

Khamidov, Imomjon; Egamberdiev, Bekhzod

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# Public perception of environmental problems in Central Asia: results from the Life in Transition survey

Imomjon Khamidov<sup>a</sup> and Bekhzod Egamberdiev<sup>b</sup>

<sup>a</sup> *German-Uzbek Chair on Central Asian Agricultural Economics (GUCAE), International Agriculture University (IAU), Tashkent, Uzbekistan, [Imomjon.Khamidov@rau.ac.uk](mailto:Imomjon.Khamidov@rau.ac.uk)*

<sup>b</sup> *Department Agricultural Market, Marketing and World Agricultural Trade, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Theodor Lieser Street 2, 06120 Halle (Saale), Germany, [egamberdiev@iamo.de](mailto:egamberdiev@iamo.de)*

<sup>b</sup> *Center for Policy Research and Outreach (CPRO), Westminster International University in Tashkent (WIUT), 12 Istiqbol street, 100047 Tashkent, Uzbekistan*

<sup>b</sup> *German-Uzbek Chair on Central Asian Agricultural Economics (GUCAE), International Agriculture University (IAU), Tashkent, Uzbekistan*

## Abstract

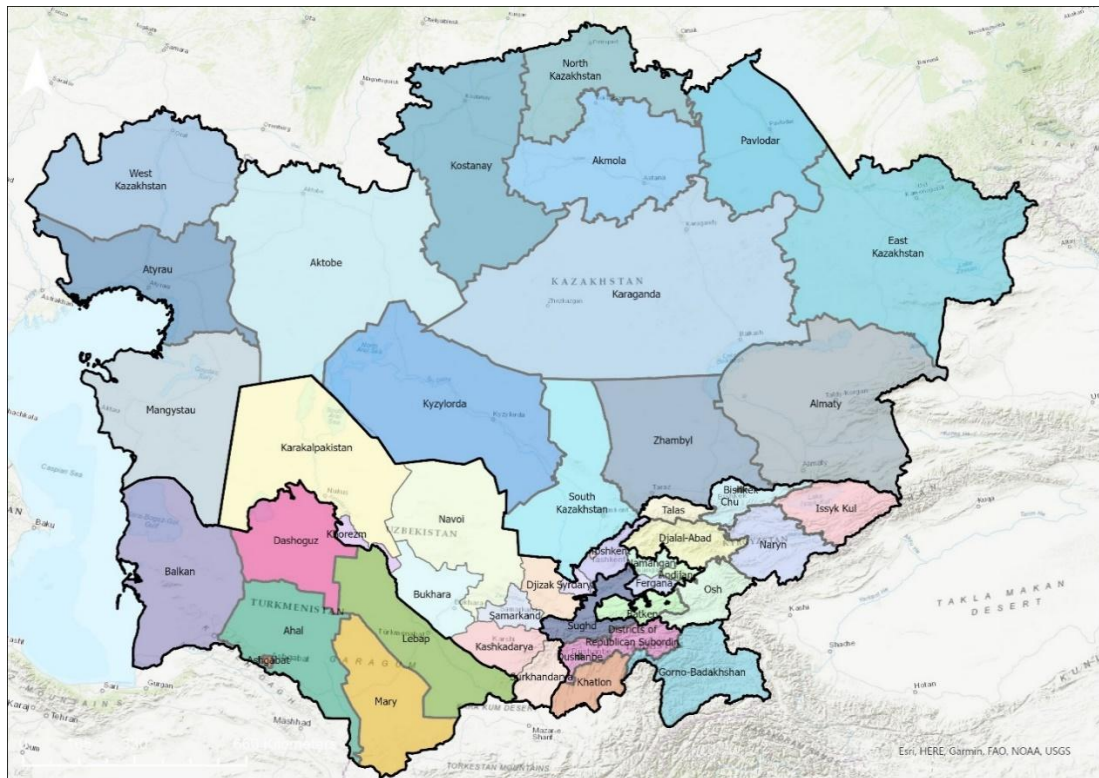
Environmental issues adversely impact air quality, biodiversity, and socio-economic conditions in Central Asia. This paper utilizes the Life in Transition dataset to analyse climate change awareness and willingness to mitigate among populations from Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan. Our findings reveal that public perceptions of environmental problems vary, with the highest concerns about air pollution, waste, species loss, temperature fluctuations, natural disasters, and disease spread noted in Uzbekistan and the Kyrgyz Republic. Conversely, awareness and concern for environmental issues in Tajikistan are relatively low.

**Key Words:** environmental problems, climate change, public perception, willingness to contribute, Central Asia

## 1. Introduction

Although climate change has reached an unprecedented level, the perception of climate change remains one of the most common ways to understand current climate scenarios. However, it is extremely challenging to analyze public attitudes toward climate change and comprehend the process by which people develop or alter their perceptions of it. Additionally, changing climate-related behaviors are often erratic and difficult to predict. Climate change beliefs are also tied to existing values and cultural norms within society. However, this manuscript does not account for any related variables due to data limitations. Therefore, further studies analyzing climate change perception and behavior should consider sociocultural factors. This complexity has led to a myriad of views on climate protection policy, resulting in less emphasis on the perception or psychological dimensions of climate change. Although the role of perception in policymaking is not formally recognized by law, it effectively determines actions and climate change policies. For example, findings by Drews and van den Bergh (2016) confirmed three key factors influencing support for climate change policies: (1) socio-psychological factors and climate change perception; (2) climate policy perception; and (3) contextual factors such as social trust, norms, and public awareness.

