Workshop on
Transboundary Water Resources Management in Central Asia
Almay, Kazakhstan 13-15 October 2010

1- International Transboundary Waters conditions

2- Climate Changes and Environmental damages of Water Resources

3- A brief review of Iran Climate and Transboundary Water Resources

3-1 The Central Asia Rivers Basins

3-2 The Atrak & Sombar River Basin

3-3 The Harirud River Basin

4- Existing capacities and international organizations for developing cooperation In transboundary Water Resources

5- suggestions
International transboundary waters conditions
Water Stress per International River Basin

<table>
<thead>
<tr>
<th>Continent</th>
<th>Numbers of Trb-basins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>57</td>
</tr>
<tr>
<td>North And Central America</td>
<td>34</td>
</tr>
<tr>
<td>South America</td>
<td>36</td>
</tr>
<tr>
<td>Asia</td>
<td>40</td>
</tr>
<tr>
<td>Europe</td>
<td>48</td>
</tr>
</tbody>
</table>

Data sources: Runoff- Fekete et al. (2000); Population- Dobson et al. (2000); Water stress by basin- Fiske and Yaffe (2001).
Climate Change and Environmental Damages of Water Resources
2010 World Summer Temperature
Pakistan Floods
Changes in Kara-Bogaz-Gol – a lagoon of the Caspian sea, Turkmenistan

Caspian Sea is the largest inland body of water in the world

- 1988: KBG is the large shallow lagoon of the Caspian sea
- 2000: Caspian Sea levels are higher than 1978 levels and water flows freely into salty waters of KBG
Death of the world’s fourth largest inland sea: Aral Sea, Kazakhstan

- 1973: The surface of the sea once measured 66,100 km²
- 1987: 60% of the volume had been lost
- 1999-2004: The sea is now quarter of the size it was 50 years ago
Alarming drop in Lake Balkhash’s water level, Kazakhstan

Images show alarming drop in lake’s water levels

- 1975-1979: Excessive use and waste of lake water are causes of the drop
- 2001: Smaller neighbouring lakes appear to be drying up
Changes in water levels on Lake Hamoun, Iran

- 1976: The amount of water in the lake is relatively high
- 1999-2001: The lake dried up and disappeared
A brief review of Iran climate and Transboundary water resources
<table>
<thead>
<tr>
<th>Major basins map</th>
<th>Precipitation map</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Map of major basins" /></td>
<td><img src="image" alt="Map of precipitation" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaporation map</th>
<th>Climate map</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Evaporation map" /></td>
<td><img src="image" alt="Climate map" /></td>
</tr>
<tr>
<td>Basin</td>
<td>Total area (km²)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Persian Gulf and Gulf of Oman Sea</td>
<td>424 209</td>
</tr>
<tr>
<td>Orumie Lake</td>
<td>51 801</td>
</tr>
<tr>
<td><strong>Caspian Sea</strong></td>
<td></td>
</tr>
<tr>
<td>Caspian Sea</td>
<td>175 051</td>
</tr>
<tr>
<td>Hamoun Lake</td>
<td>103 169</td>
</tr>
<tr>
<td>Central Plateau</td>
<td>824 356</td>
</tr>
<tr>
<td><strong>Kara kum</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1 622 751</td>
</tr>
</tbody>
</table>
Transboundary Waters between Iran and other Neighbors

- Afghanistan
- Turkmenistan
- Azerbaijan
- Armenia
- Turkey
- Syria
- Iraq
- Caspian Sea
- Atrak
- Harirud
- Piranshahr
- Hirmand (Helmand)
- Persian Gulf
The Central Asia Rivers Basins
Five countries border the Caspian sea and each have their own agendas regarding the politics in the region.
## Average water generation and use in The Amu Darya River Basin

<table>
<thead>
<tr>
<th>country</th>
<th>Contribution to The Amu Darya (BCM/Yr)</th>
<th>Percent of total</th>
<th>Water Allocation (BCM)</th>
<th>Percent of Total used</th>
<th>Irrigated land (Million Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>24</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>1.2</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>49</td>
<td>61</td>
<td>9.5</td>
<td>15.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>4.8</td>
<td>6</td>
<td>29.6</td>
<td>48.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>0.82</td>
<td>1</td>
<td>22</td>
<td>35.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>1.6</td>
<td>2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Iran and Tajikistan cooperation in Water resources

- Tajikistan has very good capacities for developing water and Hydropower plans in Central Asia.

- Iran and Tajikistan has good relation, because of their similar culture and language and customs.

- Iran is building Sang Todeh-2 Dam in Tajikistan.

