International Asian Monsoon Year 08

Agency for the Assessment and Application of Technology

Group on Earth Observations

Coordinated Energy and Water Cycle Observation Project

World Climate Research Programme

GEOSS
Asian Water Cycle Initiative

THE UNIVERSITY OF TOKYO

the 7th CEOP International Implementation Planning Meeting
the GEOSS/AWCI International Coordination Group (ICG)
6-9 September 2007, Kuta, Bali, Indonesia

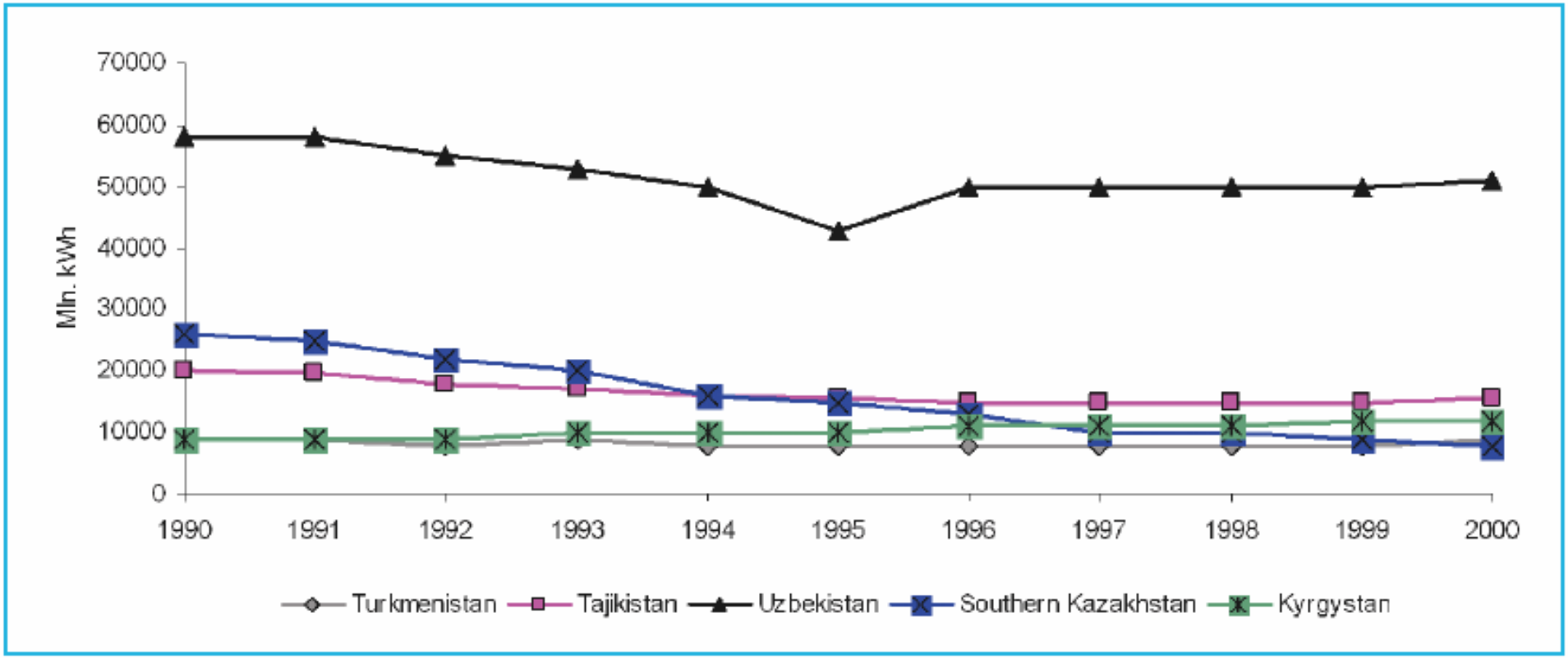
Dr. Sergey MYAGKOV
NIGMI of Uzhydromet
72, K.Makhsumov street,
Tashkent, 100052,
Uzbekistan
E-mail: nigmi@albatros.uz