Central Asia, which includes Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan, has experienced unprecedented climate change scenarios. Often regarded as the central inland region of the world, Central Asia is affected not only by its borders but also by severe climate and environmental challenges. The climate is mainly continental, with hot, dry summers and cold winters. Deserts and semi-arid regions, such as the Kyzylkum and Karakum deserts, dominate the landscape. In contrast, mountainous regions are particularly prominent in the Kyrgyz Republic and Tajikistan, where cooler temperatures and heavy snowfall are frequent. The countries in the region are facing adverse consequences related to climate change and socio-economic challenges. For example, the region's temperature increase over the last 30 years is noticeably higher than the global average (Y. Yu et al., 2019). The region has also experienced more greenhouse gas emissions (Z. Chen, Shao, Hu, Gao, & Lei, 2024; Li, Chang, Liu, & Zhang, 2019; X. Liu et al., 2024).



Map 1. Central Asia (Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan)

The main objective of this paper is to analyze awareness of climate change in Central Asia through several perception questions. Adopting a green or environmentally friendly lifestyle depends on cognitive and behavioral attitudes toward climate change. In this context, insufficient concern and trust among citizens may impact the climate-related political agenda in Central Asia. For this reason, we aim to understand public awareness and concerns about climate change in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan using the Life in Transition dataset.

## **2. Literature Review**

### **2.1. Impacts of Climate Change and Socio-Economic Consequences**

Climate change has significantly impacted Central Asia due to several environmental deteriorations over the last couple of decades. The impacts of climate change in the region have increased stress on water resources (Abuduwaili, Issanova, & Saparov, 2019; Altın & Altın, 2022; H. Chen, Liu, Chen, & Qiao, 2020; Hu, Liu, Bao, & El-Tantawi, 2018; Huang, Duan, & Chen, 2021; Xuanxuan Wang, Chen, Li, Fang, & Wang, 2020; Y. Yu et al., 2021). Environmental issues in the region are closely related to various socio-economic and developmental changes (Ding et al., 2023; Robinson, 2016). For instance, several studies have confirmed the prevalence of anticipated climate or environmental migration (Blondin, 2019, 2023; Hugo & Bardsley, 2014; Rakhmatulina, Samay, & Issova, 2024). Substantial research findings have established the adverse effects of climate change on agricultural production and food security (Bobojonov & Aw-Hassan, 2014; Hamidov, Helming, & Balla, 2016; Sidle, Khan, Caiserman, Qadamov, & Khojazoda, 2023). Due to the devastating effects of climate change on developmental outcomes, some scholars have proposed recommendations based on the premise that households should possess adaptive capacity, coping strategies, and resilience (Bekhzod Egamberdiev, Bobojonov, Kuhn, & Glauben, 2023; Bekhzod Egamberdiev, Bobojonov, Kuhn, Glauben, & Akramov, 2024; W. Liu, Liu, & Gao, 2020). A comparative analysis of climate politics in Central Asia reveals that reconciling economic growth with green policy has become extremely challenging for various reasons (Skalamera, 2024).

### **2.2. Public Perception and Theoretical Perspectives on Climate Change**

Climate change is often presented through specific scientific measurements and mathematical modelling. As a heuristic, it is beneficial to understand unobservable climate change through public perception and belief. However, relating climate change scenarios to public perception or experience is overwhelmingly challenging. In this context, findings confirmed that the physical vulnerability of the location is reflected in citizens' perceptions (Dessai & Sims, 2010; Marshall, Picou, & Bevc, 2005). From this perspective, public perceptions of climate change and related issues are no longer inconsequential. Although not immediate, climate change perception is likely to influence individual mitigation strategies. For instance, findings by Spence, Poortinga, Butler, and Pidgeon (2011) are based on the premise that perceptions, concerns, and uncertainties regarding climate change likely alter human willingness and strategies to address the consequences of climate change. The perception of climate change is influenced by various factors, including cultural, social, economic, and political contexts. A theoretical model such as the Social Amplification of Risk Framework (SARF) posits that public perceptions of environmental risks are shaped by social processes, media coverage, and individual experiences (Jones, 2021). Within the context of Central Asia, where the impacts of climate change are becoming increasingly evident, understanding these perceptions is vital for fostering awareness and prompting action. Moreover, in accordance with the Theory of Planned Behavior (TPB), attitudes toward a specific behavior (in this case, mitigating climate change), social norms, and perceptions are linked to individuals' inclination to engage in eco-friendly practices.

According to the goal-setting theory, individual beliefs determine actions to achieve desired outcomes. In line with this theory, individuals experiencing the consequences of climate change may persistently relate their behaviour to changing the situation. The present analysis will be guided by this framework as we explore how respondents' perceptions correlate with their willingness to support measures such as increased taxation for environmental initiatives.

