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

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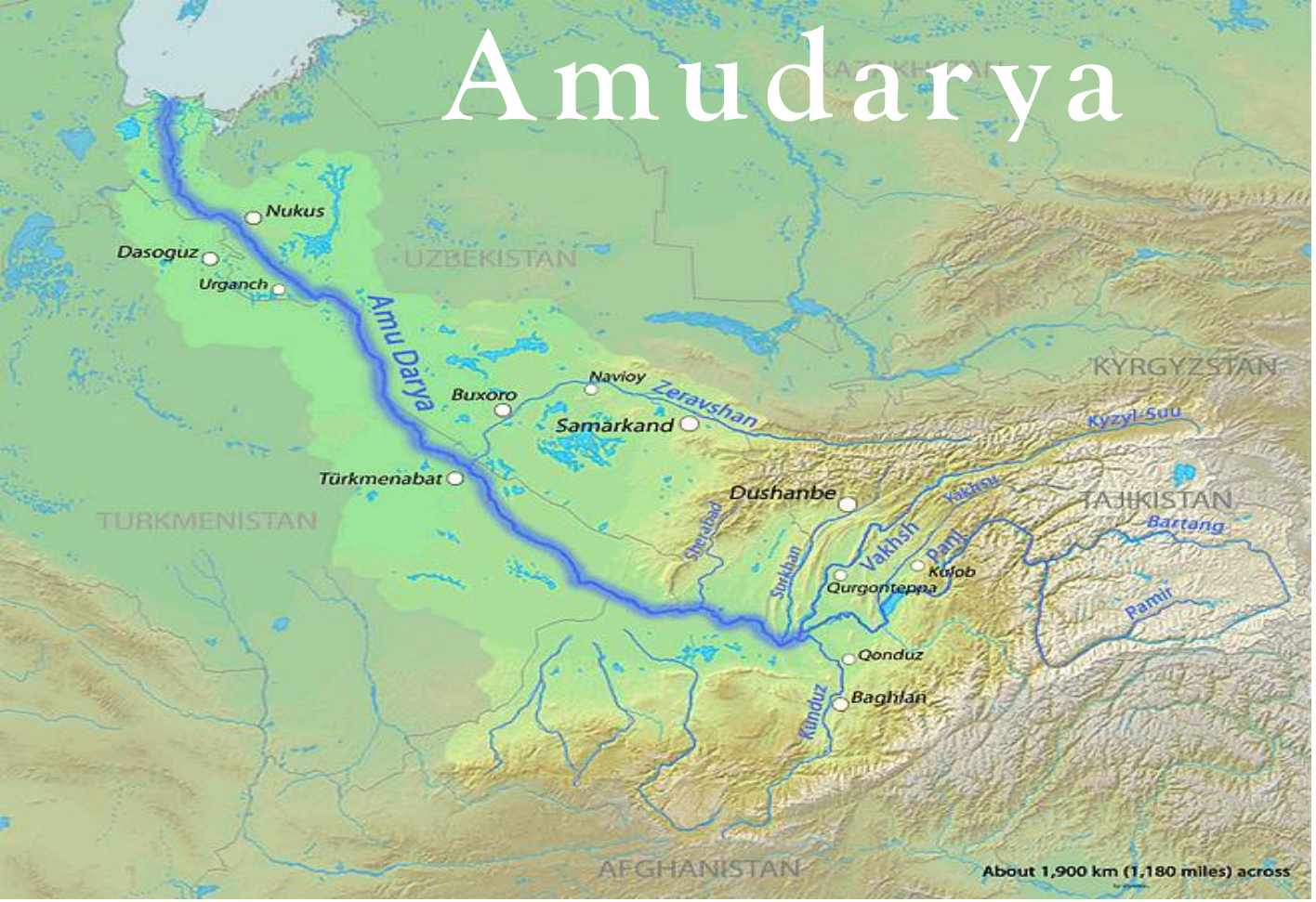
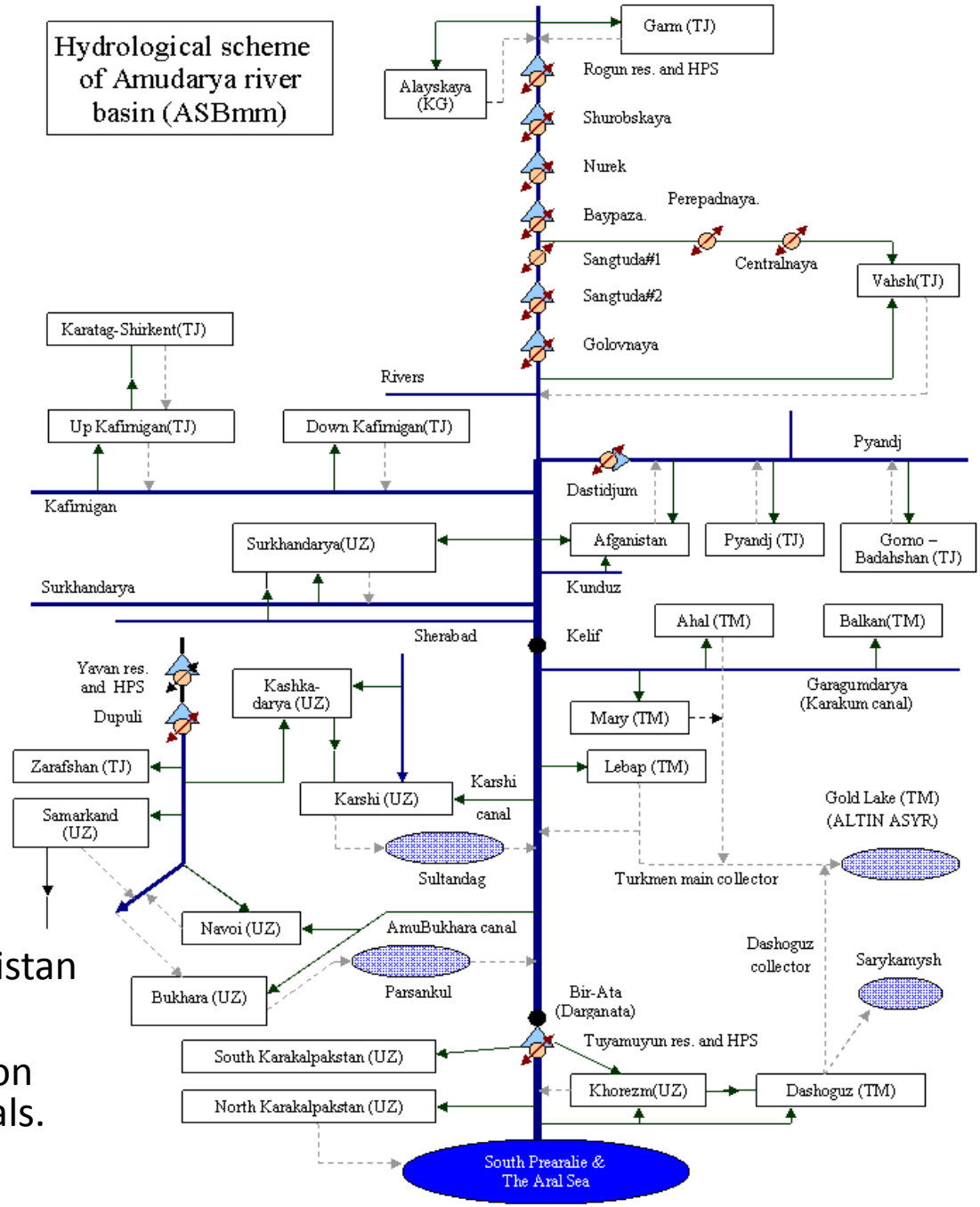
Research project under «Partnerships for enhanced engagement in research (PEER)" Cycle 4: Transboundary water management adaptation in the Amudarya basin to climate change uncertainties