Republic of Uzbekistan

For two decades already the Central Asian countries, especially in the lower reaches of the Syrdarya and Amudarya rivers, have suffered from a lack of water and its socio-economic consequences. Uzbekistan is the most vulnerable because for water will grow in response to the need it possesses the largest irrigated land area (4.3 million ha), a large rural population (more than 16 million people), and the highest density of population (54.6 people/km2)

The critical state of water and energy systems in Central Asia threatens future economic development and environmental and social stability in the region. The most obvious example of this threat is the Aral Sea disaster and its consequences. The current crisis in the natural ecosystems of the Aral Sea zone symbolizes the key problem resulting from national water use and agriculture management in the countries of region. These ecological problems include deforestation, overgrazing and a decrease in the nutrition value of forage, loss of biodiversity and other processes disturbing the structure and functions of ecosystems and biogeochemical cycles crucial for the life support systems and safety of people and the environment.

Consumption of Electricity in Aral Sea Basin



Source: GEF/ WB WEMP Project, Report of the NWG of Uzbekistan, 2002

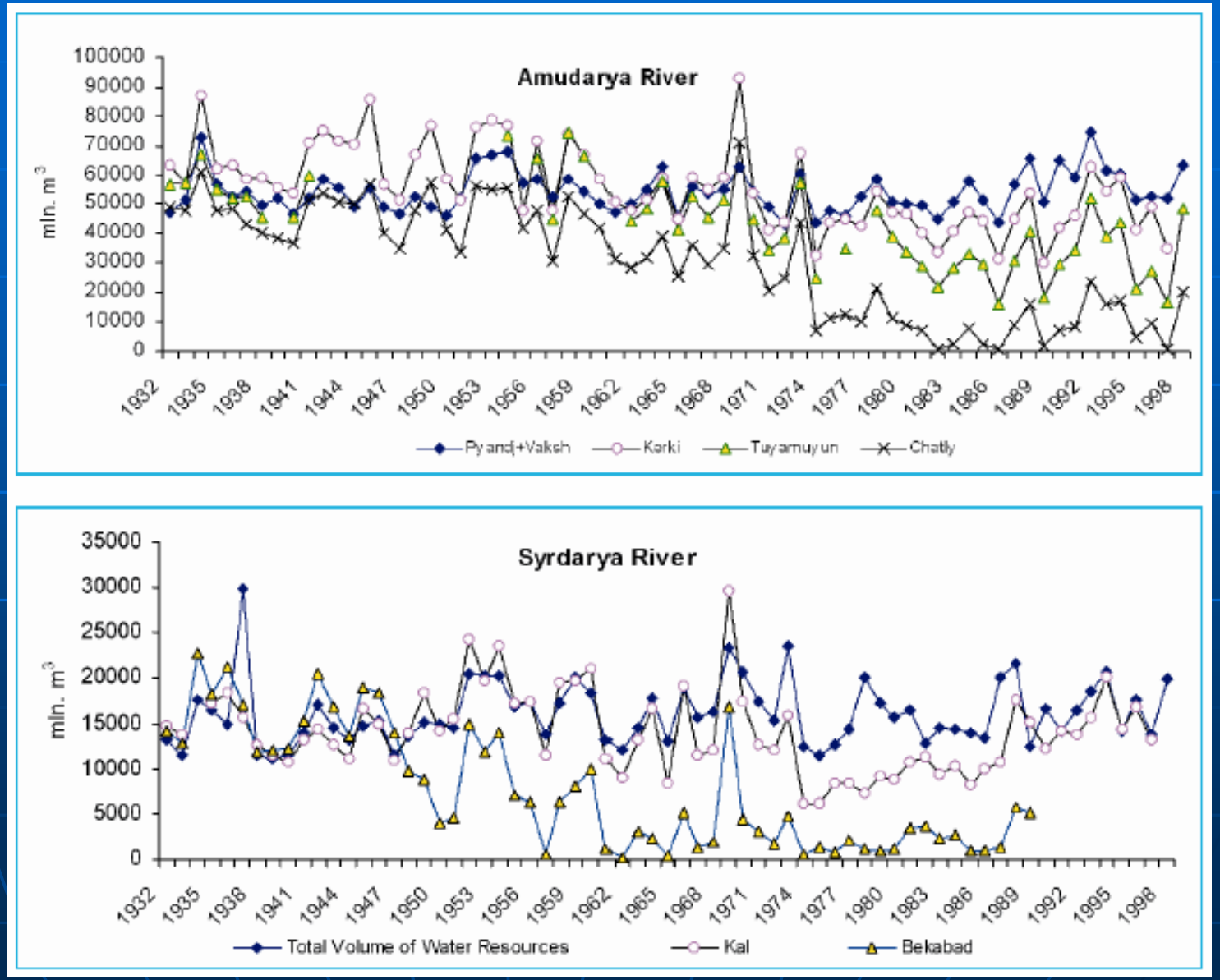
River Flow

River flow is characterized by the significant short-term and long-term variability. In dry years (with a 90% probability) it is 23 km3 less than in an average year. Wet periods (2-3 years long) occur every 6-10 years. Dry periods occur every 4-7 years and they are typically lengthy (up to 6 years).