### **3. Methodology**

#### **3.1. Summary Statistics**

In this study, we employed several forms of statistical analysis to provide a comprehensive understanding of the general landscape of climate change perception among the respondents. Summary statistics tables were created to present responses regarding concern levels about climate change and willingness to pay for various environmental issues. The mean and median responses, along with the standard deviation of categorical Ranking Likert scale data, indicate the most frequently chosen reply in the ranking scale and provide insight into the average orientation of responses in relation to the total number of responses.

Along with a summary statistical analysis, the study conducted a cross-country analysis using descriptive statistics to identify patterns and disparities in climate change perceptions among Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. Various visualisation tools were utilised to illustrate response differences. One benefit of using graphical representations of data is that it allows for the acquisition of patterns without much complexity. Additionally, graphs can include a larger number of responses with several directions to better grasp two or more variable responses in one place. For example, a heatmap visualisation tool illustrates patterns in a matrix with colour gradients reflecting the extent of perception. Notably, the intensity of blue in the heatmap indicates the level of perception derived from the Likert-scale responses. This method of visually identifying notable concerns and awareness effectively depicts the differences across regions by showing variations in climate change perception for each country. Another critical aspect of the analysis includes examining how respondents express concern for their lives and future generations due to the effects of climate change. In addition to perception analysis, the study incorporates a statistical analysis of the willingness to pay higher taxes or fees to tackle environmental challenges. This approach allows us to determine the willingness to contribute and to evaluate the correlation with climate change perception.

#### **3.2. Data**

The source of our data comes from “Life in Transition” Survey (LiT) by the European Bank for Reconstruction and Development. The Life in Transition Surveys are extensive, representative surveys that involve approximately 1,000 to 1,500 households per country. LiT has several waves, and we utilised the latest wave, LiTS IV, which analyses 37,000 households in 33 transitional economies, including countries from Central Asia (Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan). Summary statistics reflecting the perception-based concern levels for major environmental issues across these countries are available in Table 1 in section 4.1 and Table A1 in the Appendix.

## 4. Results

### 4.1. Summary Statistics

The summary statistics of concern levels for six major climate change issues are calculated in Table 1. The number of observations varies across countries, as some countries have slightly fewer responses; however, there is not a significant difference in the number of observations. A brief overview of the summary statistics shows a significant level of concern across all four Central Asian countries studied in the paper.

Table A1. Concern level for major climate changes (Likert-scale)

Country	Statement	Obs.	Mean	Mode	Std.
Kazakhstan	Air Pollution	1028	4,3	5,0	1,1
	Waste Disposal	1028	4,2	5,0	1,2
	Loss of Species	1028	4,2	5,0	1,2
	Rising Temperature	1028	4,2	5,0	1,2
	Natural Disaster	1028	4,4	5,0	1,1
	Spread of Diseases	1028	4,5	5,0	0,9
Kyrgyz Republic	Air Pollution	1001	4,5	5,0	1,0
	Waste Disposal	1001	4,5	5,0	0,9
	Loss of Species	1001	4,4	5,0	1,0
	Rising Temperature	1001	4,4	5,0	1,0
	Natural Disaster	1001	4,4	5,0	1,0
	Spread of Diseases	1001	4,7	5,0	0,8
Tajikistan	Air Pollution	1034	4,0	5,0	1,4
	Waste Disposal	1034	3,8	5,0	1,3
	Loss of Species	1034	3,9	5,0	1,4
	Rising Temperature	1034	4,1	5,0	1,3
	Natural Disaster	1034	4,1	5,0	1,4
	Spread of Diseases	1034	4,1	5,0	1,2
Uzbekistan	Air Pollution	1006	4,6	5,0	0,9
	Waste Disposal	1006	4,5	5,0	1,0
	Loss of Species	1006	4,5	5,0	1,0
	Rising Temperature	1006	4,6	5,0	0,9
	Natural Disaster	1006	4,6	5,0	0,9
	Spread of Diseases	1006	4,7	5,0	0,8



## **4.2. Cross-Country Analysis**

The findings indicate a broad perception of environmental change is strongly established in most Central Asian countries. The overall picture of concern levels for six major environmental issues reveals that the concern level is high in Central Asia. Moreover, the heatmap allows for comparison of different responses in the Likert Scale question and shows how the lowest concern level responses vary toward the highest levels across countries and major issues. There are some similarities in environmental concerns among Kazakhstan, the Kyrgyz Republic, and Uzbekistan (Figure 1). However, the figure highlights the public's skepticism about environmental change in Tajikistan. Most people in Uzbekistan and the Kyrgyz Republic express concern about environmental issues, while Kazakhstan and Tajikistan show relatively low levels of concern regarding air pollution. There is widespread unease about the rise of diseases linked to environmental issues; thus, most people in Central Asia view diseases as a serious problem (Figure 1). In this case, the region is significantly affected by climate-sensitive infectious diseases. For example, waterborne and vector-borne infections in Central Asia may heighten the region's vulnerability due to rising temperatures impacting vectors and parasites. It should also be noted that related diseases (e.g., salmonella and paratyphoid) may be transmitted through oral-fecal mechanisms as temperatures increase.

