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The Role of Climate Change on Water Resources Management in the Southern Caucasus in the Post-Conflict Period †

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Abstract: Climate change-induced environmental impacts have had an especially strong influence on water resources. Declining water availability not only is resulting in droughts but is also responsible for decreasing the quality of water in water-scarce regions, such as the South Caucasus. The armed conflict between Armenia and Azerbaijan in 2020 was the recent major war in the Southern Caucasus. In my paper, ask how will intensifying climate change in the region affect the current political situation—is there any chance of multilateral cooperation on water management?

Keywords: water management; climate change; Southern Caucasus; armed conflict; Azerbaijan; Armenia

1. Introduction

Climate change has various impacts on different living conditions of societies. Increasing global temperatures are bringing huge problems with surface water evaporation, while the warmer atmosphere is maintaining more moisture aloft that causes both heavy floods and induces extreme droughts in different parts of the world. Climate change concerning water resources raises temperatures, frequency and density of droughts, flooding, and evaporation in various parts of the World such as the Southern Caucasus. The Southern Caucasus mainly faces drought and low precipitation. Frequent armed conflicts between and within Southern Caucasus countries and neighbors work as an accelerator of competition and collaboration over water resources.

In the last century, the Southern Caucasus faces frequent armed conflicts. The long-standing Nagorno-Karabakh conflict (1988–present) between Azerbaijan and Armenia erupted again into war in 2020, resulting in Azerbaijan recapturing much of its territory from local Armenian separatists and Russia negotiating a new truce and installing troops to maintain the peace. The conflict between Armenia and Azerbaijan over Karabakh in the fall of 2020 upended the decades-old regional balance established during the 1991–94 war [1]. The long-standing armed conflict damage communication between parties and collaborative bilateral and regional actions. Parties need to build trust with the mediation of neutral parties for efficient water management in post-conflict periods to act harmful impact of climate change. Countries cannot adapt to climate change by themselves and require regional or international management of water and other natural resources. One of the most difficult development challenges of the twenty-first century is the lack of water. Nearly 3 billion people, or more than 38% of the world's population, live in watercourse regions that are affected by water shortages, water pollution, and geopolitical instability. Lack of water can have distinctly negative effects on welfare, the profitability of agriculture, armed conflict, terrorism, business decline, lack of sectoral and social growth, as well as environmental and business deterioration. Without sufficient water resources, the overall productivity of societies is decreasing, influencing demographic change, economic development, urbanization, and globalization, as well as

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intensifying conflicts over water use. This paper illustrates how the lack of enough water resources under climate change involves Azerbaijan and Armenia competing and/or collaborating in water resources management in the Southern Caucasus in the post-conflict period.

2. Materials and Methods

This article is a single case study of water in post-conflict Azerbaijan and Armenia. The research is largely qualitative in nature, although on a few occasions, some quantitative data were used. A descriptive-analytical approach was used to perform the study. The researcher examined primary and secondary sources and scholarly literature on the topic. As the theoretical background of the research was rather complex, the approach of its method is multidisciplinary, combining the fields of the environment and international relations. The analysis is based on a one-of-a-kind collection of deliberately chosen interviews with water resources management, climate change and international relations experts in Azerbaijan throughout the study period. In-depth interviewing was conducted to take into account a broad and proportional representation of various parts of society. Questions were designed and preliminarily discussed by the leading researchers and academicians in order to directly collect information on the research needs. The semi-structured interviews consisted of 12 questions in Azerbaijani. It also reviews government records, as well as literature on the role of climate change in water resources management and the post-conflict situation between Armenia and Azerbaijan, to qualify and contextualize interview data. As a technique, interviews can be seen from a wide range of qualitative angles. Having said that, the interviews were conducted largely with an exploratory goal to enable a deeper understanding of how climate change acts an essential role in water resource management between former war participants. The "snowballing" sampling method of sample selection was centered on locating the key informants through literature and internet searches in accordance with their pertinent knowledge or professional experience. By using "referral" methods—asking informants to suggest other subject-matter experts—more participants were chosen. All interview data were recorded and transcribed word by word and stored digitally. I used the NVivo® program for data systematization and transcription, while there were moments when I chose manual systematization. In addition to the systematic analysis of documents and the field diary, interpretive analysis rooted in the adopted theoretical framework was used to analyze the data and identify the relationship between climate change, water resources management, and post-conflict in this case.

