is applicable for Turkey’s northeast IBWT scheme.

2. The Kura-Çoruh IBWT project

The Kura-Çoruh IBWT scheme involves two transboundary basins, i.e. the Kura-Araks and the Çoruh river basins. Fueled by growing energy demand of Turkey (International Energy Agency, 2016), the hydropower potentials of these river basins are being increasingly exploited by the government of Turkey in the last decades. While Turkey needs external sources to meet its electricity demand historically, a trend in the recent years has been achieving a sustainable energy supply security with domestic sources. In return, the total installed capacity in Turkey reached to 88.4 gigawatts by end 2018. Of this, 28.2 gigawatts are hydropower (TEİAŞ, 2018). The existing and planned (EKSİM, 2018) hydroelectric power plants (HPPs) on the Çoruh, the Kura, and the Araks rivers are parts of this endeavor.

With the planned Beşikkaya dam, about one quarter of the water of the Kura river (216.7 million cubic meters per year) is planned to be diverted towards the Çoruh river towards Ardanuç district of Artvin province in order to provide extra water for the planned hydroelectric power plants on the Çoruh river (T.C. Çevre ve Orman Bakanlığı, 2010). The Beşikkaya project on the Kura river in the east of Ardahan province is the key for the Kura-Çoruh IBWT scheme, known officially as the Kura-Çoruh Energy Group Project with a planned installed capacity of 350 megawatts (Nokta Holding, 2011). The other important water works within the project are the Güleç HPP, the Tosunlu dam - Harmanlı HPP, the Akyürek regulator, the Ekşinar regulator and the Ardanuç-I HPP, all of which are in the Çoruh river basin.

3. Impacts and Evaluation

The Kura and the Çoruh rivers both originate from Turkey. After leaving the territory of Turkey, the Kura flows into central Georgia towards Tbilisi, and enters Azerbaijan to join the Araks mainstream before emptying into the Caspian

Sea. The Kura and the Araks rivers together constitute the widest river basin in the North Caucasus. The total drainage area of the Kura-Araks river basin is about 190 thousand square kilometers, of which 28.8 thousand square kilometers is in Turkey (FAO, 2018, p. 1).

The Kura-Araks basin waters are mainly used for irrigation and electricity generation purposes. Of the total 26.3 thousand km³ annual water withdrawal, about 20.6 thousand km³ are withdrawn for irrigation, and 3.3 thousand km³ are withdrawn for electricity generation purposes. Azerbaijan ranks first among irrigation water users in the basin with a total of about 9.5 thousand km³ irrigation water withdrawal per annum (GEF/TWAP, 2016). There are several water reservoirs in the basin of the Kura and the Araks rivers, including the huge Mingachevir reservoir with 15.7 km³ capacity and the Shamkir reservoir with its 2.7 km³ capacity in Azerbaijan. Azerbaijan heavily depends on the water of the Kura-Araks river basin for agricultural purposes. Of its 745 thousand hectares of land under irrigation, about 300 thousand hectares depend on the Araks water (UNECE, 2011, p. 138). The Azerbaijan population resides mostly in the Kura-Araks river basin and depends 80 percent on the basin water for domestic use (UNECE, 2011, p. 141). Currently, 103.95 percent of total actual renewable water resources in the Kura-Araks river basin are withdrawn by all countries and all sectors combined (GEF/TWAP, 2016).

According to the TWAP projections, the basin is under severe “human” and “agricultural water stress,” and it will be under severe “human” and “environmental water stress” by 2030 (GEF/TWAP, 2016). While precipitation and river runoff are expected to decrease, water use is expected to increase, especially in Turkey, within the basin (UNECE, 2011, p. 142). With the Kura Master Plan, which also includes the Kura-Çoruh water transfer project, a total of 38.2 thousand hectares of land will be irrigated in Turkey. In addition, 6 HPPs will be constructed with a total installed capacity of 760.52 megawatts. All these will require 846.05 million US dollars of investment (Temelsu, nd.). This means that there is a current water deficit in the basin, and the deficit will likely be increased in the following decades.

