

ASSESSMENT OF LEGISLATIVE AND INSTITUTIONAL FRAMEWORK FOR TRANSBOUNDARY WATER RESOURCES MANAGEMENT IN KAZAKHSTAN THROUGH SWOT ANALYSIS

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ABSTRACT

The issue of transboundary water resources management for Kazakhstan as country has a number of transboundary rivers coming from China, Kyrgyzstan and Uzbekistan and for sustainable and efficient water resources usage and management and also, in order to avoid conflicts and tensions, Kazakhstan has started to update the policy and the legal framework to align the water sector with the Integrated Water Resources Management concept and UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes. However, the legislative and institutional steps towards the implementation of this national and international framework are still ineffective and meet several obstacles. This paper evaluates legislative and institutional framework for transboundary water resources management in Kazakhstan based on a SWOT analysis (acronym which stands for strengths, weaknesses, opportunities and threats). As a case study, this paper specifically focuses on Aral Sea transboundary river basin in Kazakhstan. The Aral Sea basin is a transboundary river basin, which geographically covers Tajikistan, Turkmenistan, Uzbekistan, Kyrgyzstan, Kazakhstan; Iran with more of the rivers of this basin comes to Kazakhstan and Aral Sea, located on territory of Kazakhstan and Uzbekistan. Before 1960, the Aral Sea ranked as the world's fourth largest lake, after the Caspian Sea, the Great Lakes in North America and Lake Chad, since then it has been progressively drying up as result of ineffective resource management. The ultimate goal of this paper is to make sound conclusions, acting as a tool which may well facilitate a, badly needed, rational and integrated management of the entire transboundary surface river basins in Kazakhstan.

Keywords: Water Law, International convention, Transboundary water, Kazakhstan, Aral Sea.

INTRODUCTION

Water is considered as one of the most critical resources for human beings. It is vital not only for economic development, as water resources are important to the production of agricultural and industrial goods and services, but also it is the most essential component of the natural environment (Beck & Walker, 2013; Endo et al., 2017; D'Odorico et al., 2018). Also, it has a significant influence on health and nature conservation (Bisung & Elliott, 2014; Mabhaudhi

et al., 2016). However, only 2.7% of global water is available as freshwater with an appropriate quality, out of which only 30% can be applied to answer human and livestock demands (Gerten et al., 2011; Korenaga et al., 2017). Over the past 60 years, global demand for freshwater has increased for many reasons including rapid population and economic growth, urbanization and industrialization, land use change, intensive agricultural practices and environmental degradation (Arsiso et al., 2017; Miraji et al., 2019; Sanchez et al., 2020). Furthermore, changes in the frequency, duration and intensity of drought events have dramatically reduced the stocks of freshwater resources in several regions, especially in the arid areas of Kazakhstan (Rivotti et al., 2019). For instance, the 2010-2020 droughts in Kazakhstan led to the complete dry up of many internationally renowned wetlands and lakes, significant reduction of river flows and depletion of groundwater resources (Valeyev et al., 2019). On the other hand, by 2050, the world's population is projected to rise to 9.8 billion people and more than half of this population will reside in urban areas (Sibly & Hone, 2002). As population and economic growth will continue, more food will be needed to be produced in the future. It means that water demand will grow more than 40% by 2050 (Smajgl et al., 2016; Hatfield et al., 2017). Therefore, water scarcity will turn out to be a great issue in the near future. In parallel, climate change is expected to deteriorate the situation through significant reduction of freshwater supplies and increase of frequency, intensity and duration of drought events. While climate change has already affected the temporal and spatial variability of surface and ground water availability, it is predicted that approximately two-third of the world's population will encounter water stress conditions in 2040 (Arheimer et al., 2005; Hagemann et al., 2013). Therefore, creating and establishing comprehensive legislative and institutional framework is essential for sustainable and efficient water resources usage and management and also, in order to avoid conflicts and tensions especially in context of transboundary river basins.

