



Monitoring as Basis of Sustainable Groundwater Management

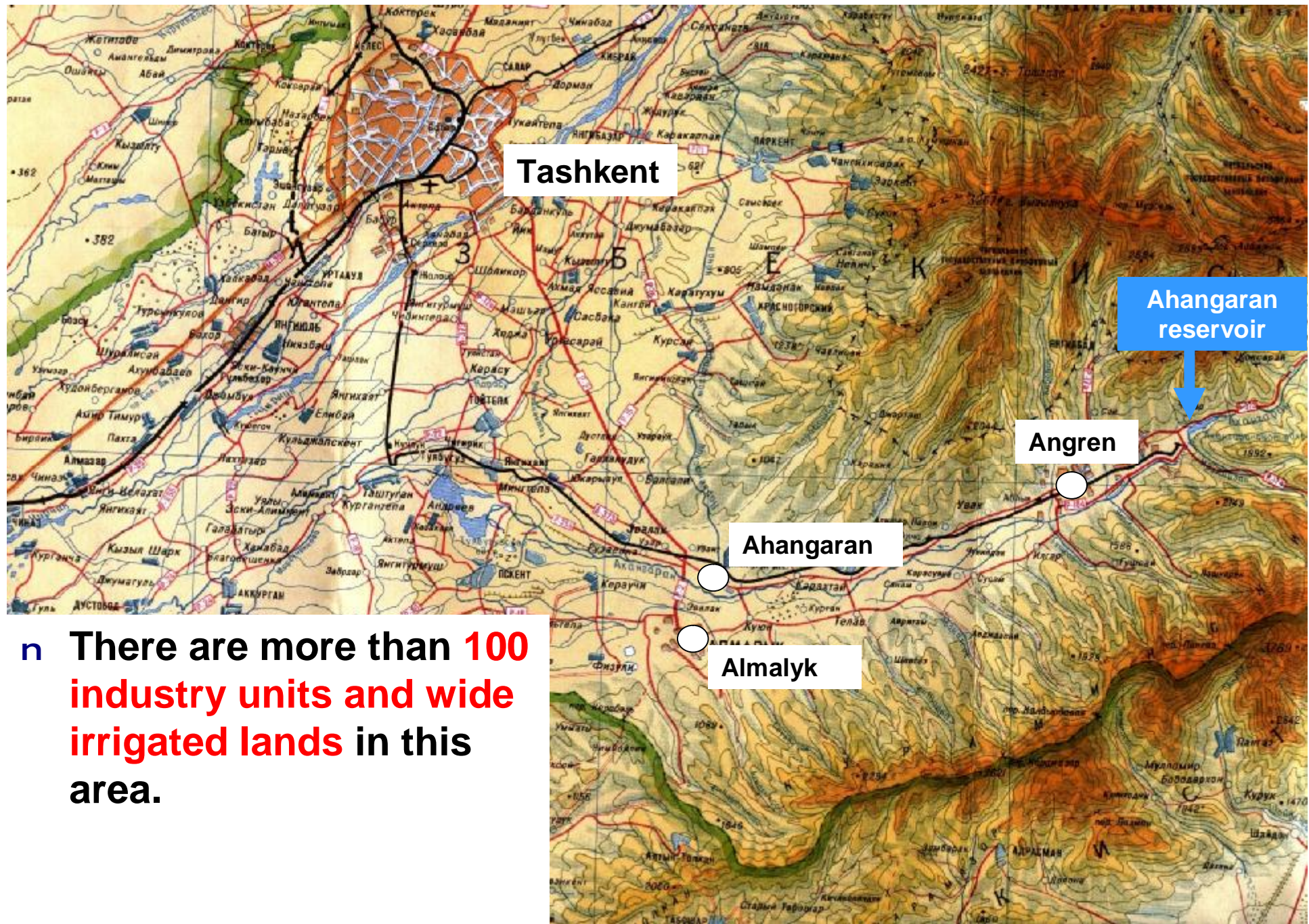
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Angren-Almalyk-Ahangaran factory-farm area of Uzbekistan

- n This area is located in the middle of the Ahangaran River intermountain valley.





n There are more than **100 industry units** and **wide irrigated lands** in this area.



