

图1: 自然水循环 (Hydrologic circle)

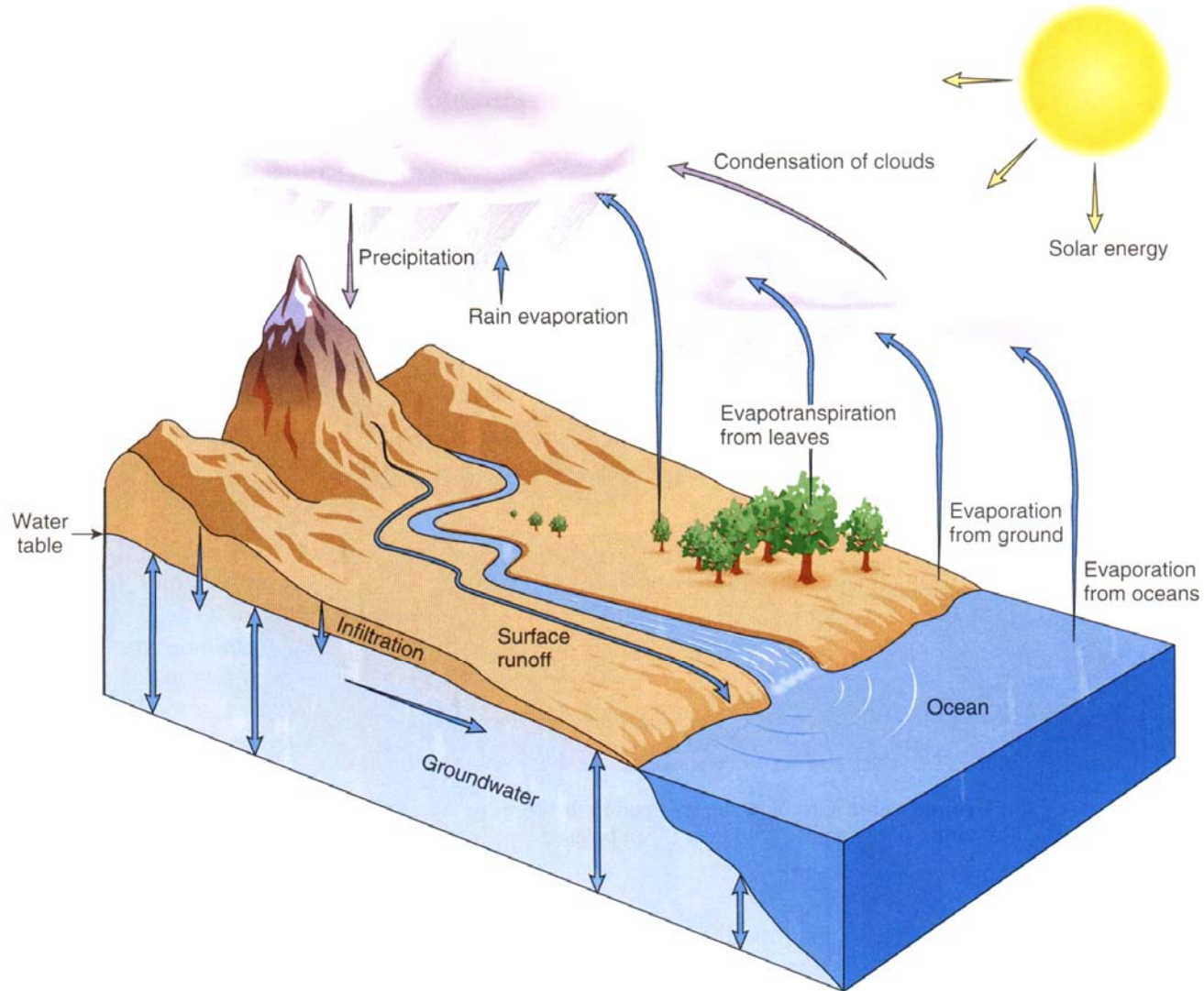


图2: 水资源的构成
(Break down of water resources)