Transboundary or transborder or transnational water resources are defined as surface or groundwater resources (rivers, lakes) shaped by two countries or more (Akamani & Wilson, 2011; Schmeier & Vogel, 2018; Munia et al., 2020). Due to the fact that water is in motion continuously, the issues of control, jurisdiction and sovereignty are very complicated and difficult to be resolved in contrary to static land resources. Transboundary Rivers and lake basins comprise about 47% of the world's continental land area, increasing to at least 60% in Africa, Asia and South America (Howard & Howard, 2016). Currently there are 261 rivers that either cross or demarcate international political boundaries, while, geographically, Europe has the largest number of international basins (69), followed by Africa (59), Asia (57), North America (40) and South America (38). International organizations and communities give great significance on the management of transboundary water resources of various types of water bodies (rivers, lakes and groundwater aquifers). The most well-known documents regarding the management of international resources, all prepared by the United Nations Economic Commission, are the: Guidelines in Monitoring and Assessment of Transboundary and International Lakes, Part A: Strategy Document and Part B: Technical Guidelines, Guidelines in Monitoring and Assessment of Transboundary and Rivers, Guidelines in Monitoring and Assessment of Transboundary Groundwaters. All of the aforementioned documents are mainly derived from the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes which was signed in Helsinki, 17 March 1992, and enforced by the United

Nations in 2014 (Medetov et al., 2018; Sabyr et al., 2019). The management of the transboundary water resources is also influenced by legal and administrative aspects such as the ones resulted from the UN Convention on the Law of the non-Navigational Uses of International Watercourses.

This paper evaluates legislative and institutional framework for transboundary water resources management in Kazakhstan based on a SWOT analysis (acronym which stands for strengths, weaknesses, opportunities and threats). As a case study, this paper specifically focuses on Aral Sea transboundary river basin in Kazakhstan. The ultimate goal of this paper is to make sound conclusions, acting as a tool which may well facilitate a, badly needed, rational and integrated management of the entire transboundary surface river basins in Kazakhstan.

METHODOLOGY

The SWOT analysis is a decision-making method that has been widely used in business management. SWOT analysis also has successfully been applied in identifying and solving problems related with water resource management which often involve interdisciplinary issues that are difficult to quantify (Bastiaanssen et al., 2007; De-Souza & Da-Silva, 2014; Grigg, 2005; Jang et al., 2014; Karatayev et al., 2016; Karatayev et al., 2017; Michailidis et al., 2015; Panigrahi & Mohanty, 2012; Srdjevic et al., 2012; Tekken & Kropp, 2015; Yavuz & Baycan, 2013). In a similar manner, during this study SWOT analysis was applied to evaluate each measure. This method was selected because it has the capacity to incorporate not only the present conditions (through strengths and weaknesses) but also the future conditions (through opportunities and threats) which is very important for Kazakhstan which is undergoing rapid changes especially in terms of economic development. In addition, the present research adopts an expert interview approach to gather information. Knowledge and information collected through interviews with relevant experts will be used as the main input for the SWOT analysis (Yerezhpekyzy et al., 2017; Issakhov et al., 2018; Poshanov et al., 2018). Expert interviews have been a popular method of gathering information in various fields of political and social sciences as it can provide insight and valuable knowledge in the relevant field and it is also considered as an efficient and concentrated method of gathering data especially in exploratory phase (Mokin et al., 2019; Kurmanalina et al., 2020). Selecting the relevant experts is essential to gather usable information and successfully construct framework for analyzing different water solutions (Saiymova et al., 2018). The experts interviewed for this research compose of people that work closely in the area of water and environmental sciences and who also have experiences in Kazakhstan.