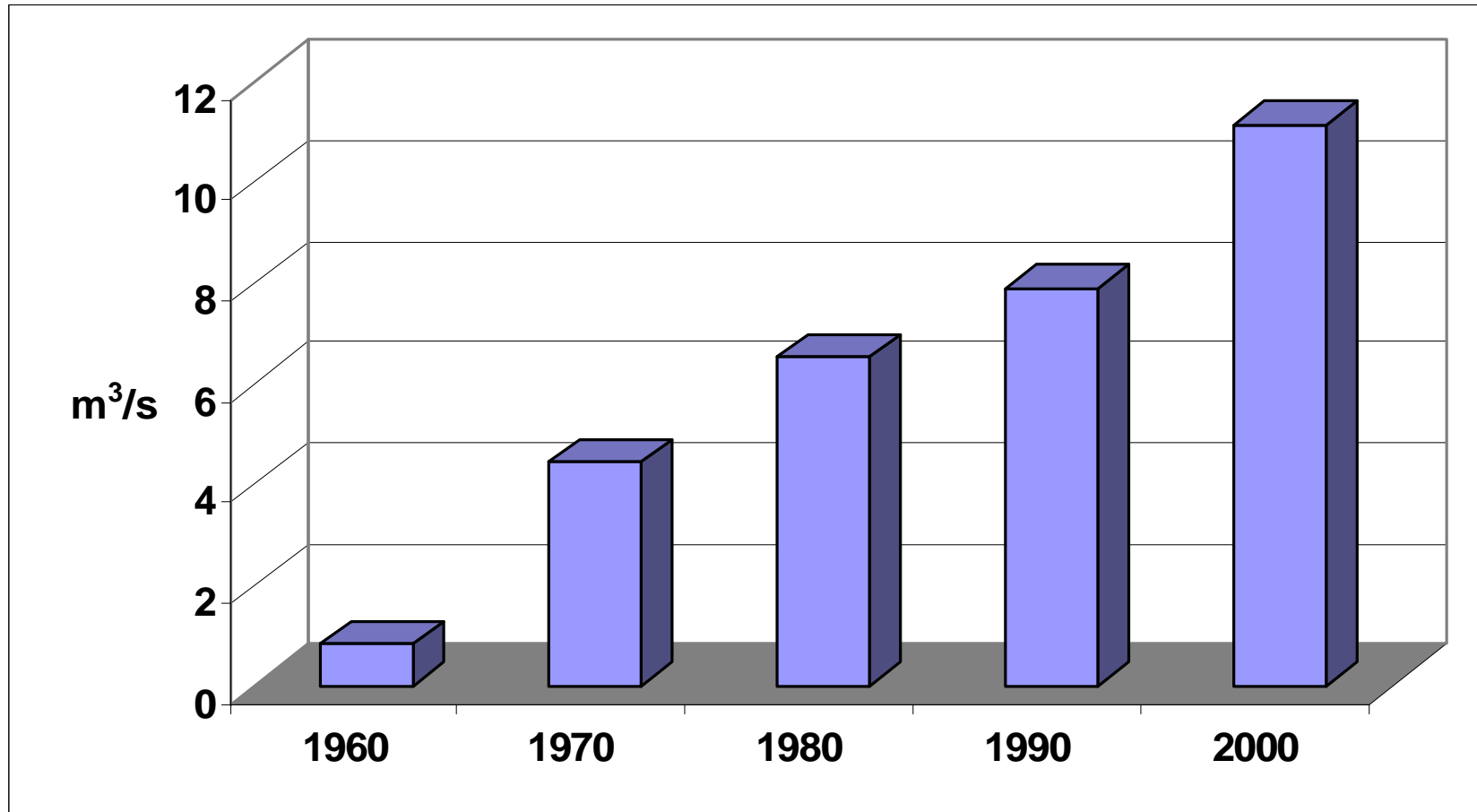
Reasons of the water resources problems in Ahangaran River's valley:

- n Nature shortage of water resources
- n Irregular runoff distribution in a year
- n Misallocation
- n Men-caused effects to the water resources



n Recently **annual average of ground water taking** in the factory-farm area amount to **91%** from water reserves.