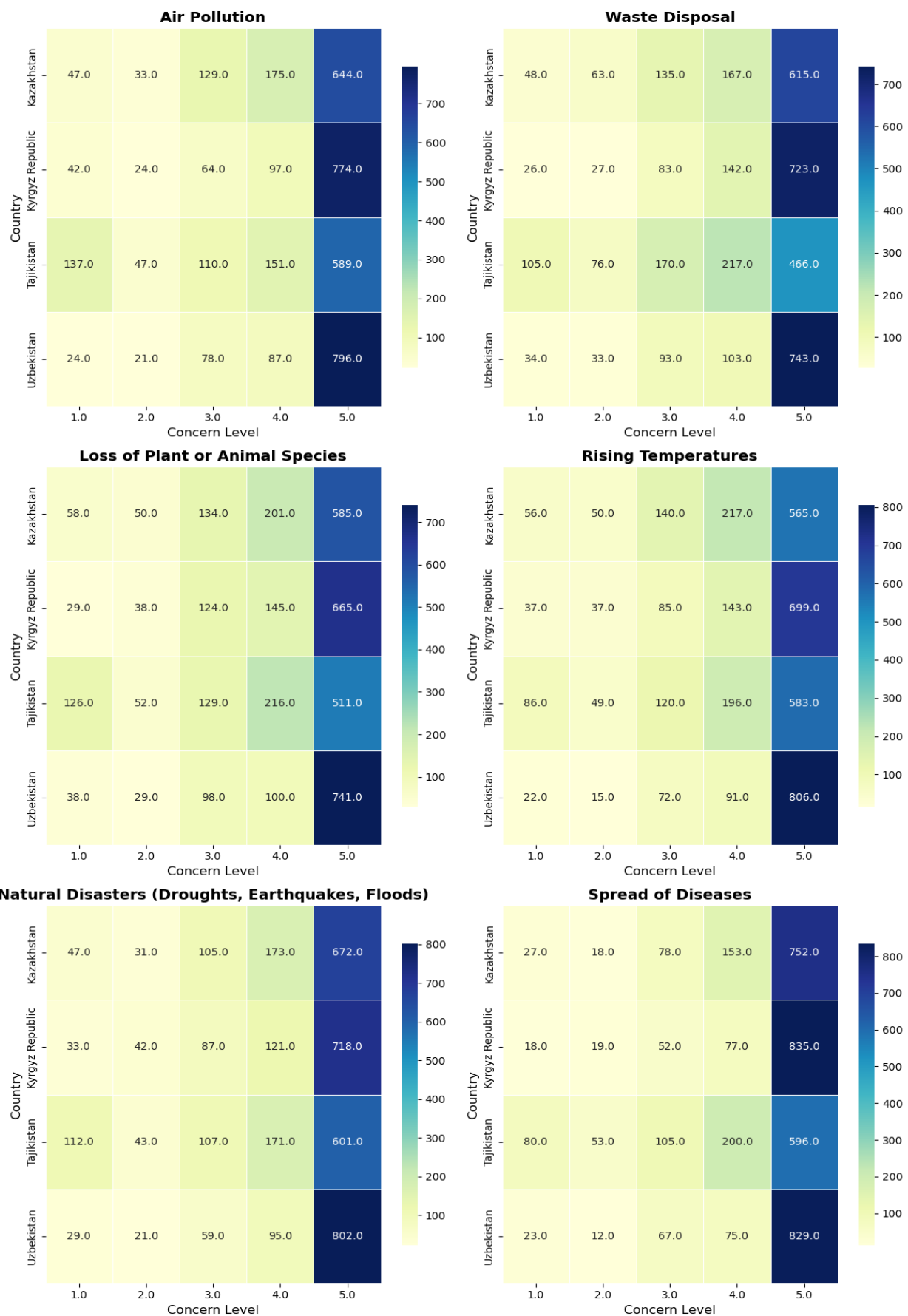


Figure 1. Climate change concern

Several findings indicate that the perception of climate change plays a crucial role in individuals' willingness to pay (Graham, de Bell, Hanley, Jarvis, & White, 2019; Veronesi, Chawla, Maurer, & Lienert, 2014). In this regard, a high willingness to pay observed in the Kyrgyz Republic and can be linked to increased concern, as illustrated in Figure 2. The urgency of the situation is reflected in the concerns expressed by agents. Conversely, the relatively low willingness may arise from personal climate change experiences (Weber, 2010). Moreover, Akerlof, Maibach, Fitzgerald, Ceden, and Neuman (2013) assert that perceptions of local climate change risks are heavily influenced by news and media coverage.