The prisoner's dilemma game model is applied in this paper. The prisoner's dilemma is a decision-making conundrum in which two persons acting in their self-interest do not generate the best conclusion. This game simulates a case in which there are benefits to cooperating, although each actor has the incentive to do whatever the other actor does. The standard prisoner's dilemma is put up in such a manner that both sides opt to defend themselves at the expense of the other party. Consequently, both participants are in a worse position than if they had collaborated in the decision-making process. The prisoner's dilemma describes a status in which two sides, separated and incapable to communicate, must each choose whether or not to cooperate with the other. In this paper, the players are Armenia and Azerbaijan due to recent armed conflicts and the third party is climate change. Georgia was excluded due to this country has a peaceful and collaborative approach to Armenia and Azerbaijan.

3. Results and Discussion

First of all, water scarcity issues are currently being experienced by nations all over the world, some of which are minor and others which are severe. A growing population and the effects of climate change will make these issues much more challenging. Given the path to 2050, the countries will thus be dealing with these issues regularly [2]. Global

warming, commonly known as man-made climate change, will alter the hydrological patterns that control the water supply on Earth [3]. Climate change affects the quantity, quality, and timeliness of water, which impacts humans more and more [4].

Moreover, climate change will further stress water resources in the South Caucasus region. Precipitation is expected to fall and temperatures to rise, resulting in a drop-in runoff by 2050 or sooner. At the same time, crop water demands will rise as temperatures rise. The transboundary character of water resources, combined with the overwhelming likelihood that climate change will limit water flow and quantities in general, raises the prospect of disputes over increasingly valuable water resources. These tensions, however, can be mitigated by integrated regional water resource planning. Increased water storage, for example, is nearly always more effectively built at higher elevations, where natural terrain may be used to produce reservoirs and where the steeper terrain offers more potential for hydropower generation at the reservoir outflow. In the World Bank's studies, scientists forecasted grave climate-induced water vulnerabilities in Armenia and Azerbaijan. Climate change has had and will continue to have the greatest influence downstream in the Kura-Aras basin, where river flow is lowest and agricultural demand is highest. Over the previous century, the volume of glaciers in the South Caucasus has decreased by half, and 94 percent of the glaciers have retreated 38 m per year [5].

Furthermore, external players, generally international organizations, also have a significant role in reshaping water governance during and after the war [6]. When armed conflict undermines water resource management, local communities also lose a critical climate adaptation option [7]. International organizations or neutral countries can be mediators to repair communication between parties for sustainable water management in post conflict periods like the Indus Waters Treaty [8] and response to climate change more effectively. Neutral international organizations can help to build trust between Azerbaijan and Armenia at least in bilateral and regional water management. Trust is often seen as a critical enabler in water governance. Water cooperation has the capacity to shift distrust and suspicion between and across countries, opening up prospects for shared profits and establishing a reciprocity paradigm [9]. Governance of water resources has a critical role in both enabling the rebuilding of trust after conflict and avoiding a return to conflict by generating or exacerbating existing conflicts [10]. One of the problems that frequently impede improved regional water cooperation is a failure to recognize the benefits of collaboration. The trust might be difficult to establish in areas with a lengthy history of war such as cases in the Southern Caucasus. Many nations are accustomed to considering water resources as an issue of national security, and thus may be reluctant to share information. When countries agree to collaborate, they want institutional structures and mechanisms that will survive over time, even if their relationship is stressed for other reasons.