Total values of annual average water consumption in AAA-factory-farm area



There is water supply deficit in the area...



It is proposed:

- n To use **surface water** for a farming
- n To use **ground water** for industrial and drinking water-supply



Main anthropogenic factors acting to water resources in AAA-area:

- n** Regulated run-off by Ahangaran reservoir
- n** Uneconomical operation of ground water intakes
- n** Discharge of industrial and domestic sewages to streams


There are hard changes in natural mechanism of surface and ground water forming in the area...



Drinking water quality of Ahangaran deposit of ground water has been deteriorated.

Reasons:

- n Fallout filtration through waste banks
- n Filtration loss of water in industrial processes
- n Water leak and filtration loss from collecting system
- n Discharges from water treating facilities
- n Stopping of sanitary outflow volume from Akhangaran reservoir to the valley
- n et cetera...

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- n Drinking water quality and quantity has been changed in the AAA-area
 - n Sustainable and safety water supply of the area has become essential task,

this is possible on the base of
embodiment of
Water Resource Monitoring

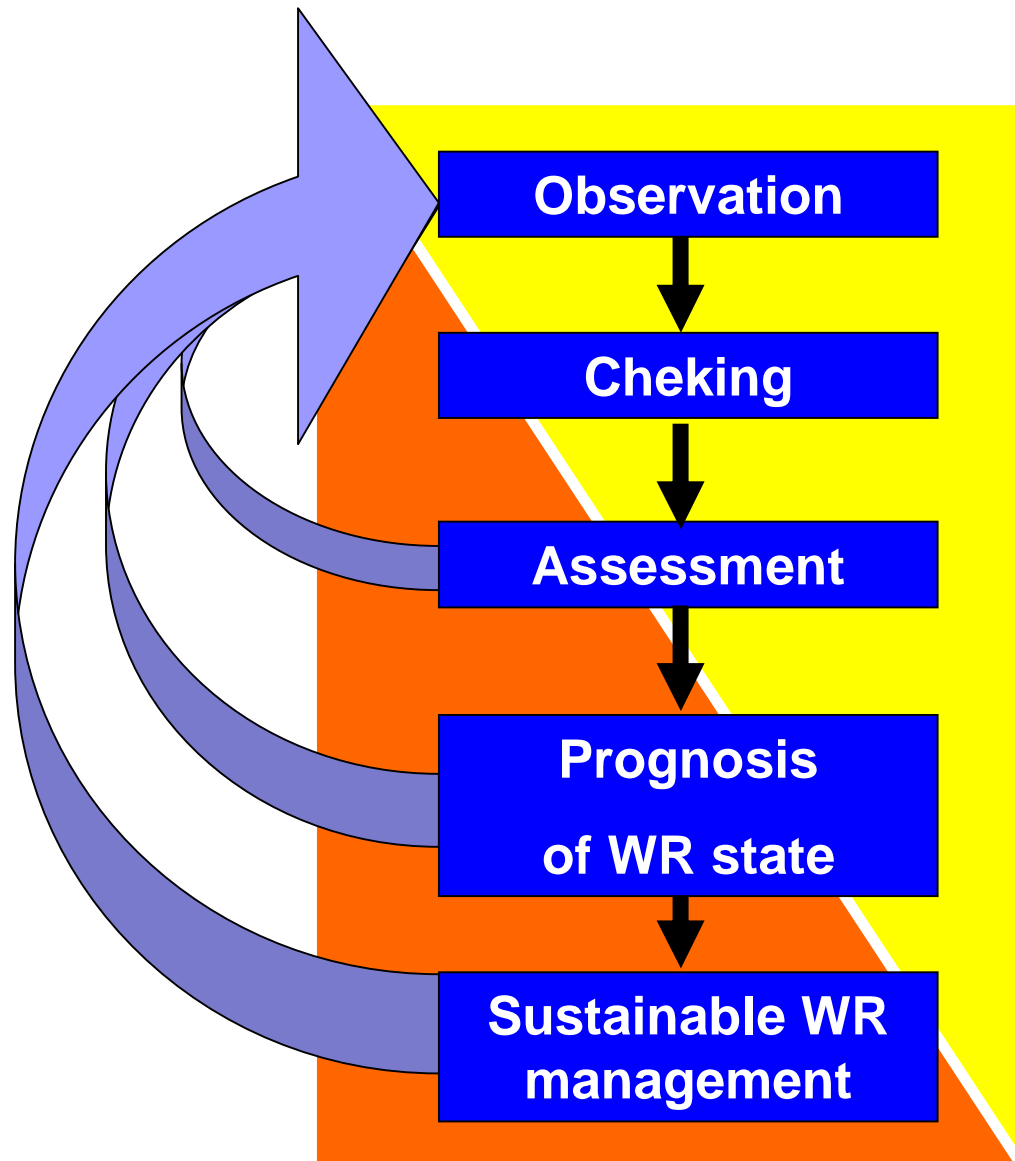


n New sources for filling the deficiency of available water storage have appeared.

It is - **return water** - filtration loss of water.

n Return water amount to **30-60% from total offtake.**


Water Resources Monitoring System:





Efficiency of the Water resources monitoring depends on:

- n Representativeness of the observation network
- n Complexity and multilevel structure of the monitoring system
- n Technical support of the monitoring system
- n Immediacy of analysis of information obtained from the monitoring network

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- n **Over 35** years Water Resources Laboratory of NUUz carry out water resource monitoring in Ahangaran River's valley.