Variation of flow within these cycles is rather significant. During a dry period of 8 years (1960/61-1967/68) the Amudarya river flow was only 90% of its normal volume. During a 2 year wet cycle (1968/69-1969/70) it exceeded the average volume by more than 30%. Variation of annual river flow is measured by the coefficient of variation: the higher the value of this coefficient, the bigger is the variation in flow.

The cyclical nature of river flow variation and the occurrence of long dry periods complicates the use of water sources in the national economy and makes it necessary to regulate flow using a system of reservoirs.

Long-term Trends of River Runoff Variations for 1932-1999

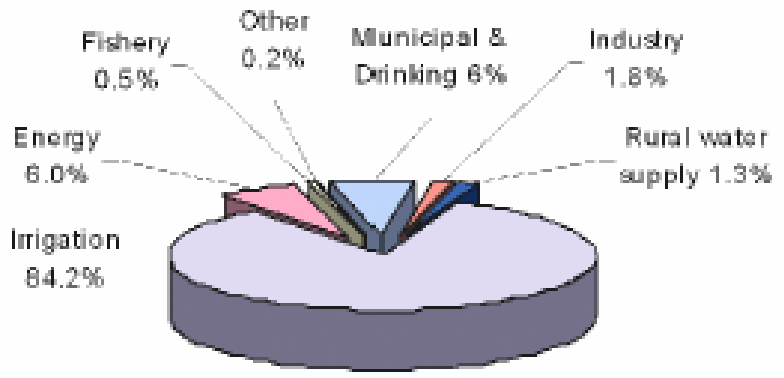


River Runoff of Various Probability, km3

River - Site	Probability			C_v
	50%	75%	90%	
Amudarya river basin	**73.69**	**66.68**	**61.41**	
Vakhsh-Tutkaul	20.17	18.44	17.00	0.13
Pyandj-Lower Pyandj	33.84	30.92	28.50	0.12
Kafirnigan-sum of rivers	5.56	4.91	4.38	0.18
Surkhandarya-sum of rivers	3.72	3.22	2.89	0.19
Kunduz river, down stream	4.11	3.57	3.57	-
Kashkadarya- sum of rivers	1.04	0.85	0.70	0.29
Zerafshan-Dupuli +Magiandarya-Sudji	5.25	4.77	4.37	0.14
Syrdarya river basin (down to Chardara res)	**34.32**	**28.86**	**24.62**	
Nary-Toktogul	13.76	11.75	10.18	0.23
Fergana valley rivers	11.61	9.69	8.22	0.25
Chirchik, Angren, Keles	6.59	7.11	5.95	0.27
Rivers of middle reaches	0.36	0.31	0.27	0.21
Total	**108.01**	**95.54**	**86.03**	

