Water resources management and challenges in the Haihe River Basin with the climate change

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1 Basic information of the basin

Haihe basin is located in the north of China with 320,000 km² of the total areas, which is the cultural and economic center of China.
1 Basic information of the basin

8 provinces and municipalities are involved, including capital Beijing, Tianjin etc.
1 Basic information of the basin

In 2008
Population: 137 M
urbanization rate: 45%
GDP: 3540 B Yuan
Farmland: 10M ha
Food production: 52M t
Change of precipitation in China from 1956 to 2000

Annual precipitation: 535 mm
Precipitation decreased by 11% comparing 1956-1979 to 1980-2000 in Haihe river basin

1 Basic information of the basin

According to China’s National Assessment Report on CC, 2007
1 Basic information of the basin

Annual runoff change (comparing 1980-2000 to 1956-1979)

- Remarkable surface runoff decreasing in the Haihe river is about 40%, from 21.6 B m³ to 13.6 B m³.

China’s National Assessment Report on CC, 2007
2 Main problems

- Flood
- Drought
- Eco-environment
- Climate Change
- Human Activity
- Socioeconomic development

5 water security problems
2 Main problems

(1) Water shortage

Overexploitation groundwater and transferring water from other basin.

Water availability per capita in 7 basins (m³)

<table>
<thead>
<tr>
<th>River</th>
<th>Water Availability (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Song River</td>
<td>2333</td>
</tr>
<tr>
<td>Liao River</td>
<td>909</td>
</tr>
<tr>
<td>Haihe River</td>
<td>272</td>
</tr>
<tr>
<td>Yellow River</td>
<td>647</td>
</tr>
<tr>
<td>Huai River</td>
<td>457</td>
</tr>
<tr>
<td>Yangzi River</td>
<td>3191</td>
</tr>
<tr>
<td>Pear River</td>
<td>2200</td>
</tr>
<tr>
<td>Average in China</td>
<td>2200</td>
</tr>
</tbody>
</table>
5 Main problems

(2) Low water use efficiency
Irrigation water use co-efficiency is only 0.55.
2 Main problems

(3) Water pollution

The total sewage is 4.8 B tons, the rate of treatment is only 55%.
2 Main problems

(4) Ecological system degradation

Water flowing into the sea decreases, estuary eco-system deteriorates (100 million m³)

Groundwater levels descending leads to subsidence, salinity intrusion etc.

Wetlands diminished by 80% from 1950 to 2000

Lakes drying up

Rivers drying up
3 Management responsibilities and outcomes

The responsibilities of the basin commission are:

to carry out integrated water resources management and supervision under MWR, such as

- River basin planning;
- Water allocation;
- Water pollution prevention;
- Soil erosion protection;
- Flood control;
- Management of construction projects financed by central government, Etc.
Outcomes of Water engineering construction

Dikes, reservoirs, irrigation and drainage systems constructed.
3 Management responsibilities and outcomes

Outcomes of water plans:

“Water Master Plan of Haihe River Basin”

“Flood Control Plan of Haihe River Basin”

“Integrated Plan of Water Resources in Haihe River Basin”

“Pollution Protection and Control Plan in Haihe River Basin”

“Integrated Plan of Estuary of Haihe River Basin”

Etc.
4 Challenges and measures

Social and economic development
The balance between demand and supply should be done

<table>
<thead>
<tr>
<th>Period</th>
<th>Water demand</th>
<th>supply water</th>
<th>Lack of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>45.1</td>
<td>36.1</td>
<td>9.0</td>
</tr>
<tr>
<td>2020</td>
<td>49.5</td>
<td>45.8</td>
<td>3.7</td>
</tr>
<tr>
<td>2030</td>
<td>51.5</td>
<td>51.8</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: without considering the effects of climate change
Probability of extreme event would be increased, and the pattern of south-flood and north-drought would be aggravated.

According to China’s National Assessment Report on CC, 2007
Climate change impacts

A rising trend of temperature would result in a little reduction of water resources in the future.

Local water resource (100 M m³)

- Present: 370
- 2030: 365

4 Challenges and Measures
4 Challenges and Measures

Establishing safety water supply system

Optimize the local surface and ground water, the water from Yangzi river and Yellow river, even the unconventional water such as salty and treated water.
Exerting water transfer project from the south to the north

4 Challenges and Measures

Middle and east routes of transferring water from south to north projects

Middle route

East route
To improve water use efficiency, Water conservation, recycling etc.

Irrigation water utilization coefficient is to reach 0.7-0.8

IC card controlling water use
Quota management

Utilization of waste water
4 Challenges and Measures

- Control groundwater overexploitation and rehabilitate the ecological flow.
- Prevent and control water pollution.
- Build monitoring and forecasting system, especially the groundwater.

Restoring ecological and environmental systems and maintaining river health.
A shift in Basin’s water policy due to above problems and challenges:

• People need to live in harmony with nature and not only exploit it;
• The focus need to be shifted from a construction orientation to management orientation;
• Increase demand management, do not depend entirely on supply augmentation;
• Strengthen the study on the effects of the climate change and human activities;
• Place more emphasis on comprehensive integrated water resources management and;
A shift in basin’s water policy due to above problems and challenges:

- Introduce the international experience and assistance, advanced technology and approaches into the Haihe River Basin.

- Welcome to Haihe River Basin to do the international cooperation.
Thanks for your attention!