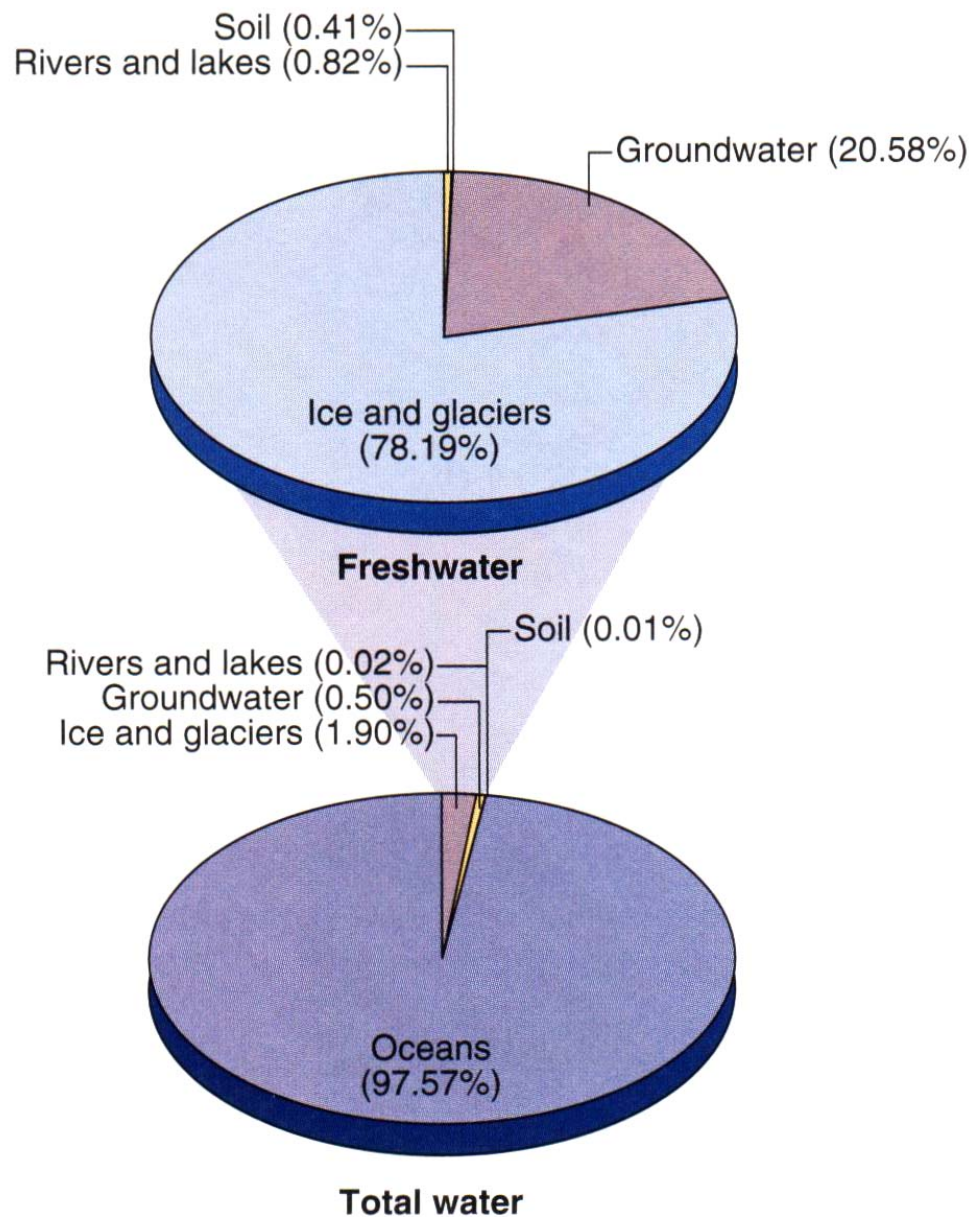
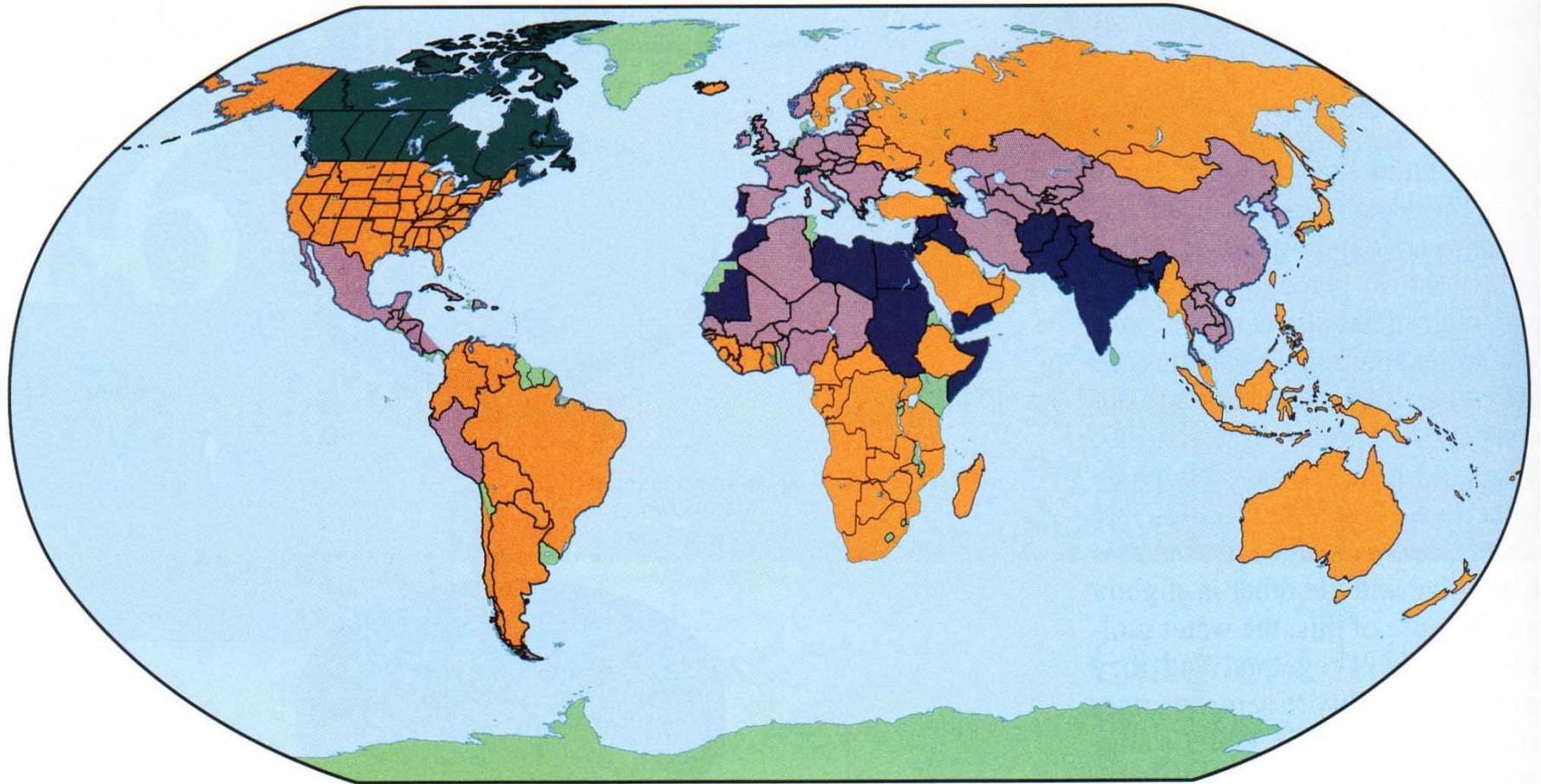