- Iranian Ministry of Energy has capacity for participation related water and power training courses in PWUT (power and water University of Technology).

- Iran is also ready to cooperate in Studying of Integrated Water Resources Management (IWRM), Integrated Flood Management (IFM) and other required studying in Central Asia, specially with Tajikistan Afghanistan and Turkmenistan.
The Atrak & Sombar River Basin
✓ Atrak River Basin is located at north east of Iran in three provinces (Khorasan Razavi, North Khorasan and Golestan) and continues to Chat, border point of Iran and Turkmenistan, to the north of Golestan Province.

✓ Some parts of Atrak River Basin is located in Turkmenistan and its important tributary in Turkmenistan is Sombar River which forms Iran and Turkmenistan Border in North Khorasan Province.

✓ Atrak River of Turkmenistan joints with Iran inter Atrak River in Chat and forms Atrak Boundary River and continues as border of two countries about 80 Km. Then river changes its way from Dashli Broon to Turkmenistan and discharges to Caspian Sea in Flooded water years.
Atrak River Basin in North East of Iran has dry climate (Khorasan Provinces), But in Golestan Province, it has semi dry climate.

The precipitation in the basin changes from 180-300 mm in Incheh Broon (border of Iran and Turkmenistan) to Maraveh Tappeh (north of Golestan Province).

the other parts of Golestan Province have more precipitations in comparison to Atrak River Basin.

The land fertility of Atrak Basin has good quality and the farmer’s productions show it during wet water year, but unfortunately because of unsuitable precipitation pattern in the basin and lack of any other water resources, most part of basin consist of dessert climate.
Because of geology condition of region and considerable thickness of loose sediments (more than 300 m) and unsuitable hydrodynamic coefficients, attempts for accessing to ground water resources have not been successful.

Just now 1.5 MCM water is withdrawal from less than 100 wells and Golestan responsible are trying to supply their water requirement for urban and rural usages from other basins in south of province and also other neighbors province (i.e. Semnan Province).
## Atrak Basin Area characteristics

<table>
<thead>
<tr>
<th>Country</th>
<th>Iran</th>
<th>Turkmenistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (km²)</td>
<td>26000</td>
<td>6000</td>
</tr>
<tr>
<td>Area in Khorasan Provinces (km²)</td>
<td>18000</td>
<td>-</td>
</tr>
<tr>
<td>Golestan Province (km²)</td>
<td>8000</td>
<td></td>
</tr>
<tr>
<td>Total (km²)</td>
<td></td>
<td>32000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Province</th>
<th>Precipitation mm</th>
<th>Evaporation mm</th>
<th>Temperature (Mean Annual) °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khorasan (2)</td>
<td>300</td>
<td>1100</td>
<td>13</td>
</tr>
<tr>
<td>Golestan</td>
<td>255</td>
<td>2000</td>
<td>19</td>
</tr>
</tbody>
</table>
Atrak Boundary River, River Training and Dredging Plans

- One of the most important problems in rivers which their Talwegs are boundaries of two or more countries, is changing bed river as a result of floods.

- Talweg of Atrak Boundary River, as boundary River of Iran and Turkmenistan, has been changed by floods in past decades and the banks of river in both side (Iran and Turkmenistan) has damaged and eroded in past decades.

- In 2008, two countries started their communications for River Training according to Boundary Protocols of 1954, 1955, and 1957 with USSR (which are valid and accepted by new independent states in Central Asia and Caucasus region).
Two countries prepared their River Dredging plans and exchanged it for technical and legal investigations by both countries related organizations.

After confirmation of River Training and Dredging plans, both countries started their implementations by regulation and control of border guards in 2008.

Atrak River Dredging phase 1 finished at 2009 and two countries have started their new communications for continuing river dredging in other phases since 2009.
Sombar Boundary River, 
River Training and Dredging Plans

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- Talweg of Sombar Boundary River, as boundary River of Iran and Turkmenistan, has been changed by floods in past decades and the banks of river in both side (Iran and Turkmenistan) has damaged and eroded in past decades.
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Sombar Boundary River, 
River Training and Dredging Plans

- Two countries prepared their River Training and Dredging plans and exchange it for technical and legal investigations by both countries related organizations.
- After confirmation of River Training and Dredging plans, both countries started their implementations by regulation and control of border guards in 2008.
- Sombar River Dredging finished at 2009 and two countries have started their flood protection plans since 2009.
### Condition of Sombar River Before Dredging