Amudarya



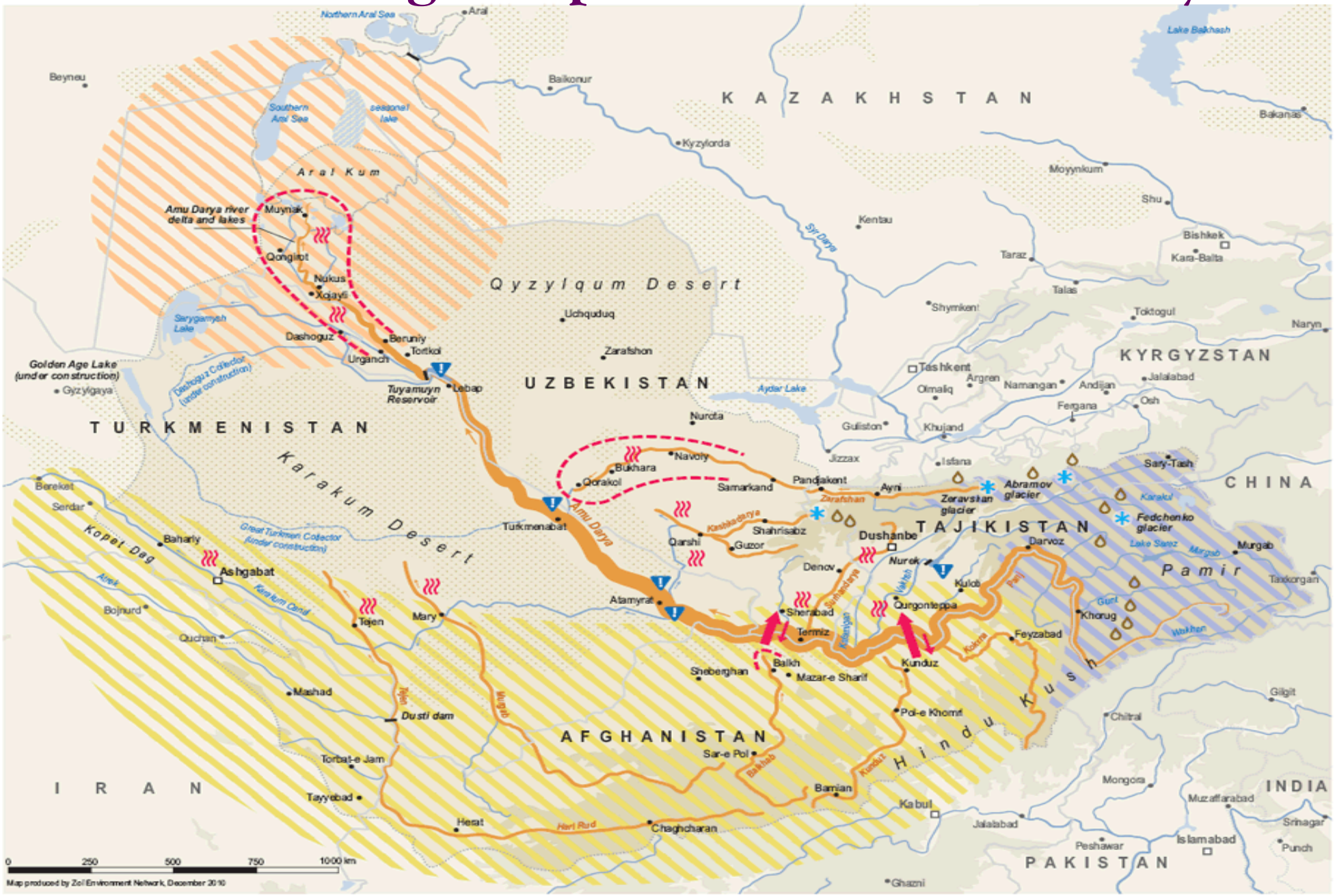


Annual runoff: 79.4 km^3/year. **Catchment area**: 309,000 km^2.