图3: 全球水资源“脆弱性”分布图 (Water resource vulnerability in the world)



■ No vulnerability ■ Low vulnerability ■ Medium vulnerability ■ High vulnerability ■ No data

表1: 全球水资源量最多的10个国家

Top 10 countries with the richest annual renewable water resources

Country	Annual Renewable Water Resources (km ³ /yr)	Population ('000)	Water Resources per Capita (m ³ /yr)
Brazil	6,950.00	170,406.28	40,784.88
Russia	4,498.00	145,491.17	30,915.97
Canada	2,901.00	30,756.70	94,320.92
China	2,800.00	1,275,132.87	2,195.85
Indonesia	2,530.00	212,092.02	11,928.78
USA	2,478.00	283,230.24	8,749.07
Bangladesh	2,357.00	137,439.26	17,149.39
India	2,085.00	1,008,937.36	2,066.53
Venezuela	1,317.00	24,169.74	54,489.62
Myanmar	1,082.00	47,748.94	22,660.19

表2: 全球人均水资源量最多的10个国家

Top 10 countries with the richest per capita water resources

Country	Annual Renewable Water Resources (km ³ /yr)	Population ('000)	Water Resources per Capita (m ³ /yr)
Iceland	170.00	279.29	608,684.13
Suriname	200.00	417.16	479,433.50
Guyana	241.00	760.51	316,891.36
Congo	832.00	3,018.43	275,640.35
Papua New Guinea	801.00	4,809.22	166,555.25
Gabon	164.00	1,230.09	133,323.79
Solomon Islands	44.70	447.43	99,904.34
Canada	2,901.00	30,756.70	94,320.92
Norway	392.00	4,469.03	87,714.78
New Zealand	327.00	3,778.00	86,553.64

表3: 全球人均水资源最少的10个国家

Top 10 countries with the least per capita water resources

Country	Annual Renewable Water Resources (km ³ /yr)	Population ('000)	Water Resources per Capita (m ³ /yr)
Kuwait	0.02	1914.40	10.45
Malta	0.02	389.94	41.03
United Arab Emirates	0.15	2605.96	57.56
Qatar	0.05	565.44	93.73
Libya	0.60	5289.73	113.43
Saudi Arabia	2.40	20346.23	117.96
Singapore	0.60	4018.11	149.32
Jordan	0.88	4913.12	179.11
Yemen	4.10	18348.75	228.45
Israel	2.15	6040.43	355.94

图4: 我国的降水量分布图 (Average annual rainfall in China)

