

# Iran and Turkmenistan:

## Lessons Learned from Transboundary Water Cooperation

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# A brief review of Iran Transboundary water resources

# Transboundary Waters between **Iran** and **other Neighbors**





## **Iran approaches for developing transboundary water cooperation**

- **Improvement of water usages efficiency upstream and downstream of transboundary basins**
- **Capacity building, information exchange between neighboring countries in transboundary basins**
- **Transboundary water management, lessons learned for prevention of waste waters**
- **Transboundary water disputes settlement with participation in common bi or multi lateral related commissions**
- **Water transfer between neighboring countries for decreasing effects of droughts or climate change in region**



## **Developing transboundary water cooperation between I.R.Iran and its neighbors**

- **Iran experience in dam construction and developing facilities and instruments of Iranian companies after Islamic revolution (since 1979)**
- **Skilful of Iranian companies for designing, execution, operation and management of water structures**
- **Development of making water equipments for neighboring countries**
- **Participation of Iranian engineering companies in water projects of neighboring and region countries such as dam construction, irrigation networks, water treatment and etc (Tajikistan, Afghanistan, Iraq, Sudan, Tanzania, ...)**
- **Iran's governmental encouragement and facilities for participation Iranian companies in neighboring countries of Iraq and Afghanistan with regards to the security condition of aforementioned countries**

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## Iran and Turkmenistan Transboundary Waters and Cooperations

- a) **The Atrak & Sombar River Basin**
- b) **The Harirud River Basin**



## Previous of legal frameworks

- **Old treaties with former Soviet Union**
  - 1- **Water Treaty on Aras and Atrak Rivers, 1921 and 1926 (Now Azerbaijan, Armenia and Turkmenistan)**
  - 2- **Water Treaty on Harirud (Tedgen) and 12 other rivers between Iran and former Soviet Union (Now: Turkmenistan)**

## Cooperation for Common water works and construction border dams

- 1- **Aras Dam and Mil-Moghan Dams have been constructed at 1970 and have been under operation since 1970 and official ceremony of 40th anniversary of Aras Dam construction and inauguration will be participated on 2012.**
- 2- **Dosti (Friendship) Dam construction and inauguration on 2005 by Iran and Turkmenisatn.**