Use of Water by Sectors of Economy

Sectors	km³	%
Municipal & Drinking Water Supply	4.05	
Industry	1.20	
Rural Water Supply	0.91	
Irrigation	57.00	
Energy	4.07	
Fishery	0.37	
Other	0.10	
Total:	**67.70**	



Hydroelectric Power Sector

The future development of hydropower in Uzbekistan will be aimed at maximizing the capacity and efficiency of one of the most important renewable energy sources. The balanced operation of the country's energy system will be ensured through implementation of measures aimed at improving the efficiency of generating capacity, energy saving, etc. This will lead to an increase in the reliability and safety of the system which is vital for the support of communities and protection of the environment.

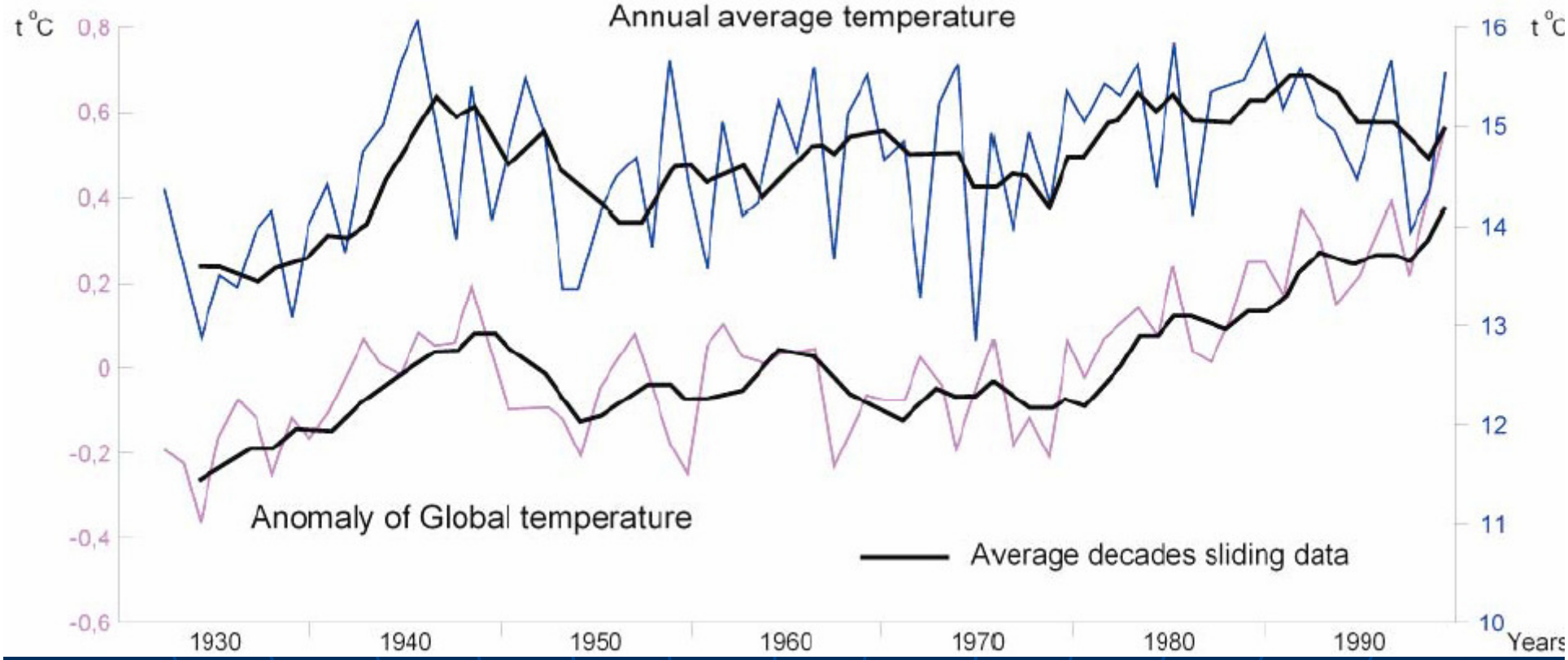
The plan in the near future is to restore and develop the existing hydro and thermal power stations. Amongst the hydroelectric power facilities planned for construction in the medium term is the Pskem hydropower station. This will have an installed capacity of 450 MW and a long-term average power generation of 0.92 billion kWh. Also envisaged is the design and development of 25-28 small-scale hydropower stations with a total installed capacity of 267 MW and power generation of 1.19 billion kWh.