The Çoruh river, on the other hand, flows into Georgia and empties into the Black Sea in Batumi. Most of the Çoruh river mainstream flows within the Turkish territory. The total drainage area of the Çoruh river basin is 22 thousand square kilometers, of which 20 thousand remains in Turkey (GEF/TWAP, 2016). Irrigated agricultural sector withdraws 392.7 km³ of water annually, mainly used by the Turkish farmers. Electricity generators withdraw 40.39 km³ per year, and domestic water use amounts to 145.02 km³ per year (GEF/TWAP, 2016). Turkey constructed a series of HPPs in the Çoruh river basin in the 2000s, such as the Deriner dam and HPP, which is among the world’s tallest dams. According to the State Hydraulic Works of Turkey, 16 HPPs are operational, 10 are under construction, and 7 are in project phase. Upon completion of the all projects in the Çoruh river basin, the total installed capacity will double and reach to 2,085 megawatts (DSİ, 2014). This means that the water demand for electricity generation purposes will increase, but there will be enough water to meet this growing demand.

According to the TWAP projections, “environmental,” “human,” and “agricultural water stress” levels are low within the Çoruh river basin. There will be no serious “human water stress” until 2050, but “environmental water stress” is likely to increase to alarming levels (GEF/TWAP, 2016).

Based on these data and projections regarding the two river basins, the Kura-Çoruh IBWT project will be assessed according to the justification criteria proposed by Kibiyi and Ndambuki (2015, p. 124). The latter criteria are built upon the set of principles of Gupta and Van der Zaag (2008) and are as follows: 1) water deficit in receiving basin, 2) water surplus in donor basin, 3) recoupling earlier investments. It is obvious that there is and will be significant deficit in the *donor* basin, and the deficit in the receiving basin is not serious. Therefore, the high investment costs of the IBWT project and the operation and maintenance costs are unlikely to serve the purpose of maximizing the expected benefits. Furthermore, the high dependence of downstream countries on the Kura river water for agricultural and domestic use may trigger hydropolitical tension within the basin.

The IBWT projects provide valuable ecosystem services to the people in distant localities. In this respect, the telecoupling framework as theorized by Liu et al. (2013); (2016), which focuses on the interactions between humans and nature, can be another viable base for assessing the Kura-Çoruh IBWT project. The interactions between sending, receiving and spillover systems are the subjects of the telecoupling framework (Liu, et al., 2016, p. 28). In accordance, the Kura river, or the sending system, and the Çoruh river, the receiving system cause spillover effects in the nearby provinces in Turkey, as well as in the downstream countries. The agents, namely the central government of Turkey, and the national private energy companies endeavor to meet the rising electricity and irrigation water demand driven by rapid economic development (causes). Political causes are the government strategy for being self-sufficient in electricity production. Potential effects are increased hydropower generation, hydrological change, spread of invasive and alien species, biodiversity loss, as well as potential displacement of people because of irrigation water loss (Liu, et al., 2016, p. 32).

4. Conclusion

This paper evaluates evidence that the Kura-Çoruh IBWT scheme scores low against the justification criteria developed for IBWT projects. Also, the Kura-Çoruh IBWT project may cause problems between Turkey and the downstream countries, especially Georgia (Kupatadze, 2005), or Azerbaijan. The diversion of the Kura water from the Caspian Sea towards the Black Sea would possibly have impacts on the ecology of both basins and seas. Also, the project may trigger some socioeconomic issues regarding the people living within the boundaries of the basins (Hattam, 2012; Karakaya, et al., 2014). The concerns about the Kura-Çoruh project led local NGOs propose alternatives such as the Turkey-Georgia joint dam project instead of the Beşikaya project (see, e.g. Hürriyet, 2017; 23 Şubat Gazetesi, 2017).

Based on the results of the abovementioned criteria application on the Kura-Çoruh project and the alternative proposals, this paper argues that the Kura-Çoruh project may not be the best option for Turkish policymakers. As suggested by the local people and some researchers, alternatives to the IBWT should be considered. This is important for protecting the ecosystem, reducing socioeconomic adverse impacts and avoiding transboundary political and ecological crises in two important river basins in the South Caucasus.

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