Adapting to climate change in the Amudarya basin: dealing with droughts...

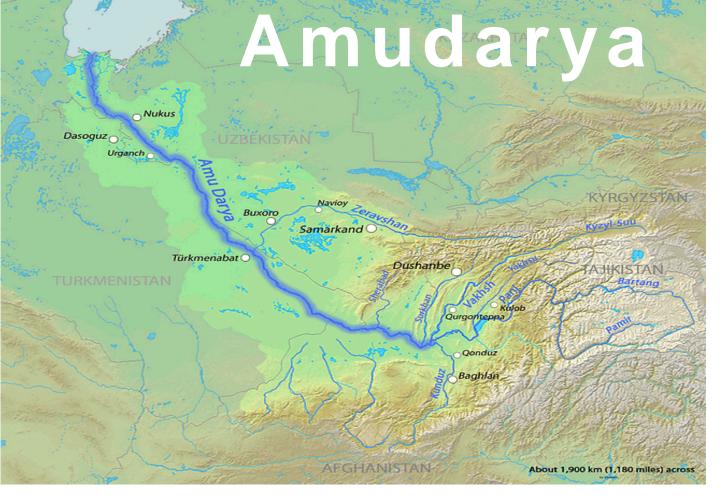


Dinara Ziganshina, PhD

Scientific Information Center of Interstate Commission for Water Coordination in Central Asia Member of the Implementation Committee under the UNECE Water Convention



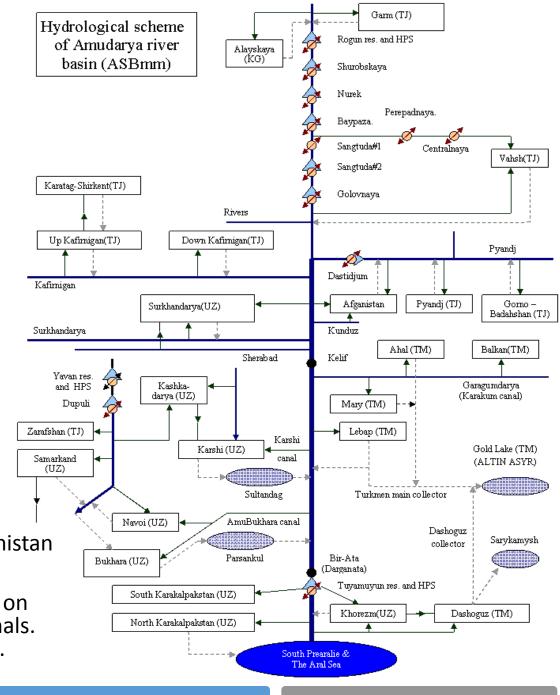
Research project under «Partnerships for enhanced engagement in research (PEER)" Cycle 4: Transboundary water management adaptation in the Amudarya basin to climate change uncertainties



Annual runoff: 79.4 km³/year. Catchment area: 309,000 km².

Riparians: Afghanistan (~13%), Kyrgyzstan (2%), Tajikistan (74%), Turkmenistan (1.7%) & Uzbekistan (8.5%).

Flow regulation: Nurek on Vakhsh (total capacity 10.5 km3), Tuyamuyun on Amudarya (total capacity 7.3 km3), a network of small reservoirs & canals. **Proposed large facilities**: Rogun on Vakhsh & Dashtidjumn on Pyandzh.