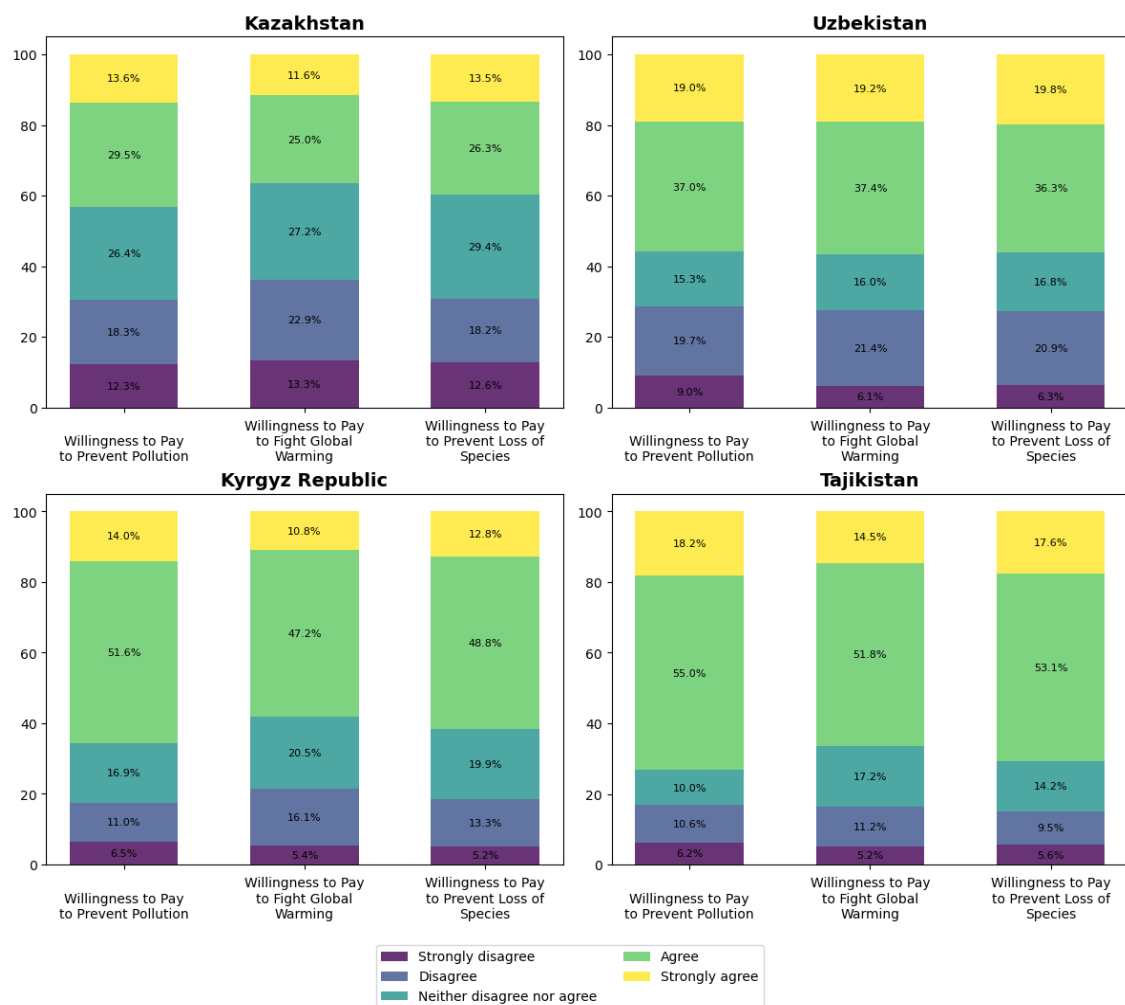


Figure 2. Willingness to pay

Willingness to pay to combat climate change issues was analysed, and responses were collected in the LITS II dataset. Map 2 illustrates the number of confirmatory responses from four countries in the study. Uzbekistan and Tajikistan had the highest levels of agreement, with over 65 percent of respondents agreeing or strongly agreeing, while the Kyrgyz Republic had around 57 percent showing readiness to pay more to address the issues.

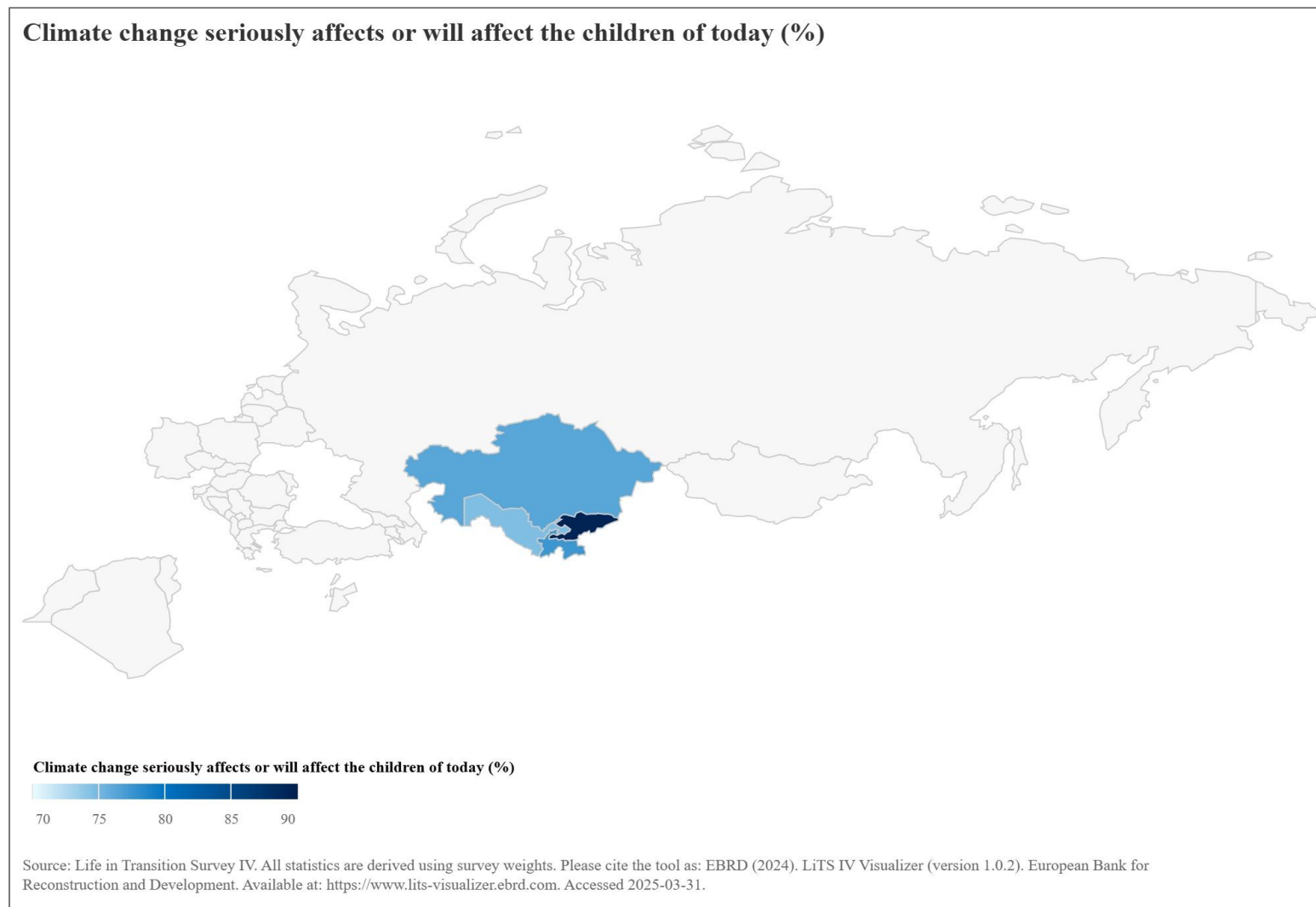
### Fighting climate change: willingness to pay more in taxes



