



Proceeding Paper

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

Firuz Suleymanov

Department of Geographical and Historical Studies, University of Eastern Finland, 80130 Joensuu, Finland; firuzsul@uef.fi

[†] Presented at the 7th International Electronic Conference on Water Sciences, 15–30 March 2023; Available online: <https://ecws-7.sciforum.net>.

Abstract: Climate-change-induced environmental impacts has an especially strong influence on water resources. Declining water availability not only results in droughts, but is also responsible for decreasing the quality of water in water-scarce regions, such as the South Caucasus. Armed conflict between Armenia and Azerbaijan in 2020 occurred during the recent major war in the South Caucasus. In this paper, I ask how will intensifying climate change in the region affect the current political situation? Is there any chance of multilateral cooperation for water management?

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

1. Introduction

Climate change has various impacts on different living conditions in societies. Increasing global temperatures are causing huge problems for surface water evaporation, while the warmer atmosphere is maintaining more moisture aloft, which causes both large floods and induces extreme droughts in different parts of the world. Climate change concerning water resources raises temperatures, the frequency and intensity of droughts, flooding, and evaporation in various parts of the world such as the South Caucasus. The South Caucasus mainly faces droughts and low precipitation levels. Frequent instances of armed conflict between and within South Caucasus countries and neighbors work as an accelerator of competition and collaboration regarding water resources.

In the last century, the South Caucasus has faced frequent instances of armed conflict. 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 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 damages 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 reduce the harmful impact of climate change. Countries cannot adapt to climate change by themselves and require the 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. A lack of water can have distinctly negative effects on welfare and the profitability of agriculture and cause 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 intensifying



Citation: Suleymanov, F. The Role of Climate Change on Water Resources Management in the Southern Caucasus in the Post-Conflict Period. *Environ. Sci. Proc.* **2023**, *25*, 43. <https://doi.org/10.3390/ECWS-7-14165>

Academic Editor: Athanasios Loukas

Published: 14 March 2023



Copyright: © 2023 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

conflict over water use. This paper illustrates how a lack of enough water resources during climate change involves Azerbaijan and Armenia competing and/or collaborating in water resources management in the South 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 the 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 focus. Semi-structured interviews consisted of 12 questions in Azerbaijani. Government records were also reviewed, as well as the literature on the role of climate change in water resources management and the post-conflict situation between Armenia and Azerbaijan to qualify and contextualize the interview data. Studying interviews from a wide range of qualitative perspectives is a technique. Having said that, interviews were conducted largely with an exploratory goal to acquire a deeper understanding of how climate change plays an essential role in water resource management between former war participants. The “snowballing” sampling method of sample selection was centered on locating key informants in the literature and through internet searches in accordance with pertinent knowledge or professional experience. By using “referral” methods—asking the informants to suggest other subject matter experts—more participants were chosen. All interview data were recorded and transcribed word for word and stored digitally. I used the NVivo® program for data systematization and transcription, while there were times when I chose to use 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 periods in this case.

The prisoner’s dilemma game model was applied in this study. 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 presented 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 they would be 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 choose whether or not to cooperate with each other. In this paper, the players are Armenia and Azerbaijan, respectively, due to recent armed conflicts, and the third party is climate change. Georgia was excluded due to this country having used 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 are severe. A growing population and the effects of climate change will make these issues much more challenging. From the present day to 2050, countries will deal with these issues regularly [2]. Global warming, commonly known as man-made climate change, alters 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 levels are expected to fall, and temperatures are expected to rise, resulting in a drop in the quantity of 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. More water storage facilities, for example, are nearly always more effectively built at higher elevations, where the natural terrain may be used to produce reservoirs and where the steeper terrain offers more potential for hydropower generation by the reservoir's 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 the quantity of water flowing from the river is lowest and the 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 by 38 m per year [5].

Furthermore, external players, generally international organizations, also played 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 improve communication between parties for sustainable water management in post-conflict periods, such as 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 terms of in bilateral and regional water management. Trust is often seen as a critical enabler of water governance. Water cooperation has the capacity to remove distrust and suspicion between and across countries, introducing prospects for shared profits and establishing a reciprocity paradigm [9]. The governance of water resources has a critical role in both enabling the rebuilding of trust after conflict and avoiding a return to conflict by ending or minimizing existing conflicts [10]. One of the problems that frequently impede improved regional water cooperation is a failure to recognize the benefits of collaboration. Trust might be difficult to establish in areas with a lengthy history of war, such as the cases in the South 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 South 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 post-conflict periods. On the other hand, building trust between previous conflict parties is a challenge. Table 1 illustrates Armenia and Azerbaijan as actors in the prisoner dilemma and the possible results of their behavior in collaborative water management during 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 those that will result from the cooperation of both of them, and the first will gain larger harm than those that will result from the non-cooperation of them. As a result, both parties are afraid to cooperate in water management during climate change to avoid the biggest possible biggest negative effect. The lack of trust as a consequence of long-standing armed conflict between parties and the lack of a peace treaty are two essential barriers to collaborative water management in the region.