In addition, armed conflicts in the Southern Caucasus in particular between Armenia and Azerbaijan damage communications and collaborations between parties. Countries cannot adapt to climate change alone and demand collaborative water management. Trust is an integral part of water management, especially in the post-conflict period. On the other hand, building trust between previous conflict parties is a challenge. Table 1, illustrates Armenia and Azerbaijan as an actor in the prisoner dilemma and the possible results of their behavior in collaborative water management under climate change. Both sides need to trust each other so that the opposite side will not take advantage of their desire to cooperate in water management. If the first side cooperates and the second side will not cooperate then the second side will gain more benefits rather than the cooperation of both of them and the first will gain more degradation rather than non-cooperation of them. As a result, both parties are afraid to cooperate in water management under climate change to avoid the possible biggest degradation. The lack of trust as a consequence of long-standing armed conflict between parties and the lack of a peace treaty is the one of essential barriers to collaborative water management in the region.

Table 1. The prisoner's dilemma game model in this case.

		Armenia	**Armenia**
		Cooperate	Don't cooperate
Azerbaijan	Cooperate	Benefits for the both of them	More benefits for water management in Armenia Damage to water management in Azerbaijan
Azerbaijan	Don't cooperate	Damage to water management in Armenia More benefits for water management in Azerbaijan	Medium damage to water management in Armenia; Medium damage to water management in Azerbaijan.

Furthermore, as a result of interviews, most participants agree that climate change plays a critical role in the water resources management between Armenia and Azerbaijan in the post-conflict period. All participants agree about water resources in the region are scarce in particular in Azerbaijan and under climate change parties need to collaborate. In detail, an academician claims that the negative impact of climate change on water resources and their management of it is already visible in Azerbaijan [11]. Nagorny Karabakh's conflict began its twentieth year of "no-war-no-peace" in 2014. Since the conflict 20 years ago, Armenian and Azerbaijani societies have been radicalized by mutual hostility [12]. During this period, Armenia and Azerbaijan took waiting for positions rather than effective collaboration including risk-taking or huge hostilities. Civil society member thinks that climate change forces Armenia and Azerbaijan act immediately to decrease the negative impact of climate change on water resource management [13]. Ecological activist claims that without collaboration it is hard to respond to climate change effectively [14], particularly during the post conflict period. According to an independent researcher, parties must involve Turkey as an upstream country of the major water resources of both countries in water resources management between Armenia and Azerbaijan or in the general context in the South Caucasus [15]. An independent researcher highlights the role of trust and mediation in water resources management. On the other hand, civil society members claim that collaboration between parties will decrease water resource availability and access in Armenia and Azerbaijan [15].

3. Conclusions

After the armed conflict, rebuild and recovery initiatives should continue a constant strategy of utilizing water resources, which will not just be sensitive to national needs and the environment but will also require the assistance of local communities to encourage collaboration and peace in the long term and restrict the opportunity of relapse of the conflict between parties. Collaboration among many parties on critical survival concerns such as water governance can have a good spillover impact in other, more controversial areas under climate change in the post conflict period. Establishing a commitment to developing and sharing critical natural resources like water in a sustainable and equitable manner can support overcoming existing insecurity or distrust between states and create a climate of mutual benefits and assessment of long-term common interests. Regional water quality management and monitoring in the Southern Caucasus may help both the economy and the ecology throughout the Kura-Aras basin. Protection of riverine aquatic ecosystems will necessitate collaboration, with the result being improved water quality for all users. As a consequence of interviews, water is already

scarce in Armenia and Azerbaijan and cooperation between parties can support the effective management of water resources and water access, particularly under climate change. Interview participants agree that climate change mainly makes a negative impact on water resources and creates more challenges for its management. Coordination of water resource management, with proper regard for riparian rights and specific country needs, has the potential to considerably lessen the consequences of climate change on water supplies and hence improve shared benefits. Future regional water management must take into account nonagricultural water consumers such as local water ensures, hydropower, and industrial consumers, as well as the preservation of natural systems. Parties need to build trust between each other via the mediation of neutral actors and repair communication at least for the collaboration in water management to respond negative impact of climate change in the Southern Caucasus.

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