As a case study, this paper specifically focuses on Aral Sea transboundary river basin (ASB). The Aral Sea basin, total area 1.76 million km², is a transboundary river basin at the heart of the Eurasian continent. Geographically it covers an extensive area of Central Asia, most of Tajikistan (99%), Turkmenistan (95%) and Uzbekistan (95%), Osh, Djalal-Abad and Naryn provinces of Kyrgyzstan (59%), Kyzylorda and South Kazakhstan provinces of Kazakhstan (13%), northern Afghanistan (38%) and a very small part of the Islamic Republic of Iran in the Tedzhen and Murghab basin. The Aral Sea basin includes the Syr Darya and Amu Darya, the Tedzhen (known as Hari Rod in Afghanistan) and Murghab rivers, the Kara Kum canal linking

the Amu Darya, Murghab and Tedzhen rivers, shallow rivers flowing from Kopet Dag and western Tien Shan, as well as the areas with no runoff between these rivers and around the Aral Sea. In Kazakhstan, the flows from the Torgai, Sarysu, Chu and Talas rivers are lost in the desert or are directed to natural depressions. These rivers are not considered part of the Aral Sea basin. Before 1960, the Aral Sea ranked as the world's fourth largest lake, after the Caspian Sea, the Great Lakes in North America and Lake Chad, since then it has been progressively drying up. The Aral Sea basin is a diverse region with approximately 50 million people in 2020 while in 1960 and 1980 the population was 15 million and 27 million people respectively. In 2020, access to improved water sources varied from 50% in Afghanistan to 96% in Iran.

RESULTS

Kazakhstan has proceeded to the enforcement of its legal framework, which regulates issues about the environment, waters and nature protection generally, in order to approach the international rules. According to the National Water Strategy, the important legislation for the water related issues was established in line with the transformation process of the country. "A number of respective regulations still in force date back or are taken over unchanged from the years of former Soviet Union". There is not only the legislation, which deals with the water management directly but there are important links with environmental or another sector or horizontal legislation, which affect the institutions and procedures in the field of water management. The legislation about environmental protection of water resources include Law on Environment; Decree on determination of projects and criteria for which an environmental impact assessment should be carried out; Decree on regulating costs for carrying out an environmental impact assessment procedure; Ordinance on the content of intention for carrying out a project, on the decision for need for an environmental impact assessment procedure, on the public consultations; Ordinance on the form, content, procedure for preparation of the Report for suitability of the study for environmental assessment for the proposed project and on the procedure for authorization of Experts on the preparation of the Report; Law on nature protection; Law on waste management; Water Code; Regulation for Classification of Water.

The institutional framework with the national law is assigned on several institutions and ministries of Kazakhstan. Competencies are divided into six ministries, Ministry of Energy, Ministry of Environmental Protection, Ministry of Agriculture, Ministry of Economy, Ministry of Education and Science, Ministry of Health. In addition, in these institutions there are departments, units, inspectorates and directorates with defined responsibilities related to water. There are eight river basins in Kazakhstan and currently there are four departments established at national level. These departments are responsible for: carrying out the basic analysis of river basin characteristics; preparation and implementation of the river basin management plans; preparation of the programme of measures; collecting the monitoring data, controlling the operators (drinking water supply utilities, irrigation operators, industry water suppliers, etc.); protection from the adverse effects of the water; protection of the water from pollution, preparation and updating of polluters cadastre; establishing and updating of registered of protected areas and international cooperation regarding the preparation of international river basins management plans, performing scientific research in water field, etc.

Based on above documents and expert interview approach, this paper vies on strengths and weakness as internal factors considered in the Aral Sea basin under study, while opportunities and threats posed by external factors. The internal factors, strengths and weakness, give certain advantages or disadvantages of the water management in the basin. On the other hand, the external analysis examines the opportunities and threats that exist independently of the basin. The results show strengths, weaknesses, opportunities and threats of the legislative and institutional framework of ASB and these are:

Strengths

1. It focuses on multi-country, multi-sectoral programs of collaborative actions, exchange of experience, and trust and capacity building designed to build a strong foundation for regional cooperation and sustainable management of water;
2. It is intrinsically geared towards achieving the Millennium Development Goals and Sustainable Development;
3. It is developing knowledge based and essential tools for integrated water resource management through capacity building in each Aral Sea Basin country;
4. It has led to the development of the decision-support system for information sharing;
5. It aims at building confidence, trust, collaborative relationships among everyone who has a stake in how water resources in their countries are developed, allocated, managed and stakeholder involvement;
6. It is promoting broad-based stakeholder participation, including dialogue, collective analysis, action and monitoring for feedback and learning;
7. It has managed to create a strong stakeholder commitment and ownership of its projects among all member countries by creating project management location units in each country;
8. The legislative and institutional framework of ASB has aspects for addressing environmental and social safeguards through an environmental management plan;
9. It has strong a support of donor support from giant institutions like the World Bank, Global Environmental Facility, German Agency for Technical Cooperation, Asian Development Bank and Canadian International Development Agency for implementing its projects;
10. It has a framework for following up its projects through consolidated annual and quarterly interim financial reports;
11. It promotes regional cooperation important for increasing a range of direct benefits to riparian countries which include electricity production, environmental conservation and Water shed protection;
12. It has set up governance, institutional structures and processes to provide permanent mechanisms for constructive dialogue, planning and development among riparian, focused on the sharing of water and water's benefits.

Weakness

1. Lack of institutional depth like thin staffing which is insufficient to respond to the increasing and emerging demands placed on the institution in the area of strategic planning, resource mobilization, or responding to basin management issues;
2. Inadequate capacity to develop regional databases and to analyze water resource information;
3. There is a lack of coordination and linkages with some ASB stakeholders like the Rural Community-based Unions;
4. The planning of ASB projects did not incorporate the local knowledge of the indigenous people in the Aral Sea Basin countries;
5. Despite the fact that the ASB is trying to develop and generate hydroelectric power along the rivers for the benefit of all people, the initiative is not part and partial of the World Commission on Dams which provides comprehensive guidelines for constructing dams on international transboundary rivers;

6. ASB is the most complex and ambitious river basin project ever and this may result into misinterpretations and wrong analysis of the whole project.

Opportunities

1. Continued support of the World Bank to the ASB projects present “hope” for achieving the ASB goals in future. Furthermore, financial and in-kind contribution of member will help sustain ASB functions;
2. Establishment of Aral Sea Fund is hoped to provide solutions to the challenges facing the ASB. For example, it will allow the ASB to undertake an institutional design processes to prepare the ASB for new challenges in absence or presence of Cooperative Framework Agreement;
3. More involvement of non-governmental organizations and civil society will involve the overall effectiveness and efficiency of the implementation of the ASB projects;
4. Since the Aral Sea Basin countries are part of the Central Asian Union, ASB project has an opportunity of benefiting from the New Partnership for Asian’s Development, which aims at providing an overarching vision and policy framework for accelerating economic co-operation and integration among Central Asian countries.

Threats

1. Long-term challenges for operational integration across the basin because of different sets of policies and procedures among ASB institutions;
2. Aral Sea Basin Water Treaty of 1995, which limits effective utilization of the Aral Sea rivers;
3. History of tensions and instability in the region, both between countries and within countries. Thus, when one country refuses to cooperate, it can have significant consequences on the ASB goals;
4. Increasing population coupled with poverty creates pressure on resources of the ASB;
5. ASB countries are in different development stages and this threatens the initiative’s path towards achieving its goals;
6. If the Cooperative Framework Agreement negotiations geared to transform the ASB into a fully-fledged river basins organizations’ flops, the future status of the transitional ASB will be undefined;
7. The World Bank polices possess future uncertainty of the ASB projects due to its historical bad record in achieving its goals in the countries under its funds;
8. Corruption and aid money disappearing into private pockets can ruin all the planning;
9. Climate change and water stress can force governments to act individually trying to exploit as much as possible for their people.