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

		Armenia	Armenia
		Cooperate	Do not Cooperate
Azerbaijan	Cooperate	Benefits for the both of them.	More benefits for water management in Armenia; Damage to water management in Azerbaijan.
Azerbaijan	Do not 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 agreed that climate change plays a critical role in water resources management between Armenia and Azerbaijan in the post-conflict period. All participants agreed that water resources in the region are scarce, in particular in Azerbaijan, and during climate change, parties need to collaborate. In detail, an academician claimed 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 began 20 years ago, Armenian and Azerbaijani societies have been radicalized to feel mutual hostility [12]. During this period, Armenia and Azerbaijan did not effectively collaborate or perform risk taking for collaboration, and instead, they expressed high-level hostility. A civil society member thought that climate change will force Armenia and Azerbaijan to act immediately to decrease the negative impact of climate change on water resource management [13]. An ecological activist claimed that without collaboration, it is hard to respond to climate change effectively [14], particularly during post-conflict periods. According to an independent researcher, parties must involve Turkey as an upstream country of the major water resources of both countries in water resource 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 claimed that collaboration between parties will decrease water resource availability and access in Armenia and Azerbaijan [15].

4. Conclusions

After armed conflict, rebuilding and recovery initiatives should use 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 reduce the chance of the relapse of conflict between parties. Collaboration among many parties regarding critical survival concerns such as water governance can have a good spillover impact on other, more controversial areas during climate change in post-conflict periods. Establishing a commitment to developing and sharing critical natural resources such as water in a sustainable and equitable manner can support overcoming existing insecurity or distrust between states and create a climate of mutual benefits and the assessment of long-term common interests. Regional water quality management and monitoring in the South Caucasus may help both the economy and the ecology throughout the Kura-Aras basin. The protection of riverine aquatic ecosystems will necessitate collaboration, with the result being improved water quality for all users. According to the 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 during climate change. The interview participants agree that climate change mainly makes a negative impact on water resources and creates more challenges for its management. The coordination of water resource management, with proper regard for riparian rights and a specific country’s needs, has the potential

to considerably lessen the consequences of climate change on water supplies, and hence, improve the shared benefits. Future regional water management must take into account non-agricultural water consumers, such as those using local water for 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 collaboration in water management to respond to the negative impact of climate change in the South Caucasus.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Saparov, A. Place-name wars in Karabakh: Russian Imperial maps and political legitimacy in the Caucasus. *Cent. Asian Surv.* **2023**, *42*, 61–68. [\[CrossRef\]](#)
2. Salem Hilmi, S.; Pudza Musa, Y.; Yihdego, Y. Water strategies and water–food Nexus: Challenges and opportunities towards sustainable development in various regions of the World. *Sustain. Water Resour. Manag.* **2022**, *8*, 114. [\[CrossRef\]](#) [\[PubMed\]](#)
3. Gehrig, J.; Rogers, M.R. Water and Conflict. In *Water and Conflict, Incorporating Peacebuilding into Water Development*; Warner, D., Seremet, C., Bamat, T., Eds.; Catholic Relief Services: Baltimore, MD, USA, 2009; p. 134.
4. Javeline, D.; Dolšak, N.; Prakash, A. Adapting to water impacts of climate change. *Clim. Change* **2019**, *152*, 209–213. [\[CrossRef\]](#)
5. Boehlert, B.; Neumann, J.; Strzepek, K.; Droogers, P.; Sharrow, S. Chapter 3 Armenia: Risks, Impacts, and Adaptation Menu. In *Building Resilience to Climate Change in South Caucasus Agriculture*; Ahouissoussi, N., Neumann, J.E., Jitendra, P.S., Eds.; The World Bank: Washington, DC, USA, 2014; pp. 41–42.
6. Schillinger, J.; Özerol, G.; Güven-Griemert, Ş.; Heldeweg, M. Water in war: Understanding the impacts of armed conflict on water resources and their management. *WIREs Water* **2020**, *7*, 11–15. [\[CrossRef\]](#)
7. Vivekananda, J.; Schilling, J.; Smith, D. Climate resilience in fragile and conflict-affected societies: Concepts and approaches. *Dev. Pract.* **2014**, *24*, 487–501. [\[CrossRef\]](#)
8. Qureshi, W.A. Water as a Human Right: A Case Study of the Pakistan-India Water Conflict. *Penn State J. Law Int. Aff.* **2017**, *5*, 376–379.
9. Swain, A. Water and post-conflict peacebuilding. *Hydrol. Sci. J.* **2016**, *61*, 1313–1322. [\[CrossRef\]](#)
10. Weinthal, E.; Troell, J.; Nakayama, M. Water and post-conflict peacebuilding: Introduction. *Water International. Post-Confl. Peacebuilding Water Manag.* **2011**, *36*, 143–153. [\[CrossRef\]](#)
11. Interview with Academician, Baku, Azerbaijan. 4 February 2023.
12. Ayunts, A.; Zolyan, M.; Zakaryan, T. Nagorny Karabakh conflict: Prospects for conflict transformation. *Nationalities Papers. J. Natl. Ethn.* **2016**, *44*, 543–559. [\[CrossRef\]](#)
13. Interview with civil society member, Baku, Azerbaijan. 29 December 2022.
14. Interview with ecology activist, Baku, Azerbaijan. 4 February 2023.
15. Interview with an independent researcher, Baku, Azerbaijan. 3 January 2023.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.