Source: Life in Transition Survey IV. All statistics are derived using survey weights. Please cite the tool as: EBRD (2024). LiTS IV Visualizer (version 1.0.2). European Bank for Reconstruction and Development. Available at: <https://www.lits-visualizer.ebrd.com>. Accessed 2025-03-31.

Map 2. Willingness to pay higher taxes to combat climate change: responses of ‘agree’ and ‘strongly agree’ (Likert Scale)

Another finding regarding how the people of Central Asia perceive the impact of climate change on their children's lives is presented in Map 3. A significantly high number of respondents expressed serious concern that climate change will affect their children's lives, with the Kyrgyz Republic showing the highest positive responses at almost 90 percent, followed by Tajikistan at 77 percent, and Kazakhstan and Uzbekistan both over 70 percent. People in Central Asia are deeply concerned about their own futures, particularly the lives of their children, in the foreseeable future due to the potential negative effects of climate change.



Map 3. Perception of how climate change affects children's lives: responses of 'agree' and 'strongly agree' (Likert Scale)

## 5. Discussion and Conclusion

Substantial findings from the supporting literature confirm a continuous rise in temperature in Central Asia. This perception is shaped by various factors that complicate its explanation or interpretation. For instance, attitudes toward climate change are correlated with peer beliefs (Wynes et al., 2024); therefore, we conclude that perception reflects the community's average attitude or awareness. Furthermore, it is strongly linked to socio-economic factors such as education, experience, and knowledge (Haq & Ahmed, 2020; Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015). Analysing the impact of external factors on climate change perception requires the development of a validated perception-based index (van Valkengoed, Steg, & Perlaviciute, 2021). Additionally, it is important to note that the term “climate change” may vary based on local contexts and cultural differences (Capstick, Whitmarsh, Poortinga, Pidgeon, & Upham, 2015). In the context of climate change, perceptions, experiences, and knowledge generally indicate a long-term shift (Lehner & Stocker, 2015). For this reason, understanding the complexities behind climate change perception suggests that research depends on multidisciplinary studies. Since human interventions create precarious conditions, anthropogenic influence is also crucial in explaining climate change (Y. Yu et al., 2020). Furthermore, adaptation and mitigation efforts are sensitive to perceptions of climate change (Fierros-González & López-Feldman, 2021; H. Yu, Wang, Zhang, Wang, & Wei, 2013). Thus, effective communication channels and close collaboration on climate change adaptation strategies must always consider citizens' perceptions, attitudes, and behaviours regarding climate change (Bere-Semerédi & Bere-Semerédi, 2020).

The findings in the paper indicate that Central Asian countries face shared environmental challenges. Based on the findings related to concerns about environmental change, Central Asian countries should collaboratively establish an environmental code and regulations. With limited rules and regulations, many institutions in Central Asia struggle to initiate a unified response to climate change. Another recommendation is to foster synergy-based integration or cooperation among ministries, public organizations, and private companies. Additionally, addressing the adverse consequences of climate change