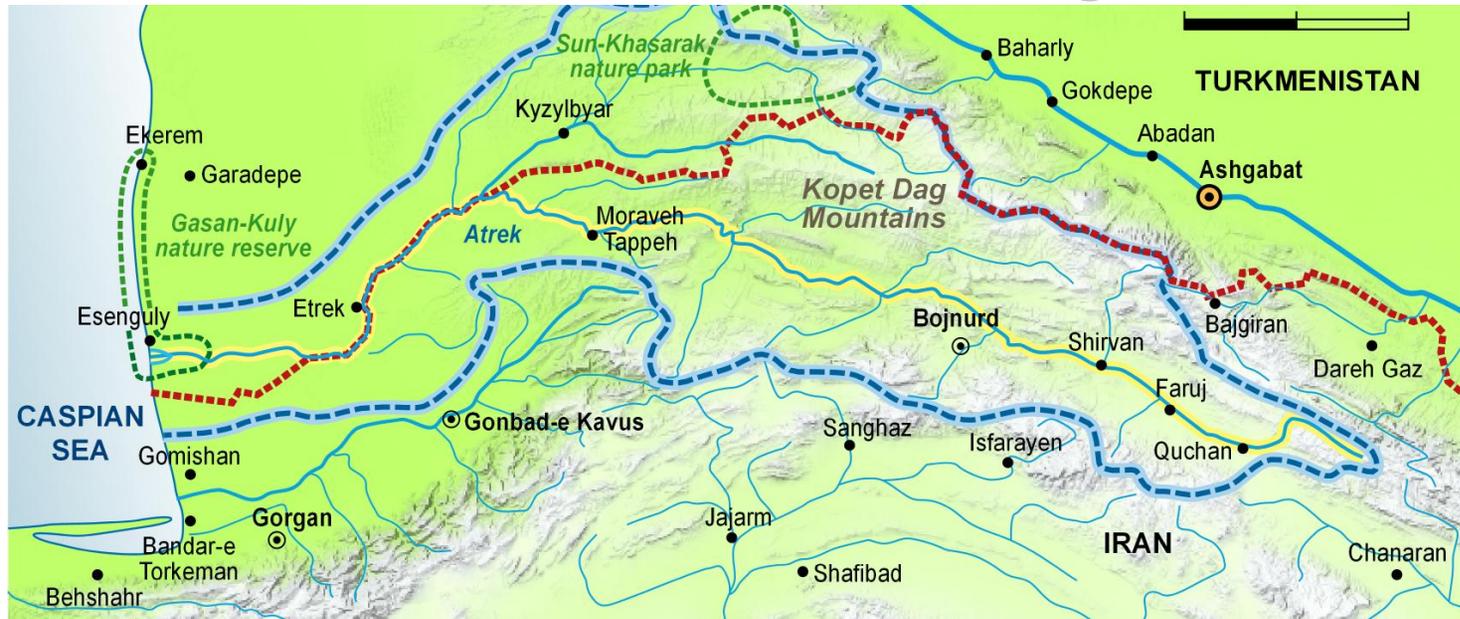


## The Caucasus and Central Asia





# Atrak Transboundary River

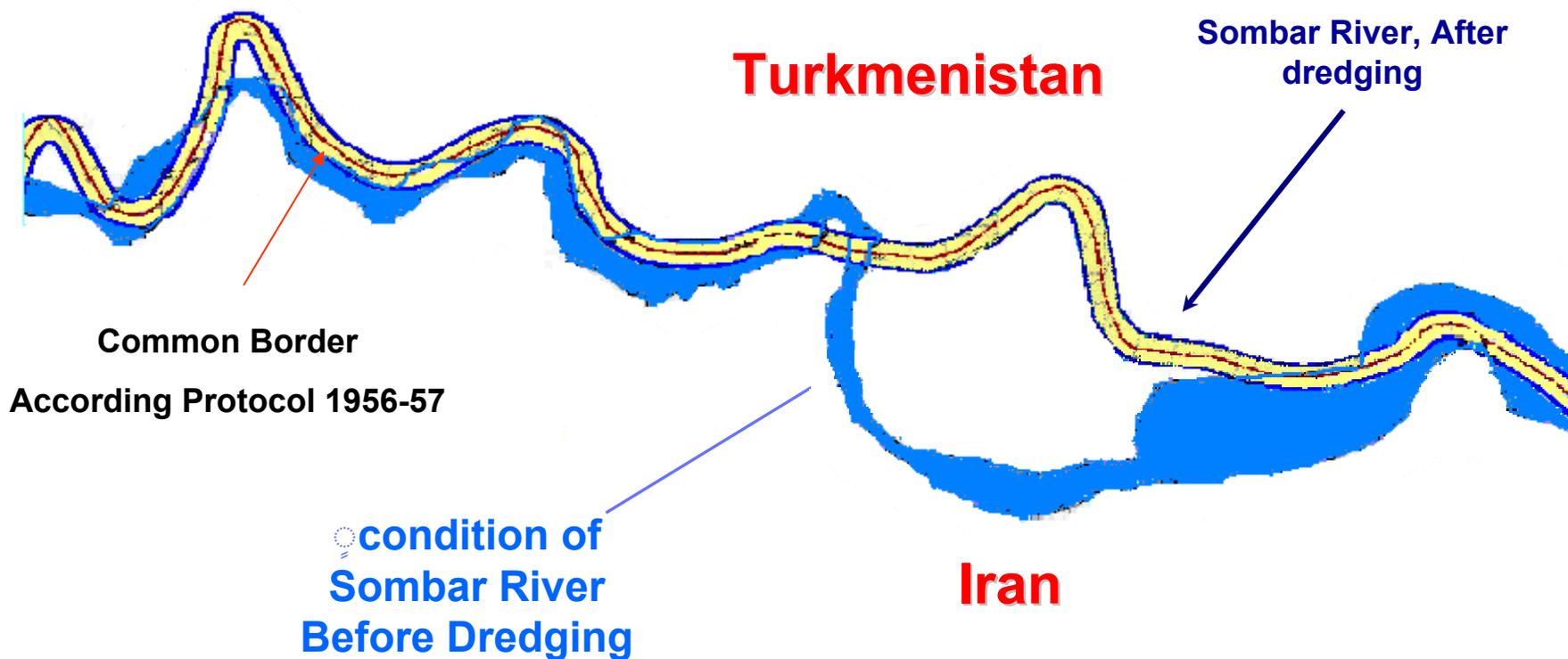


Map produced by UNEP/GRID-Arendal, August 2008

Country		Iran	Turkmenistan
Area (km <sup>2</sup> )		26000	6000
Area in Khorasan Provinces (km <sup>2</sup> )		18000	-
Golestan Province (km <sup>2</sup> )		8000	