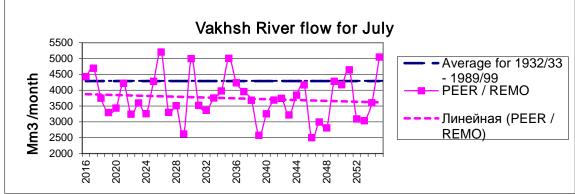


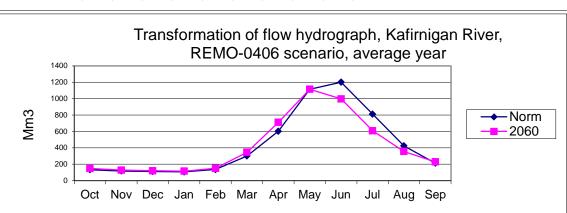
Climate change impacts in the Amudarya Climate change impacts Lake Bakhash in the Amu Darya river basin Rivers with intense water use and increased stress from climatic and hydrological changes K H S seasonal Large river delta communities and natural ecosystems with increased environmental stress and high risk of water shortages during low water years / regional droughts Moyynkum Aral Kum Bevated risk of glacial lake outburst floods (GLOFs) and ice and snow hazards Amu Darya river Muynak Increased sedimentation of reservoirs and delta and lakes Kentau es sential water infrastructure Bishkek Increased risk of climate-related Kara-Balta hazards in the mountains; more intense ice and snow melt and intensified hydro-Qyzylqum Desert logical cycle; increased surface runoff Shymken Toktogul Uchquduq Increased risk of droughts in grazing areas, rainfed and irrigated croplands; more and dimate conditions; reduced surface runoff Zarafshon KYRGYZSTAN Impacts of the shrinking Aral Sea on Golden Age Lake □ Tashkent regional climate and dust storms (under construction) Jalalabad UZBEKISTAN Namangan * Gyzylgaya Increased heat stress for rural workers on agricultural fields Nurota TURKMENISTAN Guliston* Khujand Potential risk of cross-border spread of invasive species and new diseases Navoiv Jizzax Sary-Tash Qorakol. Pandjakent CHINA Abramov Bereket Samarkand 0 Deserts Zeravskan Fedchenko Areas above 2000 metres AJIKISTAN Turkmenabat glacier Shahrisabz Dushanbe Murgab Important glacier monitoring sites _Guzzor Atamyrat . Kunduz Mashad Pol-e Khomf Du sti dam Chitral AFGHANISTAN Torbat-e Jam Mongora INDIA Barnian Tayyebad . Muzaffarabad Srinagar Jalalabad is lam abad Punch Sources: Second National Communications on dimate change 1000 km PAKISTAN of Talkistan, Turkmenistan and Uzbekistan, Gimate Change in

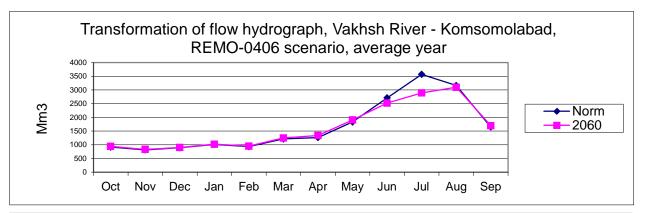
*Ghazni

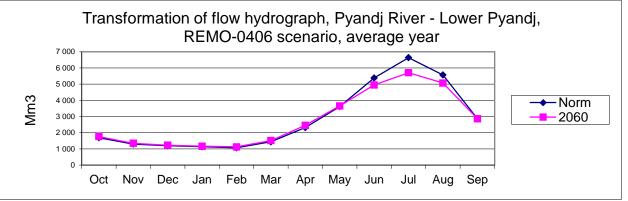
Map produced by Zeil Environment Network, December 2010

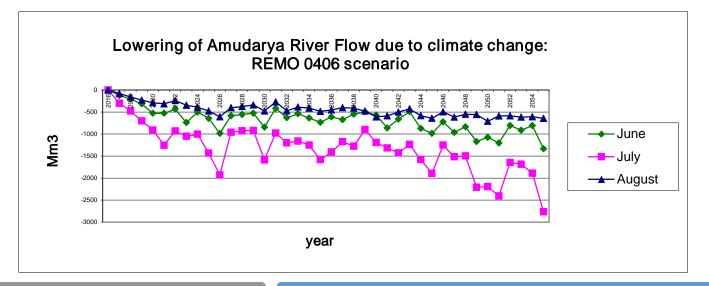
Sources: Second Neifanal Communications on dimate change of Tajkistan, Turkmenistan and Ubbelistan; Climate Change in Central Ada: A visual synthesis report (2009), Environment and Secondy initiative regional consultations in Adaptact (Sep 2007) and Kabol (Not 2007) and regional field missisters (May 2009).