It is concluded that the ASB represents the most comprehensive and complex management plan ever attempted for sustainable development of international transboundary rivers. The ASB tries to deal with all potential problems occurring at people-environment and development interface in the Aral Sea basin through a multi-disciplinary, socio-cultural, economic, political and geographical environment which is an important attribute of achieving sustainable development as well as the Millennium Development Goals. On the same note, it is also concluded that the various projects which are being implemented by the ASB, reflect a joint commitment and obligation of the Aral Sea Basin countries to put into action the recommendations of Agenda 21 Plan of Implementation. Furthermore, it is concluded that ASB is a paramount historical regional partnership in this new millennium as regards transboundary river basin management. This joint venture among the Aral Sea Basin countries has created a regional environmental-development interface think-tank, which is a vital mechanism for paving way to greater integrated water resource management that could result into mutual benefit of all without discrimination or favourism. This has been done through spatial, regional, economic and

knowledge integrations. Nevertheless, the ASB is not immune from the challenges, weaknesses and threats as it can be clearly noticed in the SWOT analysis. At this juncture, it is recommended in general terms that the ASB should capitalize on its strengths and opportunities to work out the challenges it faces.

CONCLUSION

Due to the nature of the problems regarding the common management of the water resources of ASB, all countries of ASB should establish an administrative, a scientific committee as well as a local authorities committee, which will all work simultaneously. The administrative committee will focus on the administrative as well as on the political (at a diplomatic level) matters of the transboundary river, the scientific committee will deal with the measurements which will be taking place regarding the monitoring of the qualitative and quantitative regime of the river basin. The scientific committees should develop appropriate techniques in order to provide effective exchange of knowledge with each other. In order to do so, they should be directly connected to an online database (of hydrologic, meteorological, hydrogeologic, climatologic and land use data) which will be updated continuously. The local authorities committee will consist of representatives from all the municipalities or prefectures located within the national boundaries of the river basin. It will identify the population groups which are highly depended on the river itself through certain activities (e.g. agricultural, fishery activities), as well as the socioeconomic aspects and impacts. The participation of local authorities will emerge all the socioeconomic aspects which regard the local communities located within the boundaries of the river basin, and will also enhance the principle of public information and awareness. Every single committee will produce an annual report which will contain all the aforementioned elements and will be presented within the annual meeting of all national committees. The annual meeting will aim at the synthesis of all reports of each single committee in order to produce the national annual report which will be presented at the Joint International Committee. Another critical role of the national annual meeting will be the identification of the existing problems related to the ASB river issues and consequently, through a debate between all three committees, and the definition of the national goals and objectives for the next year. The goals and objectives will be either related to quantitative or qualitative issues which strongly influence certain socioeconomic activities.

REFERENCES

- Akamani, K., & Wilson, P.I. (2011). [Toward the adaptive governance of transboundary water resources. *Conservation Letters*, 4\(6\), 409-416.](#)
- Arheimer, B., Andréasson, J., Fogelberg, S., Johnsson, H., Pers, C.B., & Persson, K. (2005). Climate change impact on water quality: model results from southern Sweden. *Ambio*, 34(7), 559-566.
- Arsiso, B.K., Tsidu, G.M., Stoffberg, G.H., & Tadesse, T. (2017). [Climate change and population growth impacts on surface water supply and demand of Addis Ababa, Ethiopia. *Climate Risk Management*, 18, 21-33.](#)
- Bastiaanssen, W.G., Allen, R.G., Droogers, P., D'Urso, G., & Steduto, P. (2007). [Twenty-five years modeling irrigated and drained soils: State of the art. *Agricultural Water Management*, 92\(3\), 111-125.](#)
- Beck, M.B., & Walker, R.V. (2013). [On water security, sustainability, and the water-food-energy-climate nexus. *Frontiers of Environmental Science & Engineering*, 7\(5\), 626-639.](#)