Total (km <sup>2</sup> )		32000	
Province	Precipitation mm	Evaporation mm	Temperature (Mean Annual) C°
Khorasan (2)	300	1100	13
Golestan	255	2000	19



# Sombar River Basin



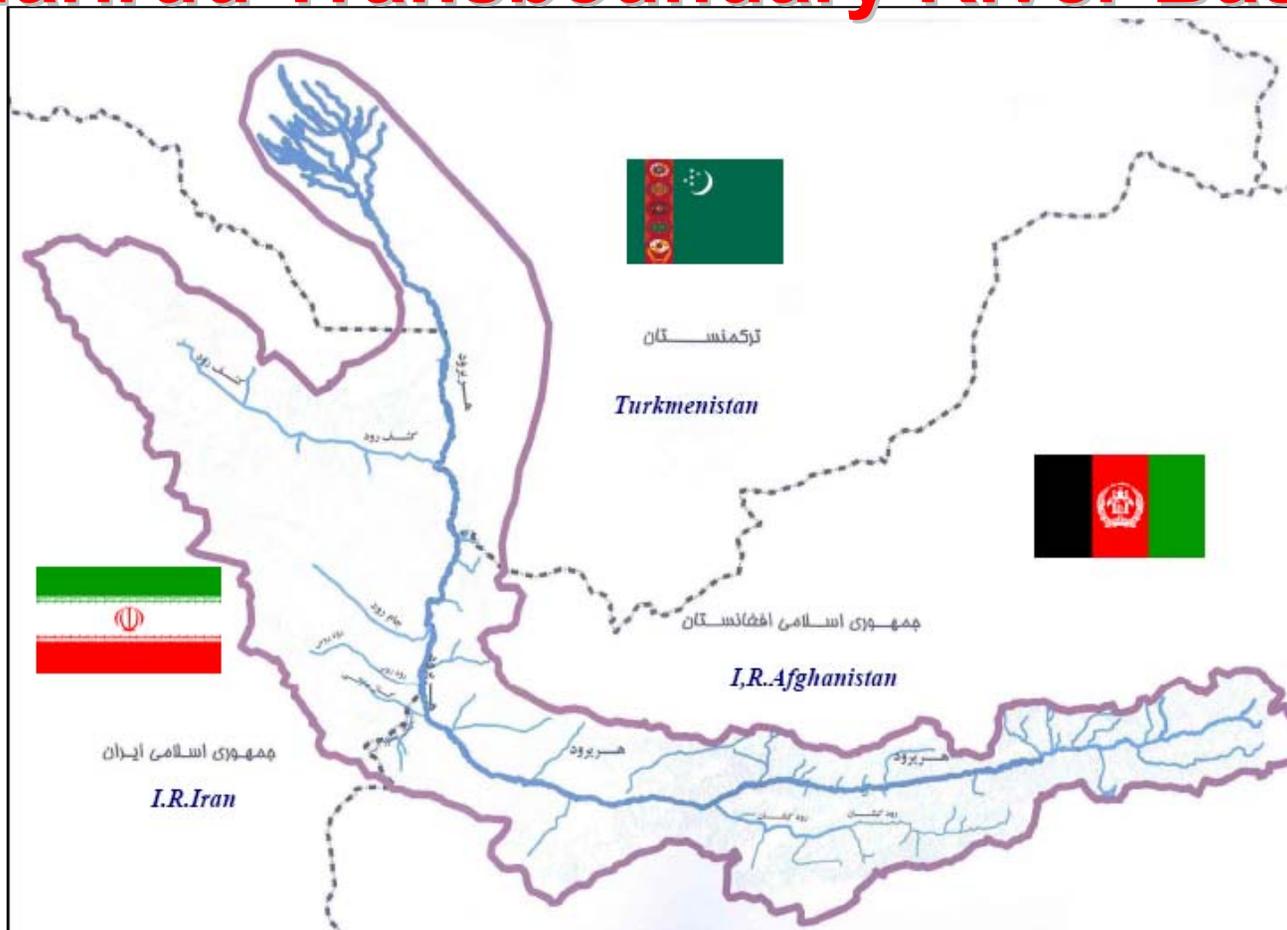
Country	Area %	Agriculture (Ha)		River length (Km)	Boundary River (Km)
		Existing	Future		
Iran	76	1200	2500	70	45 (26 + 19)
Turkmenistan	24	-	-		