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

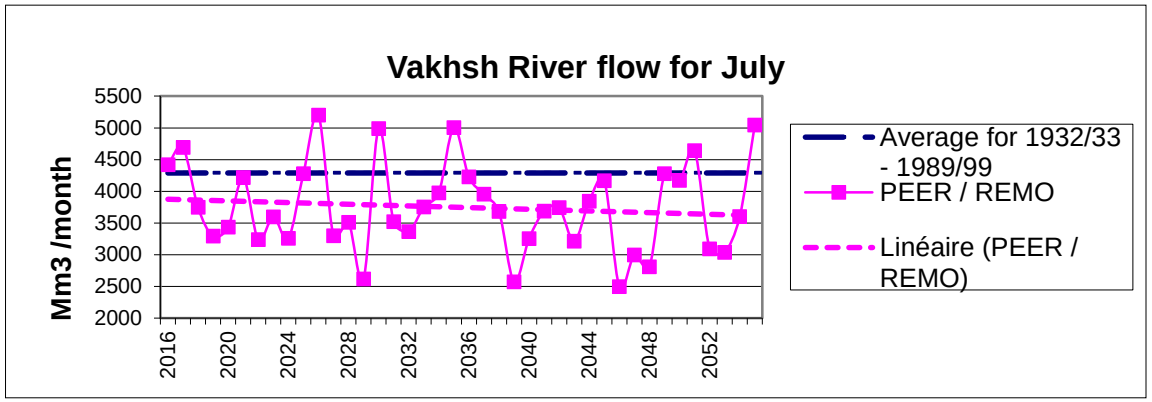


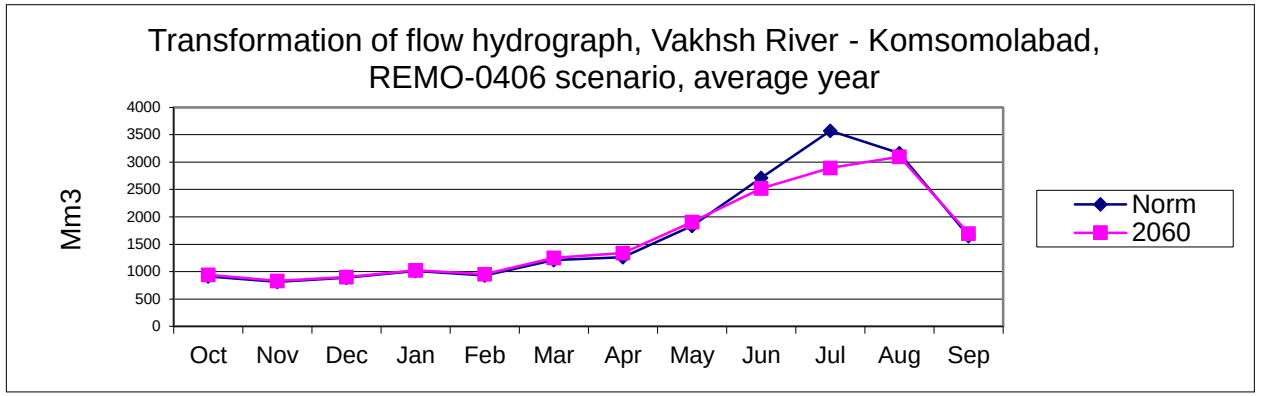
Climate change impacts in the Amu Darya river basin

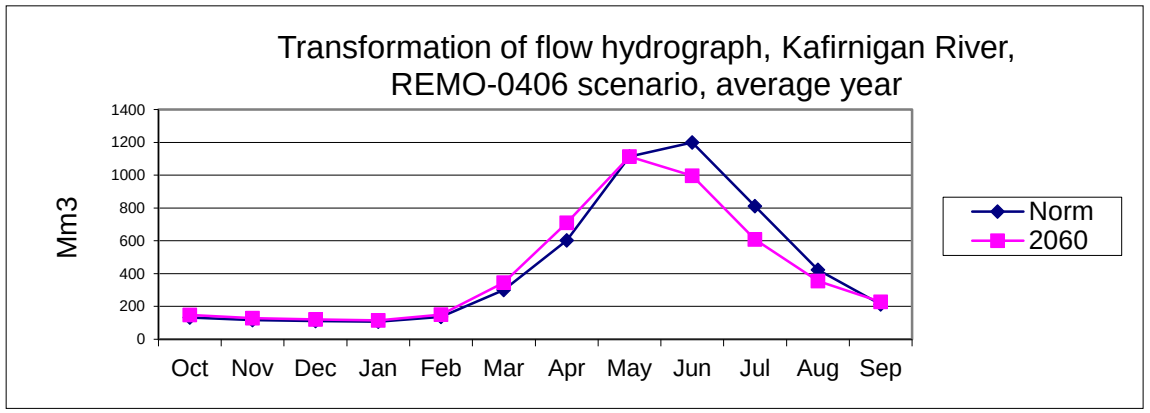
- Rivers with intense water use and increased stress from climatic and hydrological changes
- Large river delta communities and natural ecosystems with increased environmental stress and high risk of water shortages during low water years / regional droughts
- Elevated risk of glacial lake outburst floods (GLOFs) and ice and snow hazards
- Increased sedimentation of reservoirs and essential water infrastructure
- Increased risk of climate-related hazards in the mountains; more intense ice and snow melt and intensified hydrological cycle; increased surface runoff
- Increased risk of droughts in grazing areas, rainfed and irrigated croplands; more arid climate conditions; reduced surface runoff
- Impacts of the shrinking Aral Sea on regional climate and dust storms
- Increased heat stress for rural workers on agricultural fields
- Potential risk of cross-border spread of invasive species and new diseases