Thus, by 2010, use of the country's hydropower capacity will increase by up to 13.5%, and expected power generation may reach 60 billion kWh. It is planned to attract credit from the international financial institutions for the reconstruction of electric power facilities. EBRD credit has already been obtained for the reconstruction of the Syrdarya thermal power station.

In the long-term it may also be possible to construct three more hydropower stations on the Pskem River (the Karapchitugay, Upper-Pskem, and Mullalak hydropower stations) with a total installed capacity of 800 MW and a long-term average power generation of 2,135 billion kWh. The operation of these hydropower facilities will be coordinated with the irrigation-energy operation mode of the Charvak hydropower station.

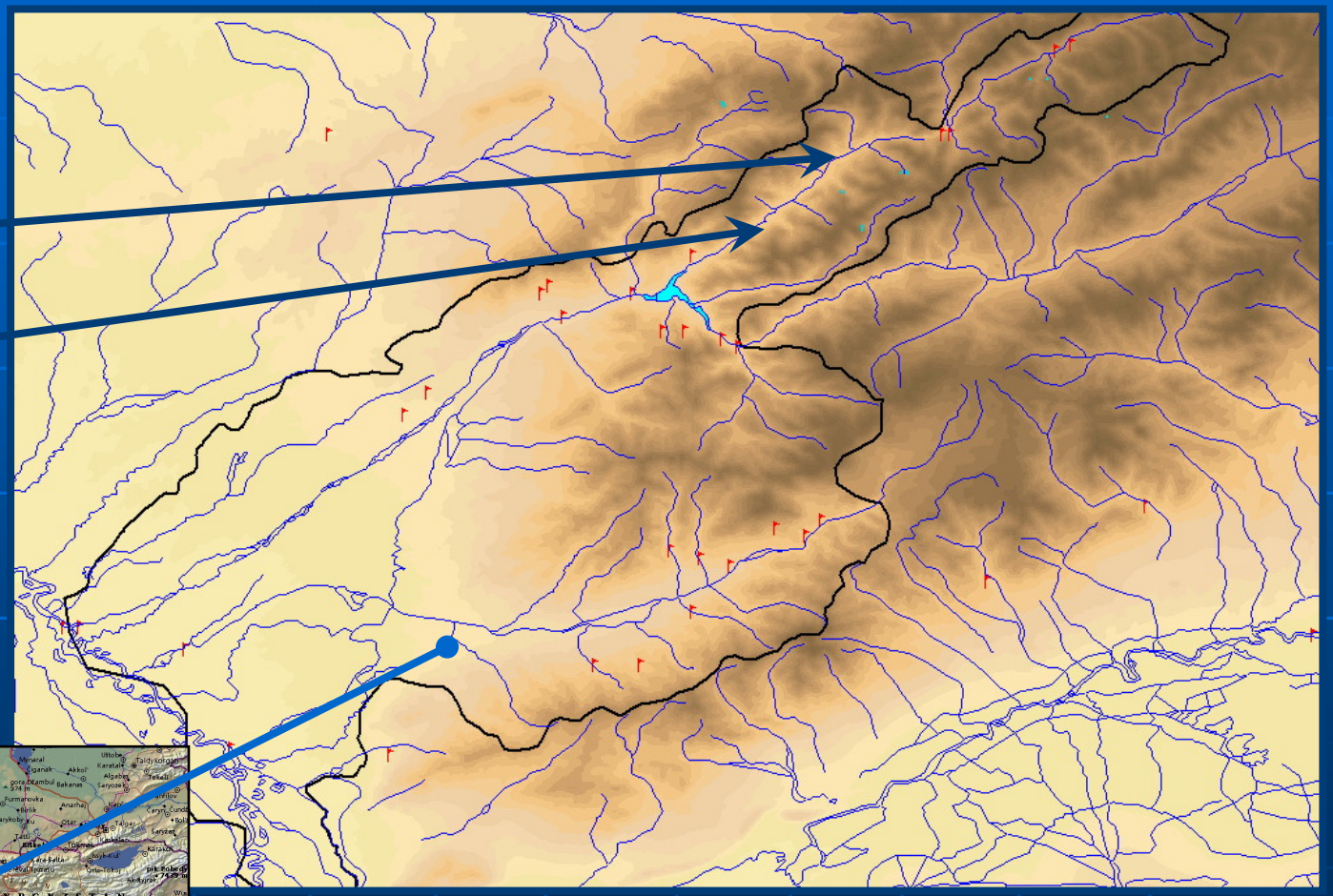
These measures will allow 35-40% of the country's hydropower capacity to be exploited by 2025, including the development of small-scale hydropower.

