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Transformation of the water-energy nexus in Turkey: Re-imagining hydroelectricity infrastructure

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ABSTRACT

This article develops a critical perspective on the water-energy nexus under transformation and introduces ‘infrastructure’ as a conceptual-analytical reference point for revealing relations between water and energy and in understanding how they work. By utilizing this approach, the article focuses on the emergence of a liberalized electricity market and the launch of a hydroelectricity program under the neoliberal water and energy policies of the Turkish state. Through a case study of the hydroelectricity infrastructures in the İzkidere River Basin, the article demonstrates that the liberalized electricity market exerts implicitly ‘structural tensions’ on the hydroelectricity companies on the local level to minimize the natural variability of the river. In return, the hydroelectricity companies built infrastructures in the form of water storage and chained configurations that take the role of providing electricity to the market in a predetermined manner. Hence, they take the control of river flow and regulate it with environmental, social, economic and political consequences. This article hopes to open a door for an infrastructure-oriented direction of research addressing the social, political, economic and environmental nexus relations that are mostly hidden and unvoiced operating on the local scale, and have major implications for the environment and the livelihoods.

1. Introduction

Water and energy are inherently interrelated and connected in a complex manner that has come to be known as the water-energy nexus [1–7]. The water-energy nexus has drawn the attention of scholars over the past two decades, in particular, due to raising concerns regarding sustainable use of water and increased demand for electricity. Scholars have developed new perspectives and understandings to conceptualize this nexus [2,8–13], studied the nexus in different geographies including urban settings [14], and carried out empirical case studies quantifying the nexus [7,15–19]. This body of knowledge focuses on the relations, interactions or links between the energy sector that needs water to produce energy and the water sector that requires energy to extract, transfer, and distribute water, and for water treatment. In general, these conceptualizations of the water-energy nexus are conventional: they hold a resource- or commodity-oriented, scarcity- and efficiency-driven view of water and energy, and are undertaken with the aim of integrating resource planning and management policies for economic reasons. Such a perspective on the water-energy nexus is limited by its understandings of resource supply-demand relations in technical terms. It presents itself as apolitical, although the interactions between water and energy have been constituted by political and economic powers, and therefore have been contested and conflicted by

interest groups. Therefore, as some scholars argue, critical perspectives on the water-energy nexus are needed to examine how the nexus is politically constituted and sustained, not only by technical and material relations, but also by social, political and economic relations and processes [8,14,20].

This article develops a critical perspective on the water-energy nexus and introduces ‘infrastructure’ as a conceptual-analytical reference point for revealing relations between water and energy and in understanding how they work. I argue that this perspective offers a more comprehensive and insightful conceptualization of transformation of the water-energy nexus. Because, hydroelectricity infrastructure is not only a physical entity using river flow to produce electricity, but also a relation building [21] and a relational entity [22]. Infrastructure has been a focus of scientific inquiry in social sciences [23–27]. Scholars have brought into focus the relations between people, environment and the institutions (public and private) that establish and govern the infrastructure [26,28–30]. Furthermore, scholars have studied how different values, rules and ethical principles can be embedded [21,25,31] even in seemingly similar infrastructure [32], how infrastructure makes certain material, institutional and social things possible [29] by design [33] and by operation [34].

In my analysis I conceptualize the hydroelectricity ‘infrastructure’ as places where the water-energy nexus becomes visible [8,14], due to the

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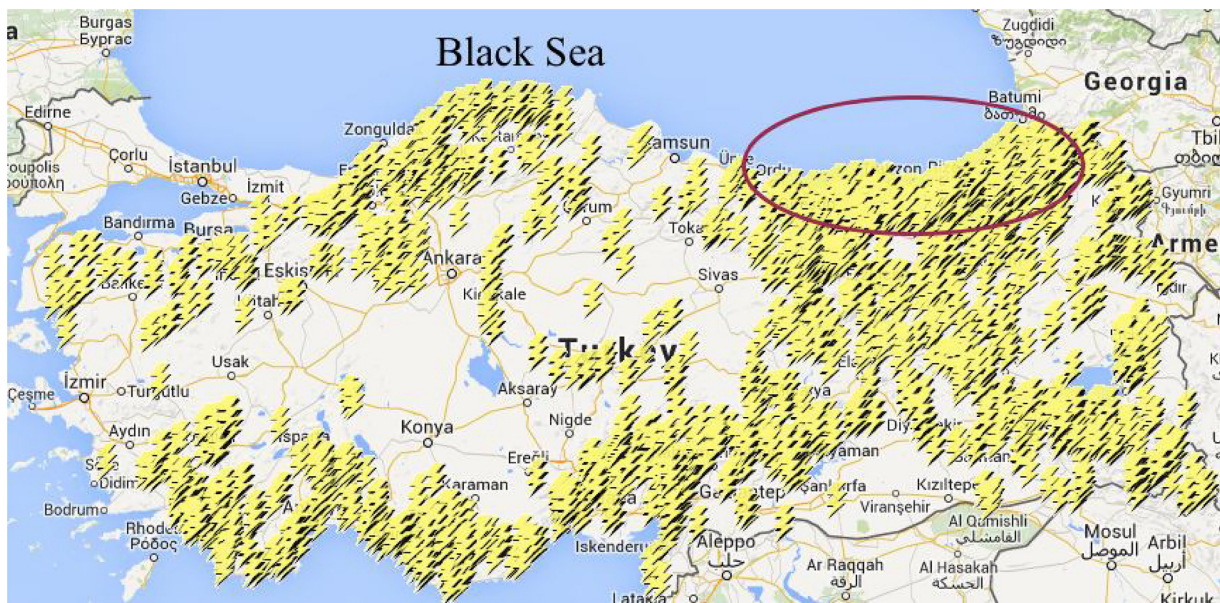