- Bisung, E., & Elliott, S.J. (2014). Toward a social capital based framework for understanding the water-health nexus. *Social Science & Medicine*, 108, 194-200.
- De Souza, E.V., & Da-Silva, M.C. (2014). Management system for improving the efficiency of use water systems water supply. *Procedia Engineering*, 70, 458-466.
- D'Odorico, P., Davis, K.F., Rosa, L., Carr, J.A., Chiarelli, D., Dell'Angelo, J. & Rulli, M.C. (2018). The global food-energy-water nexus. *Reviews of Geophysics*, 56(3), 456-531.
- Endo, A., Tsurita, I., Burnett, K., & Orencio, P.M. (2017). A review of the current state of research on the water, energy, and food nexus. *Journal of Hydrology: Regional Studies*, 11, 20-30.
- Gerten, D., Heinke, J., Hoff, H., Biemans, H., Fader, M., & Waha, K. (2011). Global water availability and requirements for future food production. *Journal of Hydrometeorology*, 12(5), 885-899.
- Grigg, N.S. (2005). Institutional analysis of infrastructure problems: Case study of water quality in distribution systems. *Journal of Management in Engineering*, 21(4), 152-158.
- Hagemann, S., Chen, C., Clark, D.B., Folwell, S., Gosling, S.N., Haddeland, I., & Wiltshire, A.J. (2013). Climate change impact on available water resources obtained using multiple global climate and hydrology models. *Earth System Dynamics*, 4(1), 129-144.
- Hatfield, J.L., Sauer, T.J., & Cruse, R.M. (2017). Soil: The forgotten piece of the water, food, energy nexus. *Advances in agronomy*, 143, 1-46.
- Howard, K.W., & Howard, K.K. (2016). The new Silk Road economic belt as a threat to the sustainable management of Central Asia's transboundary water resources. *Environmental Earth Sciences*, 75(11), 1-12.
- Issakhov, B.S., Akhatov, U.A., Mynbatyrova, N.K., Kussainov, D., & Kussainova, A. (2018). State and legal framework for the social state formation and development. *Journal of Legal, Ethical and Regulatory Issues*, 21(1), 1-7.
- Jang, W.S., Lee, D.E., & Choi, J.H. (2014). Identifying the strengths, weaknesses, opportunities and threats to TOT and divestiture business models in China's water market. *International Journal of Project Management*, 32(2), 298-314.
- Karatayev, M., Hall, S., Kalyuzhnova, Y., & Clarke, M.L. (2016). Renewable energy technology uptake in Kazakhstan: Policy drivers and barriers in a transitional economy. *Renewable and Sustainable Energy Reviews*, 66, 120-136.
- Karatayev, M., Kapsalyamova, Z., Spankulova, L., Skakova, A., Movkebayeva, G., & Kongyrbay, A. (2017). Priorities and challenges for a sustainable management of water resources in Kazakhstan. *Sustainability of Water Quality and Ecology*, 9, 115-135.
- Korenaga, J., Planavsky, N.J., & Evans, D.A. (2017). Global water cycle and the coevolution of the Earth's interior and surface environment. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 375(2094), 20150393.
- Kurmanalina, A., Bimbetova, B., Omarova, A., Kaiyrgaliyeva, M., Bekbusinova, G., Saimova, S., & Saparaliyev, D. (2020). A swot analysis of factors influencing the development of agriculture sector and agribusiness entrepreneurship. *Academy of Entrepreneurship Journal*, 26(1), 1-8.
- Mabhaudhi, T., Chibarabada, T., & Modi, A. (2016). Water-food-nutrition-health nexus: Linking water to improving food, nutrition and health in Sub-Saharan Africa. *International Journal of Environmental Research and Public Health*, 13(1), 107.
- Medetov, A., Bitemirov, K., Yessimkulov, S., Nakypov, B., & Sabyr, A. (2018). The legislative and institutional framework for transboundary water resources management in Kazakhstan. *Journal of Legal, Ethical and Regulatory Issues*, 21(S1), 1-9.
- Michailidis, A., Papadaki-Klavdianou, A., Apostolidou, I., Lorite, I.J., Pereira, F.A., Mirko, H., & Lopez, A.L. (2015). Exploring treated wastewater issues related to agriculture in Europe, employing a quantitative SWOT analysis. *Procedia Economics and Finance*, 33, 367-375.
- Miraji, M., Liu, J., & Zheng, C. (2019). The impacts of water demand and its implications for future surface water resource management: The case of tanzania's wami ruvu basin (WRB). *Water*, 11(6), 1280.
- Mokin, C. (2019). Review and analysis of imposed European Union and United States international sanctions on Ukrainian crisis and Russia's countermeasures. *Journal of Legal, Ethical and Regulatory Issues*, 22(2), 1-11.