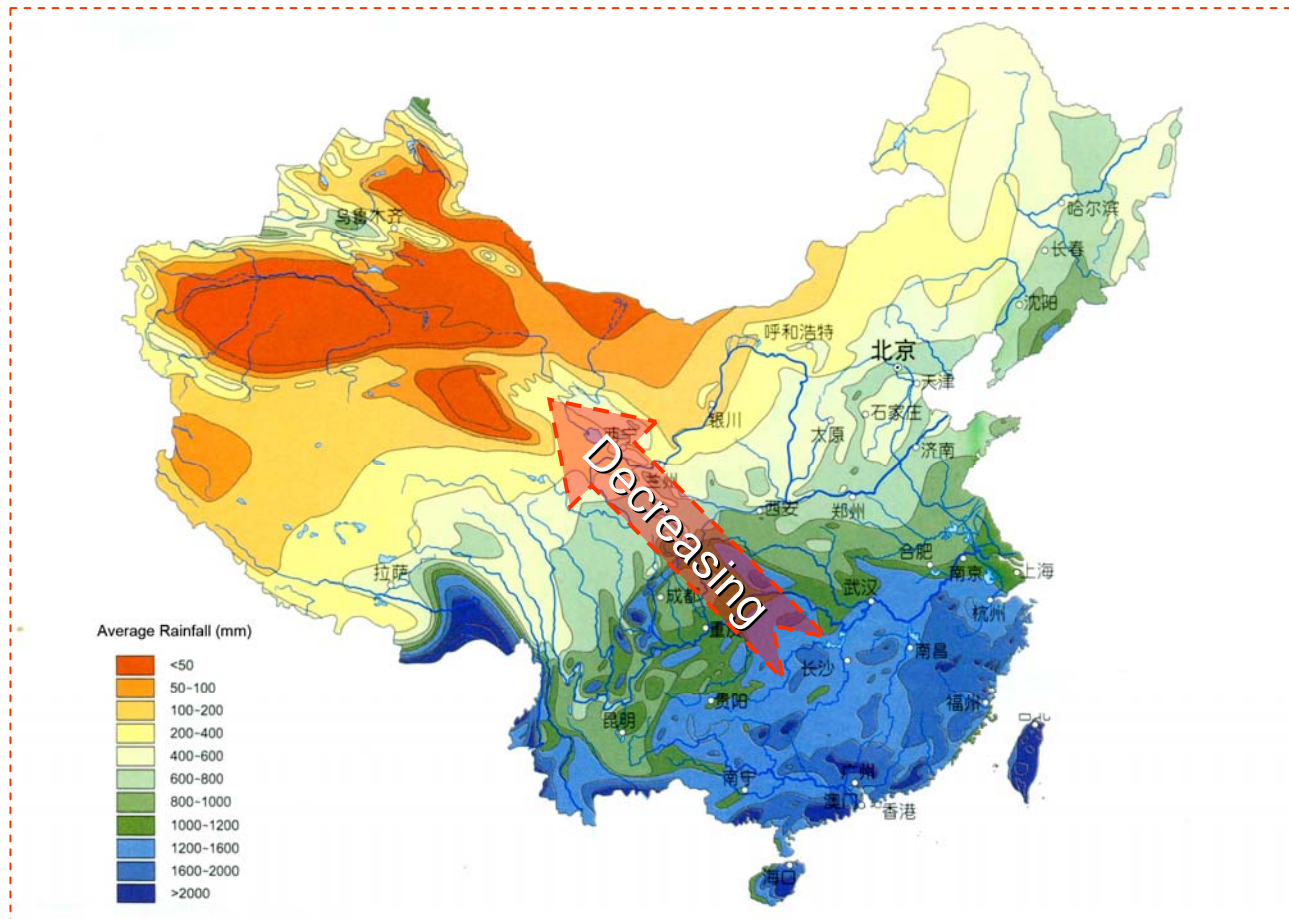


图5: 我国的干旱度指标分布图 (*Distribution of aridity in China*)

干旱度 = 蒸发势 / 降水量

Aridity = Potential Evaporation / Rainfall

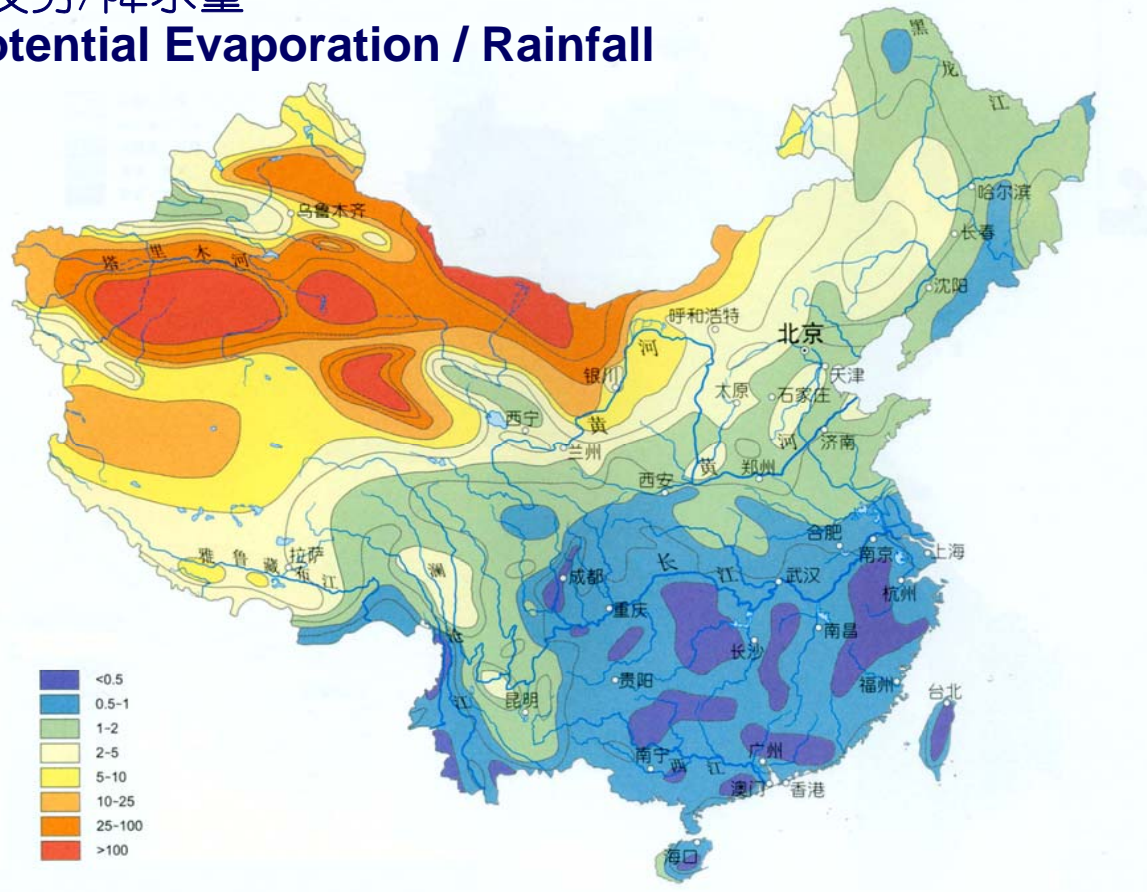


图6: 西北地区蒸发势与降雨量的关系
(Relation between annual rainfall and potential evaporation)