# The Harirud River Basin

- a) **Doosti (Friendship) Dam**
- b) **Shirtappeh Diversion Dam**



# Harirud Transboundary River Basin



Country	Area (Km2)	Percent of total area
Afghanistan	49264	42
I.R.Iran	44573	38
Turkmenistan	23640	20
<b>Total</b>	<b>117297</b>	<b>100</b>



## **Harirud Transboundary River Basin**

### **b) Socio-economic, Political / economic problems of basin**

- More than 3 decades continuous wars in Afghanistan has been weaken the economy of this country and infrastructures has been disturbed severely in the country.
- After fall of Taliban, Afghanistan government began its developing programs in west Basins with international aids (World Bank and India government).
- Along the Harirud Transboundary River, a 547 MCM capacity dam, the Bandi Salma, has been planned near Cheshti Sharif district centre in Hirat province since 2006 which will be inaugurated 2012.
- During last decade, discharge of Harirud transboundary River to Iran and Turkmenistan has been decreased. The Harirud River is main resource for supplying water of downstream countries (Iran and Turkmenistan).



No bilateral or multilateral treaties have been signed on the Harirud and Murghab. The Harirud -Murghab Basin does, however, form part of the wider Amu Darya Basin, on which a number of regional frameworks have been established as outlined above. These frameworks do not cover the Harirud–Murghab River Basin directly. Iran has indicated readiness to cooperate bilaterally and trilaterally with Afghanistan and Turkmenistan. However, bilateral



## MAKING THE MOST OF AFGHANISTAN'S RIVER BASINS

Opportunities for Regional Cooperation

By Matthew King and Benjamin Sturtewagen

February 2010

  
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### MURGAB RIVER BASIN<sup>44</sup>

The basin of the 852-km long Murgab River is shared by Afghanistan and Turkmenistan. The river originates in Afghanistan at about 2,600 m a.s.l., and disappears into a desert sink in Kara Kum in Turkmenistan. The Abikajsar River is a major transboundary tributary. Other transboundary tributaries are the Gulrom, Khash and Kushan. The total basin area is approximately 46,880 km<sup>2</sup>.

The long-term mean discharge of the river in Turkmenistan is  $1,657 \times 10^6$  m<sup>3</sup>/year. In the part of the basin that is Afghanistan's territory, the run-off is  $1,480 \times 10^6$  m<sup>3</sup>/year.

Agriculture is the predominant water user in the Murgab Basin, feeding many irrigation channels. Some 80% of the population in the basin in Afghanistan live from agriculture. The bad conditions of the irrigation and water supply infrastructure are a problem in Afghanistan. The efficiency of irrigation networks is estimated to be from 25 to 30%. However, the country has started to rehabilitate its irrigation infrastructure.

An increase of organic pollution has been observed in the past few years.

### TEJEN/HARIRUD RIVER BASIN<sup>45</sup>

Afghanistan, the Islamic Republic of Iran, and Turkmenistan share the basin of the 1,124-km long Tejen/Harirud<sup>46</sup> River. The river originates in the high mountains in Afghanistan. The Karukh is a major transboundary tributary.