Multi-Year Trend Change of Global and Average Air Temperature in Uzbekistan



Digital Relief Model of Chirchik-Akhangaran River Basin

Planed place for new Hydropower station




Water Storage Reservoir
Coal Mine

Meteorological and hydrological monitoring of water resources of the Central Asia

The system of observations of the elements of hydrometeorological regime of a locality which, besides the observations of the regime of water objects, includes acquisition, processing, statistical and physical analysis, generalization and evaluation of information, issue of prognostic messages and recommendations with respect to the use of data, is a meaning of hydrometeorological monitoring

400 meteorological stations, 475 hydrological posts, 16 aerological, 20 actinometric and agrometeorological stations operated simultaneously in the basin of the Aral Sea till 1991.

Development of the meteorological network of the national hydrometeorological services of the Republic of Uzbekistan

Years	Total	Number of stations/posts, which measures the parameters						
		Precipi-tation	Temperature of				Absolute air humidity	Snow cover height and density
			air	soil surface	soil at a depth of, cm			
					20	160		
1975	84	84	84	84	28	20	84	84
1980	91	91	91	91	37	19	91	91
1985	89	89	89	89	42	18	89	89
1990	85	85	85	85	34	16	85	85
1995	75	75	75	75	31	15	75	75
1996	75	75	75	75	31	15	75	75
2007	75	75	75	75	31	15	75	75

Hydrological network

A little more than 200 posts will have to be reserved out of about 400 hydrological posts functioning at present time according to the above-mentioned criteria. Their construction and supply with devices and necessary equipment and materials is difficult to be implemented at present time. In connection with this we have chosen 64 posts out of the most strategically important posts which are in essence «reference» points. These observation points are intended to function under any conditions and systematically transmit on-line information about the state of a certain water object.

Meteorological network

Analysis of meteorological network and analysis of hydrological network have been conducted simultaneously. 63 most important meteorological stations have been chosen during the first phase of optimization.

The limit values of the main meteorological parameters obtained on the basis of multiyear observations were evaluated during selection. There wasn't any information on the limit values of meteorological parameters of the network of meteorological stations in Kyrgyzstan and Tadjikistan. That is why the data, which had been obtained without involvement of specialists in hydrometeorology of the republics, was used.


Thank you for your attention !