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Monthly Scientific Digest on Water Issues in Central Asia: October 2017

*Dear members of the Academic Teachers' network in Central Asia,
the current monthly issue gives a short overview of recent research trends in the field of
Water Resources in Central Asia*

Scientific articles

[1] [Water-energy dilemma of the Central Asian states:
are there possible the armed clashes?](#)

E.G. Garbuzarova



Vestnik KRSU (Вестник КРСУ) 2017, Volume 17, Issue 4, pages 40-44.

Link to the article (in Russian): <https://elibrary.ru/item.asp?id=29273873>

The article is devoted to the water-energy problems of Central Asia states and the probability of conflict transformation in the phase of armed confrontation.

[2] [Simulating the Macroeconomic Impact of Future Water Scarcity](#)

Roberto Roson



2017. Discussion Paper. World Bank, Washington, DC. International Bank for Reconstruction and Development/The World Bank

Link to the paper:

<https://openknowledge.worldbank.org/bitstream/handle/10986/26027/W16006-8-2-2017-14-8-10-W.pdf?sequence=1&isAllowed=y>

Abstract

This paper considers some of the economic implications of climate change scenarios as described in the Shared Socioeconomic Pathways (SSPs). By comparing potential water demand with estimates of (sustainable) water availability in different regions, it identifies regions whose future economic growth potential is likely to be constrained by the scarcity of water resources. The paper assesses the macroeconomic impact of water scarcity under alternative allocation rules, finding that constrained regions can effectively neutralize water-related climate risks and adapt to a changing water environment by assigning more water to sectors in which it has a higher value, shifting production to less water-intensive sectors, and

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importing more water-intensive goods. However, this adaptation effort is likely to imply some radical changes in water management policies.

[3] [A new concept of irrigation response units for effective management of surface and groundwater resources: a case study from the multi-country Fergana Valley, Central Asia](#)

Usman Khalid Awan, Mirzakhayot Ibrakhimov, Bogachan Benli, John P. A. Lamers, Umar Waqas Liaqat

Irrigation Science 2017, Volume 35, Issue 1, pages 55–68. Springer Berlin Heidelberg

Link to the article: <https://doi.org/10.1007/s00271-016-0521-9>



Abstract

When estimating canal water supplies for large-scale irrigation schemes and especially in arid regions worldwide, the impact of all factors affecting the gross irrigation requirements (GIR) are not properly accounted for, which results in inefficient use of precious freshwater resources. This research shows that the concept of irrigation response units (IRU)—areas having unique combinations of factors effecting the GIR—allows for more precise estimates of GIR. An overlay analysis of soil texture and salinity, depth and salinity of groundwater, cropping patterns and irrigation methods was performed in a GIS environment, which yielded a total of 17 IRUs combinations of the Oktepa Zilol Chashmasi water consumers' association in multi-country Fergana Valley, Central Asia. Groundwater contribution, leaching requirements, losses in the irrigation system through field application and conveyance and effective rainfall were included in GIR estimates. The GIR varied significantly among IRUs [average of 851 mm (± 143 mm)] with a maximum (1051 mm) in IRU-12 and a minimum (629 mm) in IRUs-15, 16. Owing to varying groundwater levels in each IRU, the groundwater contribution played a key role in the estimation of the GIR. The maximum groundwater contribution occurred in IRUs dominated by cotton–fallow rotations as evidenced by an average value of 159 mm but a maximum of 254 mm and a minimum of 97 mm. Percolation losses depended on irrigation methods for different crops in their respective IRUs. The novel approach can guide water managers in this and similar regions to increase the accuracy of irrigation demands based on all the factor effecting the GIR.

[4] [Multivariate assessment and attribution of droughts in Central Asia](#)

Zhi Li, Yaning Chen, Gonghuan Fang, Yupeng Li

Scientific Reports 2017, Volume 7: 1316, PMCID: PMC5430973.