Basin of the Harirud/Tejen River

Country	Area in the country (km <sup>2</sup> )	Country's share %
Afghanistan	39 300	39.5
Iran	49 264	43.7
Turkmenistan	23 640	20.9
<b>Total</b>	<b>112 204</b>	

Sources: Ministry of Nature Protection of Turkmenistan, Ministry of Energy and Water of Afghanistan, Ministry of Energy (Water and Electricity) of the Islamic Republic of Iran, East West Institute (Making the most of Afghanistan's River Basins opportunities for more cooperation, 2010).

Name	Country to which the information refers (country also sharing the aquifer)	Area (km <sup>2</sup> )	Mean thickness (m)	Max thickness (m)	Dominant flow direction	Link with surface water
Karat aquifer (no. 34)	Islamic Republic of Iran (Afghanistan)	350	65	N/A	towards Afghanistan	medium
Taybad aquifer (No. 35)	Islamic Republic of Iran (Afghanistan)	896	60	250	towards Afghanistan	medium
Torbat-e-jam aquifer (No. 36)	Islamic Republic of Iran (Afghanistan)	2 142	65	300	towards Afghanistan	weak
Janatabad aquifer (No. 37)	Islamic Republic of Iran (Afghanistan, Turkmenistan)	350	35	N/A	towards Afghanistan, Turkmenistan	medium
Aghdarband aquifer (No. 38)	Islamic Republic of Iran (Turkmenistan)	100	30	N/A	towards Turkmenistan	weak
Sarakhas aquifer (No. 39) <sup>a</sup>	Islamic Republic of Iran (Turkmenistan)	710	45	130	towards Turkmenistan	strong

Notes: All the aquifers in the table are of Type 3, alluvial and Quaternary in age. In the Islamic Republic of Iran, in the Karat, Taybad, Torbat-e-jam, Janatabad and Aghdarband aquifers there is an extreme water deficit and water withdrawal from the aquifers is forbidden. Groundwater supports ecosystems and agriculture, maintains base flow and springs, and prevents land subsidence.

<sup>a</sup> According to a water balance study in the Islamic Republic of Iran, the Sarakhas aquifer is estimated to recharge by about  $110 \times 10^6$  m<sup>3</sup>/year, mostly from the Tejen/Harirud River. Source: Islamic Republic of Iran.

<sup>44</sup> Based on information provided by Afghanistan and on the First Assessment.

<sup>45</sup> Based on information provided by the Islamic Republic of Iran and the First Assessment.

<sup>46</sup> The river is called Harirud in Iran and Tejen in Turkmenistan. It is also known as the Tedshen and the Gerirud.

<sup>47</sup> According to a water balance study in the Islamic Republic of Iran.

### Hydrology and hydrogeology

In the Iranian part of the basin, surface water resources for the whole basin are estimated at  $535 \times 10^6$  m<sup>3</sup>/year (average for the years 1950 to 2007), and groundwater resources at  $2,547 \times 10^6$  m<sup>3</sup>/year. These represent 874 m<sup>3</sup>/year/capita. There is no permanent flow in the river, only seasonal.

Only the Sarakhs sub-basin in the border area has been studied; the rest of the basin is considered to have low transboundary groundwater potential (impermeable formations). Karstic aquifers may have some potential, but would need to be studied.

In Iran, in the Karat, Taybad, Torbat-e-jam, Janatabad and Aghdarband aquifers there is an extreme water deficit and water withdrawal from the aquifers is forbidden.

### Pressures and status

The Tejen/Harirud River is important to Afghanistan, not only because of its economic significance in Herat Province, but also due to its political importance as the border between Afghanistan and the Islamic Republic of Iran. In the Islamic Republic of Iran, the river is important for regional development in all sectors, and is vital for supplying water to the eastern part of Khorasan Razavi Province.

The total irrigable land area in Afghanistan's part of the basin is 100,000 ha, but, due to the limited water availability, only 40,000 ha is being irrigated. Irrigated cropland (both by surface waters and groundwaters) makes up 292,920 ha in the Islamic Republic of Iran, representing 20% of the country's share of the basin. Irrigation return waters affect water quality.