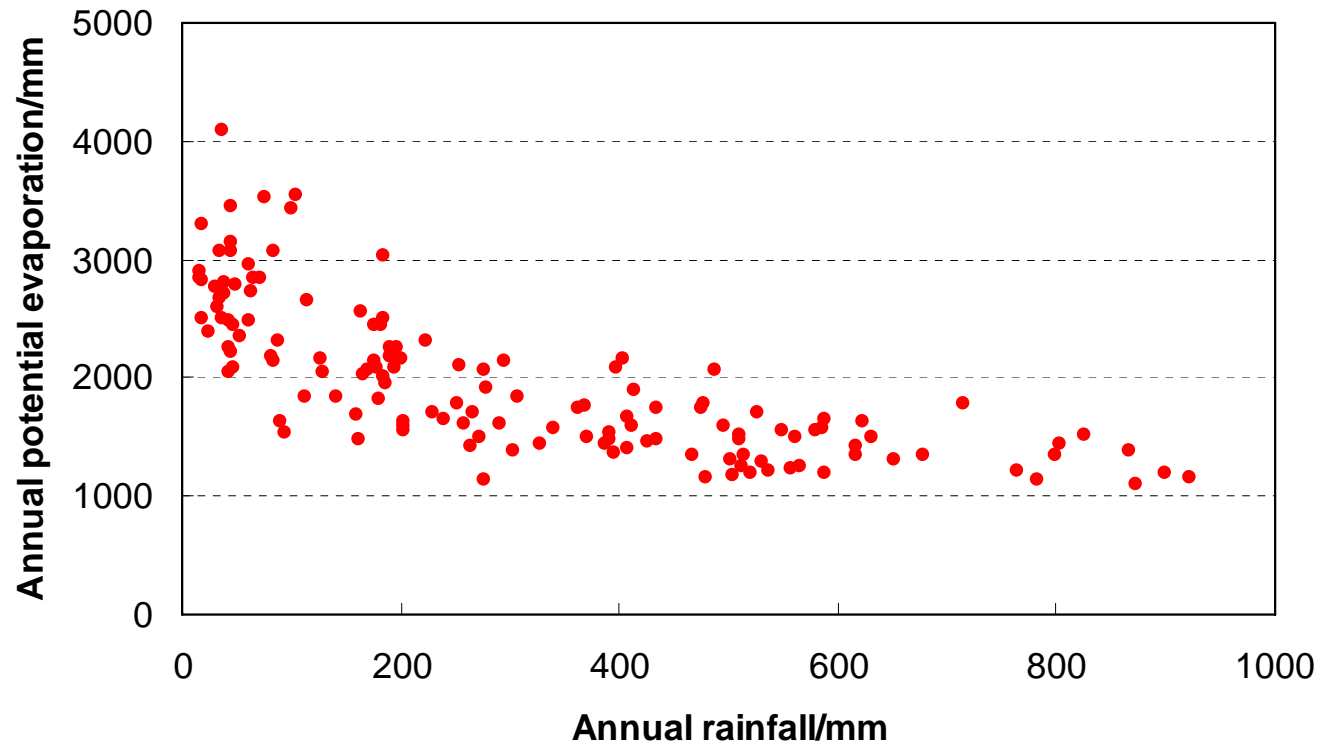
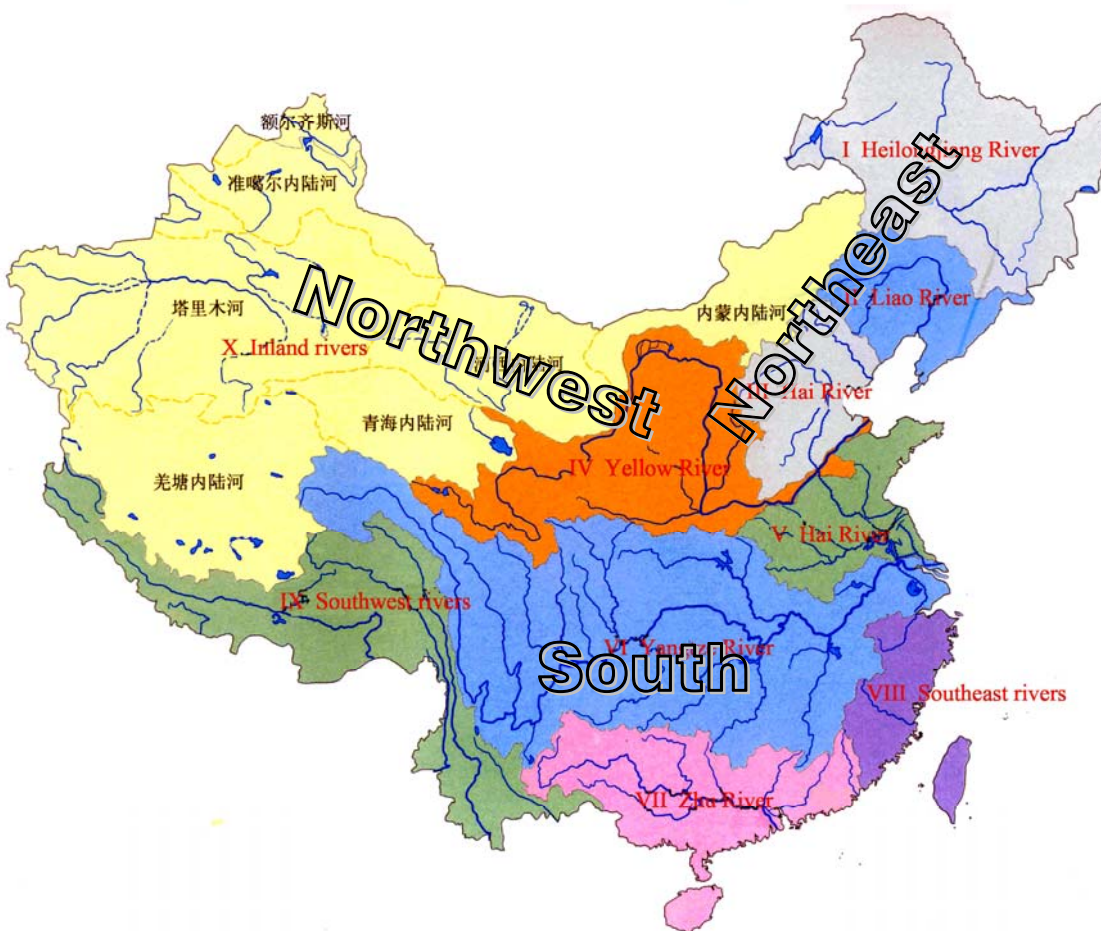