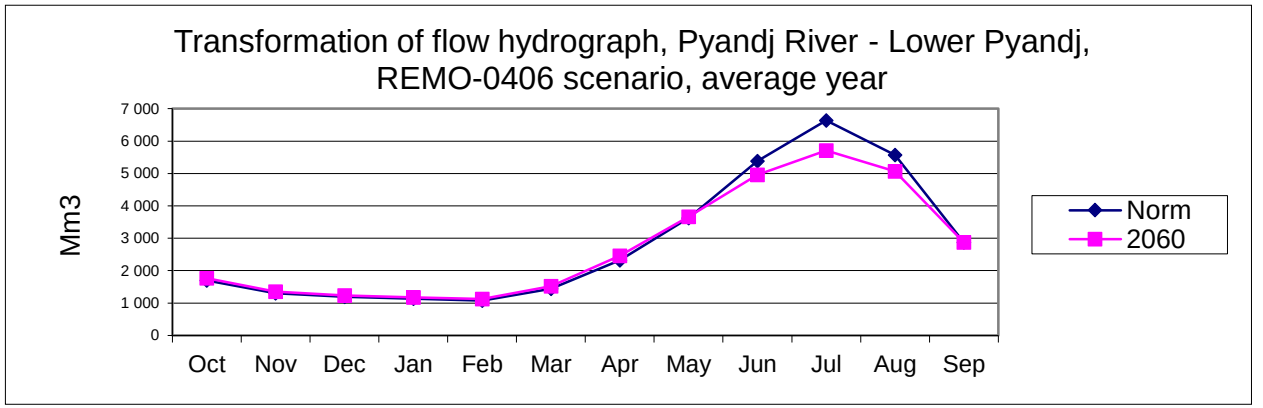
- Deserts
- Areas above 2000 metres
- Important glacier monitoring sites

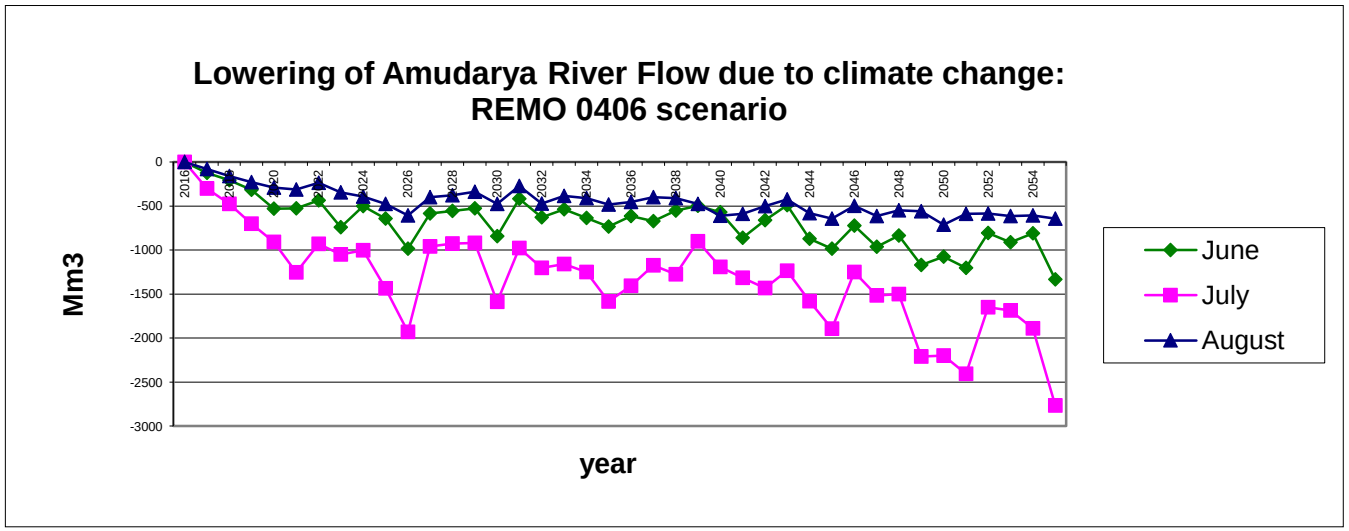
Sources: Second National Communications on climate change of Tajikistan, Turkmenistan and Uzbekistan; Climate Change in Central Asia: A visual synthesis report (2009); Environment and Security initiative regional consultations in Ashgabat (Sep 2007) and Kabul (Nov 2007) and regional field missions (May 2008).