<table>
<thead>
<tr>
<th>Country</th>
<th>Area %</th>
<th>Agriculture (Ha)</th>
<th>River length (Km)</th>
<th>Boundary River (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>76</td>
<td>1200</td>
<td>70</td>
<td>45 (26 + 19)</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
The Harirud River Basin

a) A brief review of basin
b) Socio-economic, Political / economic problems of basin
<table>
<thead>
<tr>
<th>Country</th>
<th>Area (Km2)</th>
<th>Percent of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>49264</td>
<td>42</td>
</tr>
<tr>
<td>I.R.Iran</td>
<td>44573</td>
<td>38</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>23640</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117297</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
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. 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.
The Harirud-Murghab River Basin

The Harirud-Murghab River Basin represents approximately 12 percent of Afghanistan’s water resources and is centered on the intensely irrigated area of Herat. It rises in the central Hazarajat and flows west through northeast Iran before exhausting itself in Turkmenistan. The Murghab River rises in the Paropamissus range, which separates it from the Harirud Basin, and flows north into Turkmenistan. The Harirud originates in the Koh-I-Baba Mountains and flows west, forming the border with Iran and later between Iran and Turkmenistan before ending in the Qaraqum Desert in Turkmenistan. The Murghab flows from Afghanistan directly into the Qaraqum desert in Turkmenistan. The Western Harirud and Murghab basins form part of the wider Amu Darya Basin.

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.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>41000</td>
<td>1290000</td>
<td>32</td>
</tr>
<tr>
<td>Iran</td>
<td>35500</td>
<td>3410000</td>
<td>96</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>16100</td>
<td>168000</td>
<td>10</td>
</tr>
</tbody>
</table>
Characteristics of Salma Dam

a) Generation of Hydro Power with an installed capacity of 3x14 MW

b) Stabilizing the existing irrigation facility to the extent of 15,000 hectares

c) Development of additional irrigation facility to the extent of 25,000 hectares

d) Present scope of work covers the generation of Hydro Power to the extent of 42 MW only and is being implemented under the Government of India, Assistance Programme in Afghanistan.
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 independency and establishing new states in Central Asia, according to protocol of 1921 and 1926 between Iran and Russia and also protocol 1989 between Iran and USSR, Iran and Turkmenistan decided to construct a common dam named Dosti (Friendship).

- Reservoir impounded in 2004 and finally Dosti Dam inaugurated in 2005.
a) **Formulation:** Programming for an international training course with invitation of related organization of riparian countries responsible such as water resources, environment, agriculture, socio economy and international law related experts by experienced international teachers with suitable subjects and materials.

b) **Description – data, information:** Introducing a brief review of transboundary river basins of the world and Presenting successful transboundary river basin management organization such as NBI (Nile Basin Initiative), ICPDR (International Commission for the Protection of the Danube River), Integrated and Sustainable Management of Transboundary Water Resources in the Amazon River Basin, including benefits of above organizations and their problems.

C) **Analysis:** By participating discussion sessions in workshop, all of participants and experts of riparian countries could explain their opinions and ideas by presenting their country reports which will be summarized in final report of workshop.
Existing capacities and international organizations for developing cooperation in Transboundary Water Resources
Sustainable socio-economic development for people of the region
Suggestions
**Integrated Climate Changes Studying Effects in Water Resources of Central Asia specially in Transboundary Water Resources**

**Integrated Water Resources Management (IWRM) Studying in Central Asia and its Transboundary River Basin with Cooperation of International Organization (UNECE, UNEP, EWI, ECO, ...)**

**Strengthening Regional coordination of Central Asia Transboundary Rivers Riparian countries and their Related Governmental and non-Governmental Organizations**
Integrated Studying on Harirud Transboundary River Basin with Cooperation of International Organization (UNECE, UNEP, EWI, ECO, …)

Strengthening Regional coordination of Riparian countries (Iran, Afghanistan and Turkmenistan) Related Governmental and non-Governmental Organizations in Integrated Management of Harirud Transboundary Basin

Compiling legal regime of Harirud Transboundary River Basin for riparian countries with cooperation of International organizations
Samuel Langhorne Clemens (November 30, 1835 – April 21, 1910), better known by his pen name Mark Twain, was an American humorist, novelist, writer, and lecturer. According to his experiences in Mississippi River, he says:

**Whiskey is for drinking.**

**Water is for fighting over.**
But What we need is, changing our idea and approaches:

From Potential Conflict
to Co-operation Potential

\[PC \rightarrow CP\]

Water for Peace

a contribution to

World Water Assessment Programme
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CAREC

UNECE Secretariat

Francesca Bernardini
Annukka Liponnen