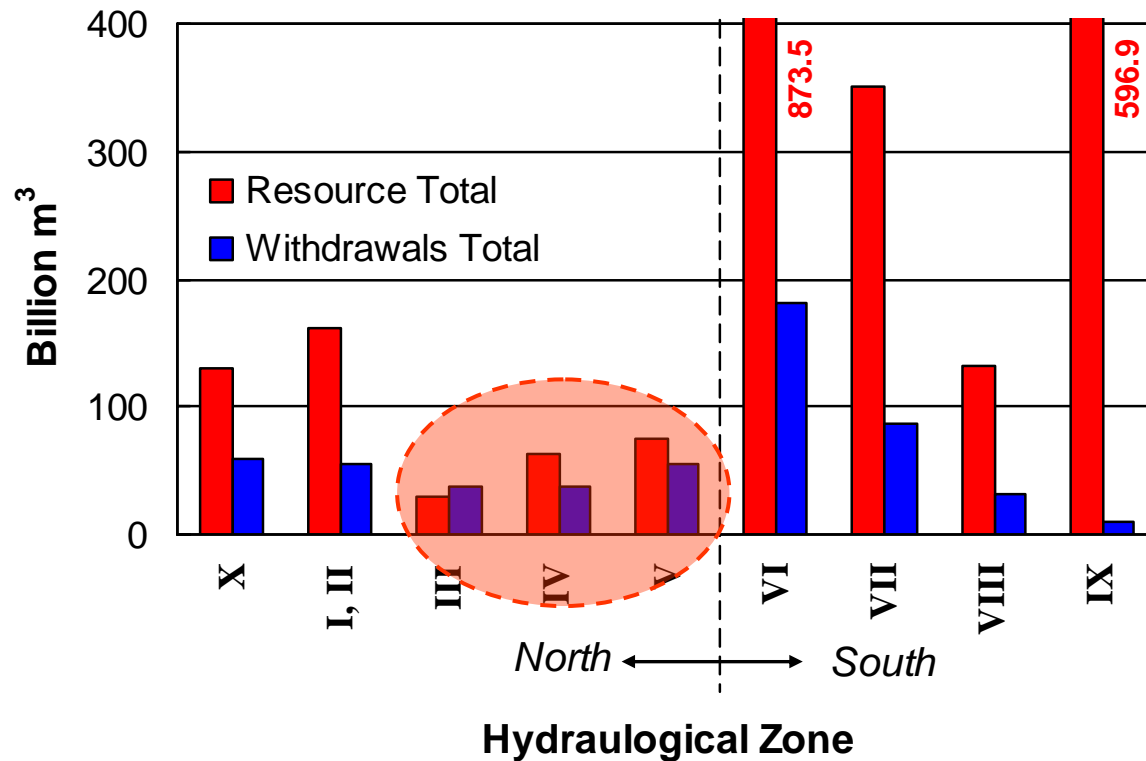