## References

- Akerlof, K., Maibach, E. W., Fitzgerald, D., Ceden, A. Y., & Neuman, A. (2013). Do people “personally experience” global warming, and if so how, and does it matter? *Global Environmental Change*, 23(1), 81-91. doi:<https://doi.org/10.1016/j.gloenvcha.2012.07.006>
- Allamov, O. T., Khalmuratov, O. U., Rakhimova, L. S., Allamova, S. T., Yusupova, F. Y. q., & Rustamov, A. (2024, 15-17 Nov. 2024). *The Method of Determining the Level of Air Pollution in the City of Urgench Based on Smart Technologies*. Paper presented at the 2024 IEEE 3rd International Conference on Problems of Informatics, Electronics and Radio Engineering (PIERE).
- Altın, A., & Altın, S. (2022). Ecological, Political, and Social Impacts of Climate Change in the Large Water Basins of Central Asia. In R. A. Castanho (Ed.), *Handbook of Research on Sustainable Development Goals, Climate Change, and Digitalization* (pp. 63-75). Hershey, PA, USA: IGI Global.
- Bekturganov, Z., Tussupova, K., Berndtsson, R., Sharapatova, N., Aryngazin, K., & Zhanasova, M. (2016). Water Related Health Problems in Central Asia—A Review. 8(6), 219.
- Bere-Semerédi, I., & Bere-Semerédi, A.-A. (2020, 2020/). *Perception, Knowledge, Attitude and Behavior Toward Climate Change—A Survey Among Citizens in Timisoara, Romania*. Paper presented at the Innovation in Sustainable Management and Entrepreneurship, Cham.
- Bezrodnykh, Y., Yanina, T., Sorokin, V., & Romanyuk, B. (2020). The Northern Caspian Sea: Consequences of climate change for level fluctuations during the Holocene. *Quaternary International*, 540, 68-77. doi:<https://doi.org/10.1016/j.quaint.2019.01.041>
- Blondin, S. (2019). Environmental migrations in Central Asia: a multifaceted approach to the issue. *Central Asian Survey*, 38(2), 275-292. doi:10.1080/02634937.2018.1519778
- Blondin, S. (2023). The Dual Relationship Between Human Mobility and Climate Change in Central Asia: Tackling the Vulnerability of Mobility Infrastructure and Transport-Related Environmental Issues. In R. Sabyrbekov, I. Overland, & R. Vakulchuk (Eds.), *Climate Change in Central Asia: Decarbonization, Energy Transition and Climate Policy* (pp. 111-122). Cham: Springer Nature Switzerland.
- Bobojonov, I., & Aw-Hassan, A. (2014). Impacts of climate change on farm income security in Central Asia: An integrated modeling approach. *Agriculture, Ecosystems & Environment*, 188, 245-255. doi:<https://doi.org/10.1016/j.agee.2014.02.033>
- Brosch, T. (2021). Affect and emotions as drivers of climate change perception and action: a review. *Current Opinion in Behavioral Sciences*, 42, 15-21. doi:<https://doi.org/10.1016/j.cobeha.2021.02.001>
- Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N., & Upham, P. (2015). International trends in public perceptions of climate change over the past quarter century. *WIREs Climate Change*, 6(1), 35-61. doi:<https://doi.org/10.1002/wcc.321>
- Chen, H., Liu, H., Chen, X., & Qiao, Y. (2020). Analysis on impacts of hydro-climatic changes and human activities on available water changes in Central Asia. *Science of The Total Environment*, 737, 139779. doi:<https://doi.org/10.1016/j.scitotenv.2020.139779>
- Chen, Z., Shao, M., Hu, Z., Gao, X., & Lei, J. (2024). Potential distribution of Haloxylon ammodendron in Central Asia under climate change. *Journal of Arid Land*, 16(9), 1255-1269. doi:10.1007/s40333-024-0061-8
- Crona, B., Wutich, A., Brewis, A., & Gartin, M. (2013). Perceptions of climate change: Linking local and global perceptions through a cultural knowledge approach. *Climatic Change*, 119(2), 519-531. doi:10.1007/s10584-013-0708-5
- Darvishi Bolorani, A., Soleimani, M., Papi, R., Neysani Samany, N., Teymouri, P., & Soleimani, Z. (2023). Sources, Drivers, and Impacts of Sand and Dust Storms: A Global View. In A. Al-Dousari & M. Z. Hashmi (Eds.), *Dust and Health: Challenges and Solutions* (pp. 31-49). Cham: Springer International Publishing.
- Dessai, S., & Sims, C. (2010). Public perception of drought and climate change in southeast England. *Environmental Hazards*, 9(4), 340-357. doi:10.3763/ehaz.2010.0037
- Ding, G., Chen, J., Lei, Y., Lv, F., Ma, R., Chen, S., . . . Chen, F. (2023). Precipitation variations in arid central Asia over past 2500 years: Possible effects of climate change on development of Silk Road civilization. *Global and Planetary Change*, 226, 104142. doi:<https://doi.org/10.1016/j.gloplacha.2023.104142>