 - n The monitoring network is situated in 8 group and 13 single water intakes, which are under impact of industrial plants of the area.

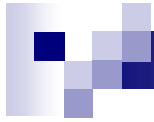
The Monitoring network consist of:

- n Observation holes – 84
 - n Operation holes – 120
 - n Hydrometric posts – 23
 - n Hydro chemical posts – 116
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- n Besides, 73 posts for ground water level observation are working.



Information from Water Resources Monitoring Network is aimed for:

- n Water resources conservation
- n Water resources protection
- n Calculation of available ground water storage
- n Ecological assessment of water resources
- n Water resources impact assessment
- n Developing of documentation for water use, permissible discharging...
- n Looking for secondary water resources, secondary water storage assessment
- n Prognosis of ground water level



Suggested the Water monitoring system has become **self-supporting** and **profitable**.




Management decisions made on base of monitoring information is aimed to:

- n Careful operation of water-intakes
- n Optimal ground water taking
- n Saving of drinking water
- n Improvement of ecological state of surface and ground water



Saving of drinking water is determined by:


- n Priority use water of good quality for drinking water supply
- n Use **secondary water** for industry needs
- n Use flood flow

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- n **Drainage water intakes** are developed in industrial areas with more polluted ground water.
 - n Working of drainage water intakes improves and stabilizes ground water quality.



Main criteria in operating of drainage water intake -

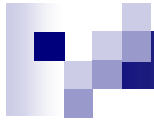
- n To provide of secondary water taking and debar of ground water taking.**



Cost efficiency of the Water Resources Monitoring is made by:

- n Using of secondary water taking from drainage water intakes for industrial water supply.**

Annual value of cost efficiency in 2003 was more than 200 000 US\$ (without environmental efficiency).



Many thanks for attention.