图7: 我国的流域分布 (Hydrological zones in China)



- I: 黑龙江
- II: 辽河
- III: 海河
- IV: 黄河
- V: 淮河
- VI: 长江
- VII: 珠江
- VIII: 东南诸河
- IX: 西南诸河
- X: 内陆河

图8: 各流域的用水现状 (Current condition of water use)



- I: 黑龙江
- II: 辽河
- III: 海河
- IV: 黄河
- V: 淮河
- VI: 长江
- VII: 珠江
- VIII: 东南诸河
- IX: 西南诸河
- X: 内陆河

图9: 各流域人均水资源量使用现状 (Current condition of per capita water use)

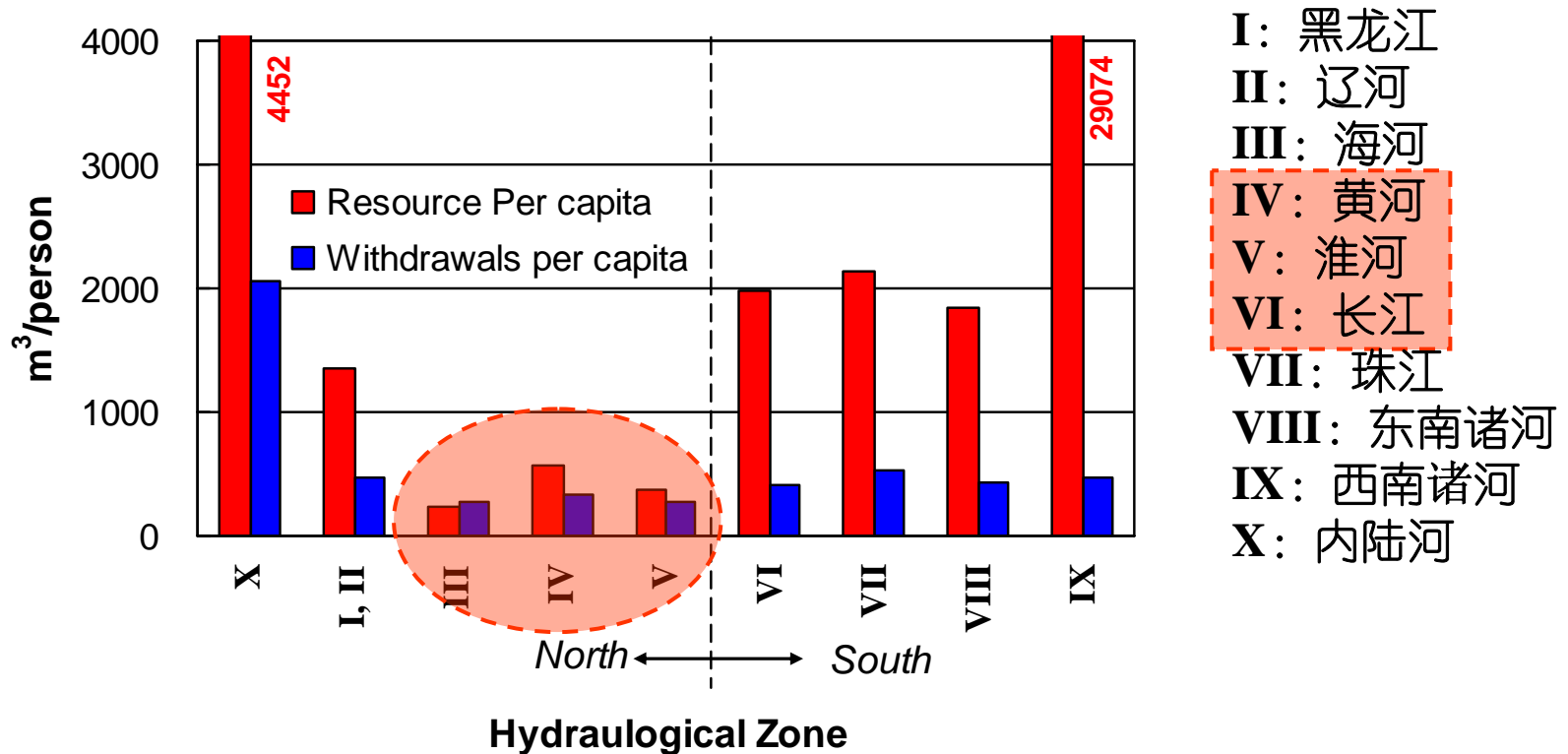


图10: 约旦河流域 (Jordan River basin)



图11: 约旦河三角地带 (Jordan River Delta)