Link to the article: <https://doi.org/10.1038/s41598-017-01473-1>



Abstract

While the method for estimating the Palmer Drought Severity Index (PDSI) is now more closely aligned to key water balance components, a comprehensive assessment for measuring long-term droughts that recognizes meteorological, agro-ecological and hydrological perspectives and their attributions is still lacking. Based on physical approaches linked to potential evapotranspiration (PET), the PDSI in 1965–2014 showed a mixture of drying (42% of the land area) and wetting (58% of the land area) that combined to give a slightly wetting trend (0.0036 per year). Despite the smaller overall trend, there is a switch to a drying trend over the past decade (–0.023 per year). We designed numerical experiments and found that PDSI trend responding to the dramatic increase in air temperature and slight change in precipitation. The variabilities of meteorological and agro-ecological droughts were broadly comparable to various PDSI drought index. Interestingly, the hydrological drought was not completely comparable to the PDSI, which indicates that runoff in arid and semi-arid regions was not generated primarily from precipitation. Instead, fraction of glacierized areas in catchments caused large variations in the observed runoff changes.

[5] [Transboundary water cooperation in Central Asia and regional security](#)

Gulnar Askeeva, Bagysh Gabdulina, Elena Nechaeva, Janar Smakova



Central Asia and the Caucasus 2017, Volume 18, Issue 1, pages 64-75, CA&CC Press AB

Link to the article: <https://elibrary.ru/item.asp?id=28804337>

Abstract

This is an attempt to answer the question about the growing water deficit in Central Asia, its impact on regional security, and the ways and means of ensuring it. The authors have analyzed the contemporary state of regional water resources; investigated the conceptual approaches to the studies of water cooperation; analyzed the contradictions between the Central Asian countries caused by the transboundary management of water resources; and outlined approaches to potentially efficient management of regional water resources.

[6] [Reasonable use of transboundary water resources and streams](#)

Tobirov O.Q.



European Science 2017, Volume 25, Issue 3, pages 31-36. Olimp (Издательство: Олимп)

Link to the article: https://elibrary.ru/download/elibrary_28804410_83463876.pdf

Abstract

Currently, natural resources, especially the rational use of water and energy resources is one of the most serious problems. In order to be nominated by the various and ambiguous approaches in this area, preventing the development of the conflict, and sometimes even lead to environmental disaster. In this article, the use of transboundary river water hydropower and large dams, human and social security, social and economic development, as well as issues of environmental impact. The use of water resources in Central Asia, the upper reaches of rivers, environmental, social and technological creates a great danger, says the impact of water consumption.

[7] [State of melioration, problems and ways of solutions in the Republic of Tajikistan](#)



Sharifov G.V., Bakhrieva Sh.A., Isoev Kh.M.

Science and innovation (Наука и инновация) 2017, Issue 1, pages 67-70. Publisher: Tajik National University (Dushanbe)

Link to the article: <https://elibrary.ru/item.asp?id=29759866>

Abstract

The deterioration of the ecological situation of water and land reclamation in Central Asia, including in the Republic of Tajikistan is under concern. To address the issues of water and land reclamation in Tajikistan, the sufficient funding and development of effective measures are needed.

Report

[8] [Migration and its Interdependencies with water scarcity, gender and youth employment](#)



Miletto M., Caretta M.A., Burchi F.M., Zanlucchi G.

2017. WWAP. Paris, UNESCO.

Link to the report: <http://unesdoc.unesco.org/images/0025/002589/258968e.pdf>

Abstract

This paper seeks to assess the interdependencies among water scarcity, youth unemployment and migration. It also attempts to unravel the different roles of women and men in the gendered migration process. Evidence shows that growing climatic variability has impacts on water availability and quality, which in turn jeopardizes social stability and jobs

for the younger generations. This is particularly true in arid and semi-arid regions, where often migration is both the result of and a way to adapt to climate-induced environmental stresses. The impacts of climate change, including water scarcity, are expected to lead to substantial employment cuts across the global economy, impacting in particular heavily water-dependent jobs – 95% of which are estimated to be agricultural jobs (WWAP, 2016) – in arid and semi-arid areas highly affected by climate change, where populations with low adaptive capacity may be led to migrate. Migration can hence represent a response to the consequence of failed adaptation to environmental stress. As the World Water Development Report 2016 (WWDR 2016) points out, ‘There is a clear connection between water scarcity, food insecurity, social instability [...] which in turn can trigger and intensify migration patterns throughout the world’ (WWAP, 2016).