Fig. 1. The locations of licensed and in-operation hydroelectricity plants with the location of the Eastern Black Sea Region (circled red). The İikizdere River Basin is in the Eastern Black Sea Region. Map Source: Turkish Ministry of Forest and Water Works. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

fact that the hydroelectricity plants intrinsically depend on river flow to produce electricity. The hydroelectricity infrastructure is a profoundly useful reference point not only because it is invested in, planned, built, made operational and managed to supply electricity, but also because it affects the movement and moderation of river flow by making water either absent from or present in the riverbed. Hence the suggested approach considers the environmental, social, economic and political consequences, and implications of the water-energy nexus.

Moreover, I argue that the hydroelectricity infrastructure conceptually connects the national context of the water-energy nexus to its local context, because they are approved and planned on the national level, and run by the private companies or the state, and operated in the river valleys on the local level. Therefore it allows a broader conceptualization of the water-energy nexus that considers nexus relations across scales (i.e. national electricity demand has local impacts in the river valleys) [2].

By using the new conceptualization of the water-energy nexus in a case study of the hydroelectricity infrastructures in the İikizdere River Basin, I aim to demonstrate that as the national neoliberal policies and programs have been launched, the water-energy nexus has been transformed through the emergence of new nexus relations and changes in the established ones in a dialectical manner. More specifically, I examine how the Turkish electricity market influences the hydroelectricity production after the commodification of river flow and market-driven electricity pricing schemes, and in return I argue that the hydroelectricity infrastructures in the İikizdere River Basin take a particular and distinct role in the electricity market impacting the İikizdere River with environmental, social and political consequences.

At this point, it is necessary to underline that the water-electricity coupling in hydroelectricity sector goes beyond using water for producing electricity to transferring the electricity from where it is produced to the national grid system [35]. This layer of water-energy nexus solidifies as electricity transmission infrastructure in the river valleys. Since I focus primarily on the relations between electricity market and hydroelectricity production, electricity transmission is beyond the scope of this article.

The reason for focusing on the İikizdere River Basin is that it offers a very illustrative case. It is one of the river valleys in Turkey impacted most by the neoliberal policies and programs of water and energy [36,37]. Moreover, the history of hydroelectricity production in the

valley goes back to the 1950s. Hence all periods of hydroelectricity development of the state in terms of neoliberalism have reflections in the İikizdere River Basin. Additionally, the İikizdere River Basin case can provide useful findings that will be relevant on a national scale.

This article is organized in six sections. Following the introduction, the next two sections provide the national context of the water-energy nexus in Turkey and the details of the case study and the methodology of the research. In the following sections, the article first examines the emergence of a liberal electricity market for buying, selling and trading commoditized electricity. Then, it articulates market-based electricity pricing schemes and the price makers' perception of river flow. Finally, it discusses how the liberal electricity market has influenced hydroelectricity infrastructures, leading to the emergence of new infrastructures with water damming and storing capabilities in chained forms. The last section of the article summarizes the findings and contributions of the study.

2. The Turkish water-energy nexus in transformation

In Turkey, the transformation of the national water-energy nexus goes back to the early 1980s. The 1980 coup was a milestone in the political economic path toward liberalization and privatization [38,39], and opened 'a political window of opportunity to introduce economic liberalization' that had a dramatic impact on the social, economic and political dynamics of the country [40, p. 291]. The impact on the electricity and hydroelectricity sectors was immense, and the reforms toward liberalization and privatization marked a clear departure from earlier policies and programs. When Adalet and Kalkınma Partisi (AKP) came to power with a majority of votes in 2002, state policies experienced a distinctive trend toward liberalization. Since 2002, AKP held the majority of the seats in the parliament and therefore was able to command and control the law-making process. This political context allowed 'The liberalization and deregulation of the energy sector' [41, p. 83] that has driven a significant shift in national hydroelectricity policy, referred by Harris and Islar as the 'Privatization of Turkey's rivers' [42, p. 55].

There are two key developments that amplify, reconfigure and transform the national water-energy nexus in hydroelectricity: establishment of the electricity market, which will be discussed in section four, and the launch of the 'sustainable development' of

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