In Afghanistan, about 90% of the irrigation systems are traditional, and the irrigation network's efficiency is estimated at 25-30%. At the same time, insufficiency of water for irrigation is experienced both in Afghanistan and the Islamic Republic of Iran. The Shirtappeh diversion dam between Iran and Turkmenistan is under construction to supply water to agricultural areas around Sarakhs in both countries.

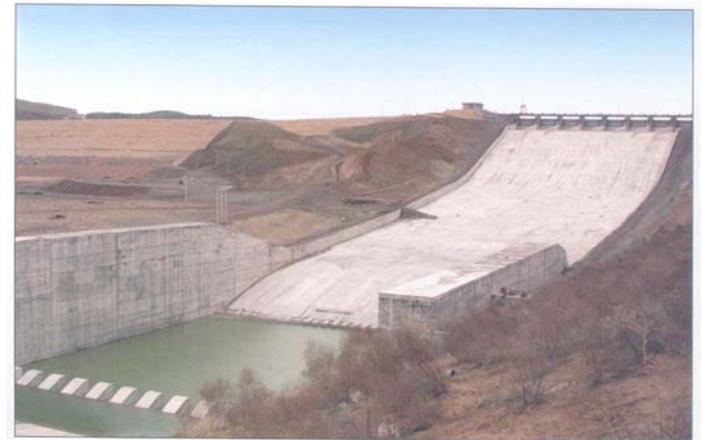
Water scarcity also affects forests.



## Harirud/Tedjen River Basin

# Doosti (Friendship) Dam

- As historical role of Harirud Transboundary River for supplying water needs of Iran and Russia (Former Soviet Union), the first agreement on Harirud River development signed in 1921 between Iran and Soviet Union.
- After establishing newly states in Central Asia, according to protocol of 1921 and 1926 and also protocol 1989 between Iran and USSR, Iran and Turkmenistan decided to construct a common dam.
- Reservoir of Dosti (Friendship) Dam impounded in 2004 and dam was inaugurated in 2005.





## Memorial of official inauguration ceremony of Dosti (Friendship) Dam (2005/04/12) over crest of dam

سَدِ نَخْرَنِي دوستي که نما د بهکاري و روابط دوستانه دو ملت جمهوري اسلامي ايران و ترکمنستان است در ساينه تلاش کارشناسان و کارگران دو طرف در ۲۳ فروردين ۱۳۸۴ (۱۲ آوريل ۲۰۰۵) توسط رؤساي جمهور دو کشور جناب آقای سيد محمد خاتمي و جناب آقای صفر مراد ترکمنباشي به بهره برداري رسيد

وزارت نيزي جمهوري اسلامي ايران  
وزارت آب ترکمنستان

"DOSTLUK" SUW HOWDANY BENDI TÜRKMENISTANYŇ WE EYRAN YSLAM RESPUBLIKASYNYŇ AÇYK GÖWÖNLI HYZMATDASLYGYNYŇ WE DOSTLUKLY GATNAŞYKLARYNYŇ NYSANY HÖKÖMÖNDE İKİ DOĞANLYK HALKYŇ HÖNÄRMEŇLERININ WE İŞÇILERININ AGZYDİR, TUTANVERLI ÇEKEN ZÄHMETLERININ NETJESINDE 2005-ıjı YLYŇŇ GURBANSOLTAN AYYNYŇ 12-ne (1384 YLYŇŇ FARWARDIN AYYNYŇ 23-ne) İKİ YÜRÜDÜŇ PREZIDENTLERI:

ONUŇ ALYHEZRETI HORMATLY BEYIK SAPARMYRAT TÜRKMENBASY  
ONUŇ ALYHEZRETI HORMATLY SEYITMUBAMMET HATAMI

TARAPYNDAN DABARALY AÇYLDY WE ULANVLMAGA BERILDI.