- Duan, Z., Afzal, M. M., Liu, X., Chen, S., Du, R., Zhao, B., . . . Awais, M. (2024). Effects of climate change and human activities on environment and area variations of the Aral Sea in Central Asia. *International Journal of Environmental Science and Technology*, 21(2), 1715-1728. doi:10.1007/s13762-023-05072-8
- Hoseini, S. M., Soltanpour, M., & Zolfaghari, M. R. (2025). Climate change impacts on temperature and precipitation over the Caspian Sea. *International Journal of Water Resources Development*, 41(1), 31-56. doi:10.1080/07900627.2024.2313050
- Hu, W., Liu, H., Bao, A., & El-Tantawi, A. M. (2018). Influences of environmental changes on water storage variations in Central Asia. *Journal of Geographical Sciences*, 28(7), 985-1000. doi:10.1007/s11442-018-1517-6
- Huang, W., Duan, W., & Chen, Y. (2021). Rapidly declining surface and terrestrial water resources in Central Asia driven by socio-economic and climatic changes. *Science of The Total Environment*, 784, 147193. doi:<https://doi.org/10.1016/j.scitotenv.2021.147193>
- Hugo, G., & Bardsley, D. K. (2014). Migration and Environmental Change in Asia. In E. Piguet & F. Laczko (Eds.), *People on the Move in a Changing Climate: The Regional Impact of Environmental Change on Migration* (pp. 21-48). Dordrecht: Springer Netherlands.
- Jones, M. D. (2014). Cultural Characters and Climate Change: How Heroes Shape Our Perception of Climate Science. *Social Science Quarterly*, 95(1), 1-39. doi:<https://doi.org/10.1111/ssqu.12043>
- Kharlamova, N. F., & Revyakin, V. S. (2006, 2006/). *REGIONAL CLIMATE AND ENVIRONMENTAL CHANGE IN CENTRAL ASIA*. Paper presented at the Environmental Security and Sustainable Land Use - with special reference to Central Asia, Dordrecht.
- Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C.-Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature Climate Change*, 5(11), 1014-1020. doi:10.1038/nclimate2728
- Marshall, B. K., Picou, J. S., & Bevc, C. A. (2005). Ecological disaster as contextual transformation: Environmental values in a renewable resource community. *Environment and Behaviour*, 37(5), 706-728.
- Mavlyanova, N. G., Denisov, I., & Lipatov, V. (2015, 2015/). *A Review of Central Asian Trans-border Issues Associated with Environmental Problems and Hazard Mitigation*. Paper presented at the Environmental Security of the European Cross-Border Energy Supply Infrastructure, Dordrecht.
- Mavlyanova, N. G., Lipatov, V. A., & Yuldashev, O. R. (2018). Transboundary Problems of Overcoming Natural Disasters for International Regional Organizations in the Eurasian Region. *Studies on Russian Economic Development*, 29(3), 322-328. doi:10.1134/S1075700718030097
- Su, F., Liu, Y., Chen, L., Orozbaev, R., & Tan, L. (2024). Impact of climate change on food security in the Central Asian countries. *Science China Earth Sciences*, 67(1), 268-280. doi:10.1007/s11430-022-1198-4
- Tursumbayeva, M., Muratuly, A., Baimatova, N., Karaca, F., & Kerimray, A. (2023). Cities of Central Asia: New hotspots of air pollution in the world. *Atmospheric Environment*, 309, 119901. doi:<https://doi.org/10.1016/j.atmosenv.2023.119901>
- Viter, A., Zsarnóczai, S. J., & Vasa, L. (2015). Climate change impact on crop production in Central Asian Countries. *Applied Studies in Agribusiness and Commerce*, 9(4), 75-82. doi:10.19041/APSTRACT/2015/4/10
- Yu, Y., Pi, Y., Yu, X., Ta, Z., Sun, L., Disse, M., . . . Yu, R. (2019). Climate change, water resources and sustainable development in the arid and semi-arid lands of Central Asia in the past 30 years. *Journal of Arid Land*, 11(1), 1-14. doi:10.1007/s40333-018-0073-3
- Zhang, M., Chen, Y., Shen, Y., & Li, B. (2019). Tracking climate change in Central Asia through temperature and precipitation extremes. *Journal of Geographical Sciences*, 29(1), 3-28. doi:10.1007/s11442-019-1581-6
- Zhiltsov, S. S., Zonn, I. S., Grishin, O. E., Egorov, V. G., & Ruban, M. S. (2018). Transboundary Rivers in Central Asia: Cooperation and Conflicts Among Countries. In S. S. Zhiltsov, I. S. Zonn, A. G. Kostianoy, & A. V. Semenov (Eds.), *Water Resources in Central Asia: International Context* (pp. 61-80). Cham: Springer International Publishing.

## Appendix

Table A1. Willingness to pay increased taxes for addressing three major climate change issues (Likert-scale)

Country	Statement	Obs.	Mean	Mode	Std.
Kazakhstan	Willingness to pay to prevent air pollution	1028	3,1	4,0	1,2
	Willingness to pay to fight global warming	1028	3,1	3,0	1,2
	Willingness to pay to prevent loss of species	1028	3,1	3,0	1,2
Kyrgyz Republic	Willingness to pay to prevent air pollution	1001	3,6	4,0	1,1
	Willingness to pay to fight global warming	1001	3,4	4,0	1,1
	Willingness to pay to prevent loss of species	1001	3,5	4,0	1,0
Tajikistan	Willingness to pay to prevent air pollution	1034	3,7	4,0	1,1
	Willingness to pay to fight global warming	1034	3,6	4,0	1,0
	Willingness to pay to prevent loss of species	1034	3,7	4,0	1,0
Uzbekistan	Willingness to pay to prevent air pollution	1006	3,4	4,0	1,2
	Willingness to pay to fight global warming	1006	3,4	4,0	1,2
	Willingness to pay to prevent loss of species	1006	3,4	4,0	1,2