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

Droughts in the Amudarya

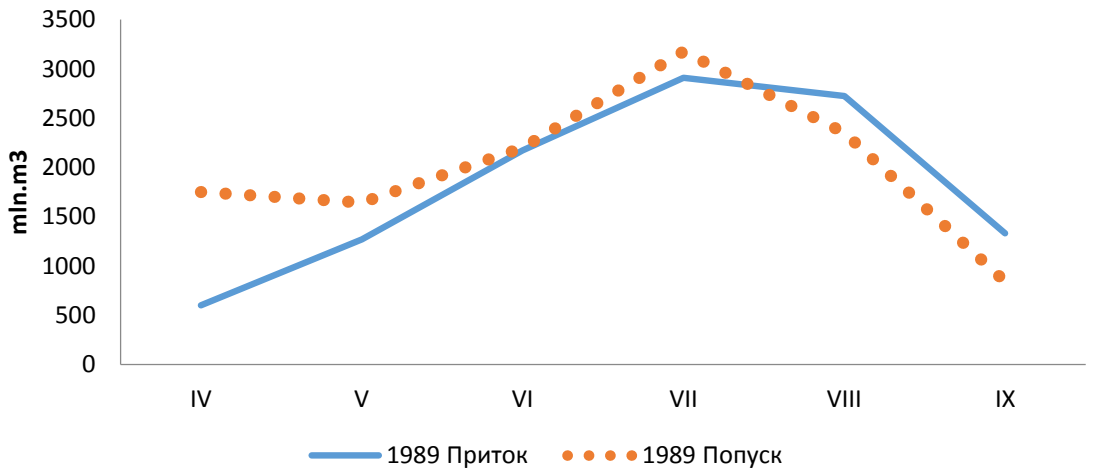
Droughts are increasing in frequency, severity & duration:

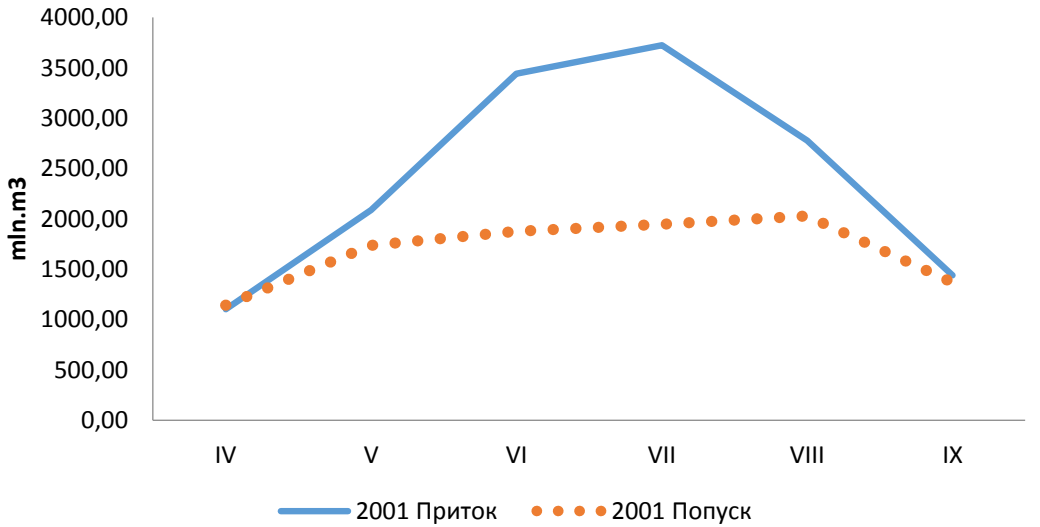
- Frequency of dry years increased by 1.3 times from 1991 to 2008
- Severity of highly dry years increased by 1.5 times (deviation of the average flow in dry years from the average flow for the given period)

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

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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