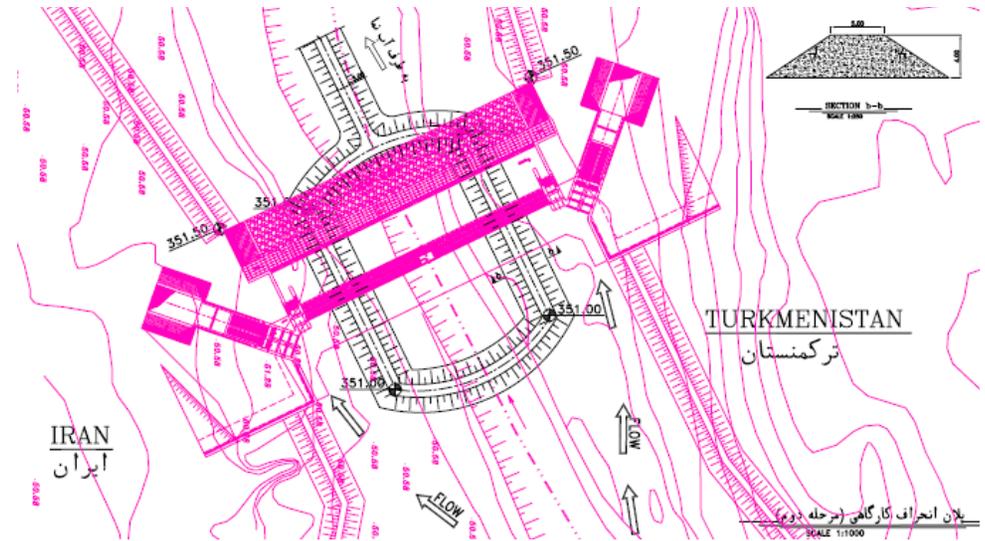
Türkmenistanyň Suw hojalyk ministrligi  
Eýran Yslam Respublikasynyň Energetika ministrligi



## Harirud/Tejen River Basin

### Shirtappéh Diversion Dam

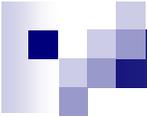
- It will divert Harirud/Tejen flows in two canals for irrigation usages both side of river.
- Iran and Turkmenistan have a joint committee which investigate any technical or legal problem during construction of dam. Duties of Joint committee will develop to operational activities in future by an agreed framework.
- The diversion dam and its networks will be finished early months of 2012.





# Lessons learned

- **Iran and Turkmenistan have developed their cooperation with long discussions based on previous agreements between Iran and USSR.**
- **Two countries have developed their legal frameworks in a joint management and operation committee for Dosti (Friendship) Dam in which process of water distribution from the reservoir, environmental flow of Harirud (Tejen) River and making a new diversion dam downstream for agricultural usages is being managed in the committee.**
- **Two countries have financed the project equally and will shared the benefits equally by their common joint management committee.**
- **Also two countries have used of international experiences for more advantages and prevention of new challenges.**



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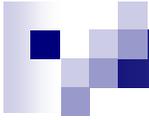
# Challenges



# Challenges

**There are Following challenges in Harirud Transboundary Basin:**

- **Lack of any legal framework and agreement for Harirud Transboundry Basin between Iran, Afghanistan and Turkmenistan**
- **Upstream development water works and irrigation networks and farms and its effects on downstream countries**
- **Using old cultivation and irrigation system upstream with low water efficiency**
- **Deficiency of water in Iran (Mashad) and Turkmenistan specially in Sarakhs both sides of Harirud River Basin**



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# Conclusions



# From **Potential Conflict** to **Co-operation Potential**



**Water for Peace**

a contribution to

## **World Water Assessment Programme**





## Conclusions

- + **Integrated Studying on Harirud Transboundary River Basin with Cooperation of riparian countries is required.**
- + **Strengthening Regional coordination of Riparian countries (Iran, Afghanistan and Turkmenistan) between related legal and Technical Organizations for Integrated Management of Harirud Transboundary Basin is necessary.**
- + **Compiling legal regime of Harirud Transboundary River Basin for riparian countries for any sustainable development is necessary.**



## Conclusions

- + Among legal regime for Harirud transboundary basin, other actions in the basin are proposed as following:
  - Capacity building;
  - Sustainable development of water supply infrastructures,
  - Increasing water use efficiency;
  - Benefit sharing among stakeholders;
  - International customary laws for equitable water use;
  - Creation of database for information exchange;
  - Organization of seminars and training workshops



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***Thank you***