Assessment of climate change effects on river flow and flow hydrographs according to PEER/ASBmm – REMO 0406 for 2016—2055

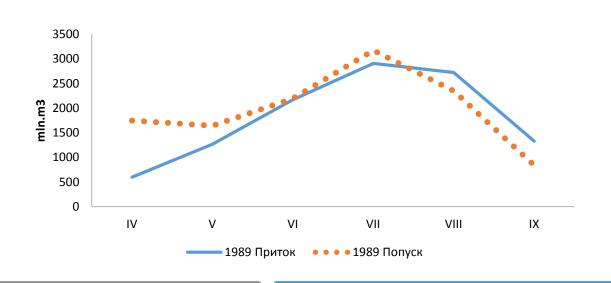
Droughts in the Amudarya

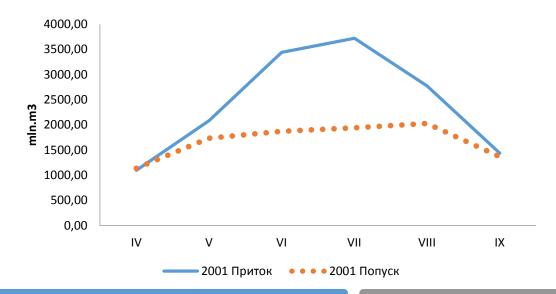
Droughts are increasing in frequency, severity & duration:

- Frequency of dry years increased by 1.3 times from 1991 to 2008
- Severity of highly dry years increased by 1.5 times (deviation of the average flow in dry years from the average flow for the given period)

Runoff during the dry years in Amudarya may decrease for 25-40% by 2050 Intensified by uncoordinated flow regulation

The Nurek Reservoir operation in dry growing seasons of 1989 & 2001





Water allocation in the driest growing seasons

% of actual water allocation against agreed limits – along river reaches

| Dry years | Upstream (TJ/UZ) | Middle stream (TM/UZ) | Downstream (TM/UZ) | River Delta |
|------------|---------------------|--------------------------|-----------------------|-------------|
| 2000 (72%) | 84 | 83 | 48 | 20 |
| 2001 (69%) | 97 | 92 | 50 | 5 |
| 2008 (58%) | 92 | 91 | 45 | 21 |

% of water received by countries against agreed limits

Kyrgyzstan – 2.2.%

Tajikistan – 94%

Turkmenistan – 72%

Uzbekistan – 63%

Response to droughts reactive, not proactive

Lack of institutional flexibility, low level of preparedness → higher vulnerability:

- Countries & regional institutions react to droughts when these occur (awareness seminars, strict water discipline, etc) but do little at regional scale to prevent them;
- Poor forecasting accuracy is the main cause of poor preparedness & uncertainty;
- Lack of long-term planning reduces climate-resilience of the whole system;
- Lack of sanctions or other provision for violation of agreed water allocation regime.

Need for drought management plan or strategy under ICWC:

 No concerted efforts at the regional level to initiate a dialogue on the adoption of drought management plans that would provide a framework for a proactive, risk-based management for dealing with droughts, including comprehensive monitoring, information & early warning systems, impact assessment procedures, risk management measures, etc



Research project under «Partnerships for enhanced engagement in research (PEER)" Cycle 4: Transboundary water management adaptation in the Amudarya basin to climate change uncertainties

Learn more

on the project that seeks to build adaptive capacity of the countries sharing the Amudarya basin to manage effectively their transboundary waters under climate change and other uncertainties at http://cawater-info.net/projects/peer-amudarya/about_e.htm