- Munia, H.A., Guillaume, J.H., Wada, Y., Veldkamp, T., Virkki, V., & Kummu, M. (2020). Future transboundary water stress and its drivers under climate change: A global study. *Earth's Future*, 8(7), 13-21.
- [Panigrahi, J.K., & Mohanty, P.K. \(2012\). Effectiveness of the Indian coastal regulation zones provisions for coastal zone management and its evaluation using SWOT analysis. *Ocean & Coastal Management*, 65, 34-50.](#)
- Poshanov, N., Kosanov, Z., Alibekov, S.T., Dossymbekova, M., & Begzhan, A. (2018). Comparative analysis of existing environmental control in the Republic of Kazakhstan and foreign countries. *Journal of Legal, Ethical and Regulatory Issues*, 21(1), 1-7.
- Rivotti, P., Karatayev, M., Mourão, Z.S., Shah, N., Clarke, M.L., & Konadu, D.D. (2019). Impact of future energy policy on water resources in Kazakhstan. *Energy Strategy Reviews*, 24, 261-267.
- Sabyr, A., Rustemova, G., Koshkinbayeva, A., Bitimirov, K., Bizhanova, A., Medetov, A., & Kussainova, L. (2019). The role of international conventions and covenants in achieving economic and environmental justice: A conceptual review. *Journal of Legal, Ethical and Regulatory Issues*, 22(2), 1-8.
- Saiymova, M., Yesbergen, R., Demeuova, G., Bolatova, B., Taskarina, B., Ibrasheva, A., & Saparaliyev, D. (2018). The knowledge-based economy and innovation policy in Kazakhstan: Looking at key practical problems. *Academy of Strategic Management Journal*, 17(6), 1-11.
- [Sanchez, G.M., Terando, A., Smith, J.W., García, A.M., Wagner, C.R., & Meentemeyer, R.K. \(2020\). Forecasting water demand across a rapidly urbanizing region. *Science of the Total Environment*, 730, 139050.](#)
- Schmeier, S., & Vogel, B. (2018). Ensuring long-term cooperation over transboundary water resources through joint river basin management. In *Riverine Ecosystem Management* (pp. 347-370). Springer, Cham.
- Sibly, R.M., & Hone, J. (2002). Population growth rate and its determinants: An overview. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 357(1425), 1153-1170.
- [Smajgl, A., Ward, J., & Pluschke, L. \(2016\). The water–food–energy Nexus—realizing a new paradigm. *Journal of Hydrology*, 533, 533-540.](#)
- Srdjevic, Z., Bajcetic, R., & Srdjevic, B. (2012). Identifying the criteria set for multicriteria decision making based on SWOT/PESTLE analysis: A case study of reconstructing a water intake structure. *Water Resources Management*, 26(12), 3379-3393.
- Tekken, V., & Kropp, J.P. (2015). Sustainable water management-perspectives for tourism development in north-eastern Morocco. *Tourism Management Perspectives*, 16, 325-334.
- [Valeyev, A., Karatayev, M., Abitbayeva, A., Uxukbayeva, S., Bektursynova, A., & Sharapkhanova, Z. \(2019\). Monitoring coastline dynamics of Alakol Lake in Kazakhstan using remote sensing data. *Geosciences*, 9\(9\), 404.](#)
- Yavuz, F., & Baycan, T. (2013). Use of swot and analytic hierarchy process integration as a participatory decision making tool in watershed management. *Procedia Technology*, 8, 134-143.
- [Yerezhpekyzy, R., Karatayeva, A., Kuanalieva, G.A., Konysbai, B.M., & Azhinurina, D.A. \(2017\). Legal regulation of public access to information in the field of environmental protection and use of natural resources. *Journal of Legal, Ethical and Regulatory Issues*, 20\(2\), 1-6.](#)