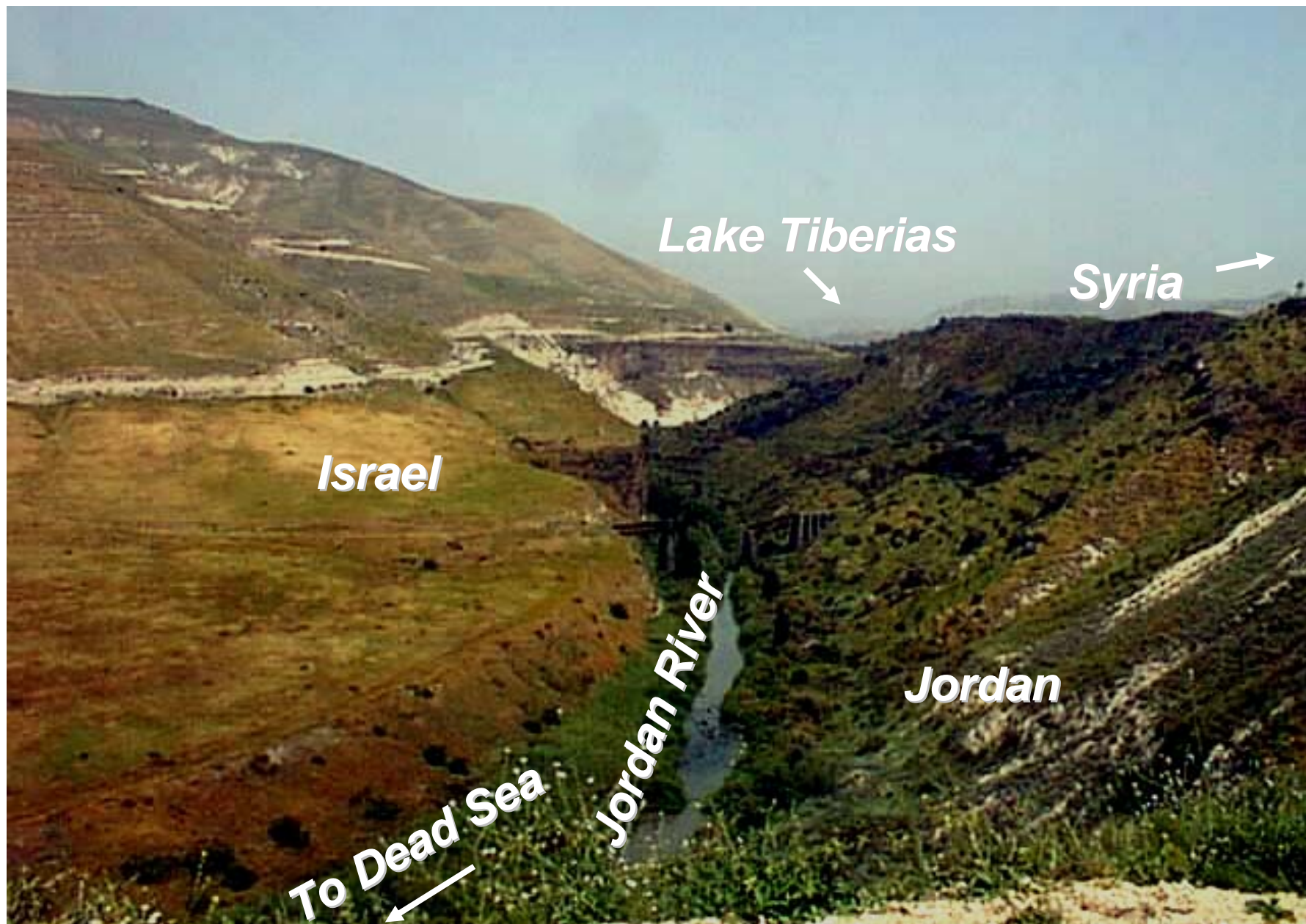


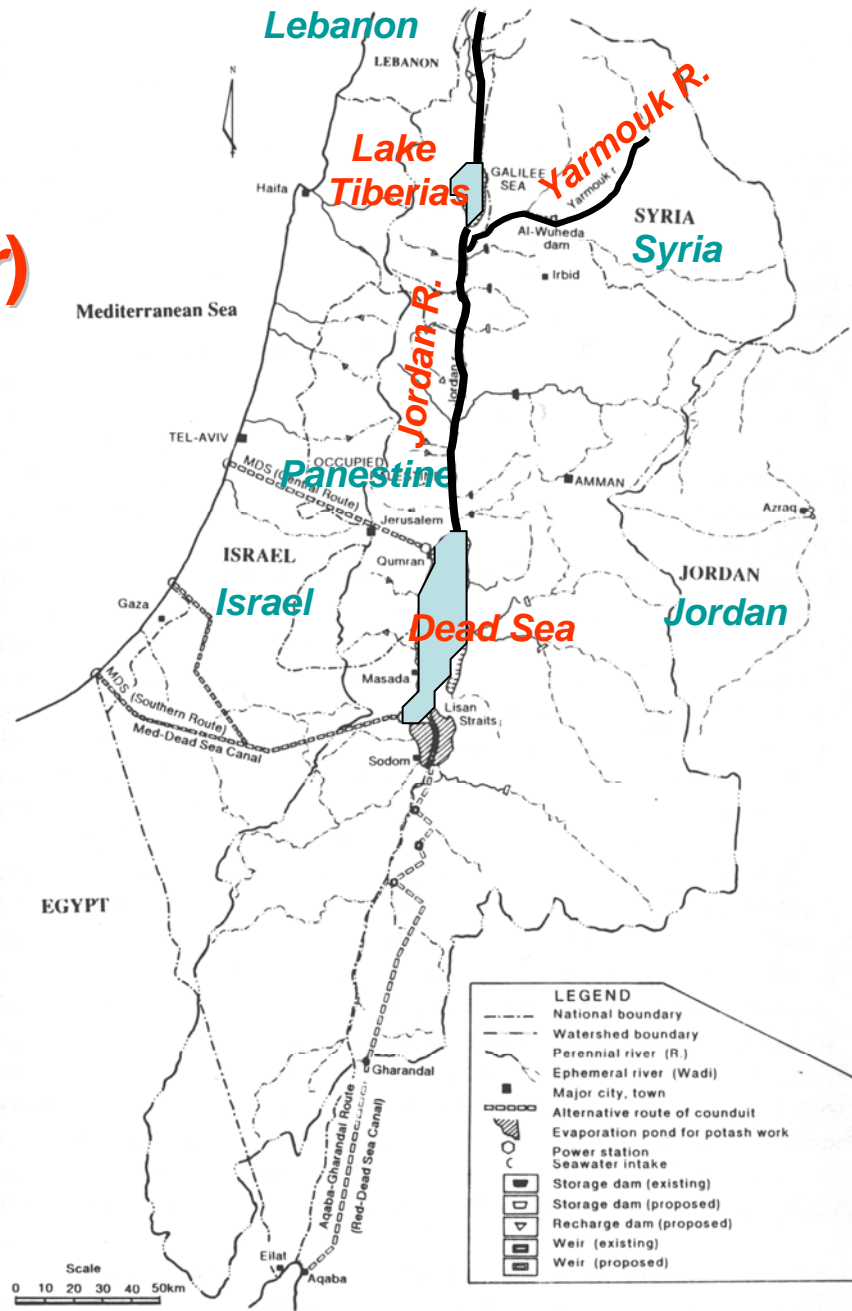
图12: 约旦河和死海 (Jordan River and Dead Sea)



图13: 约旦河概况 (General condition of the Jordan River)

Basic Data –

- Total length:
 - 228 km
- Riparian countries:
 - Lebanon
 - Syria
 - Israel/Panestine
 - Jordan
- Catchment area:
 - 18300 km²
- Three sections:
 - Upper reach
 - Yarmouk river
 - Lower reach



The Jordan River Basin

图14: 约旦河的取水工程 (Water projects in the Jordan River)

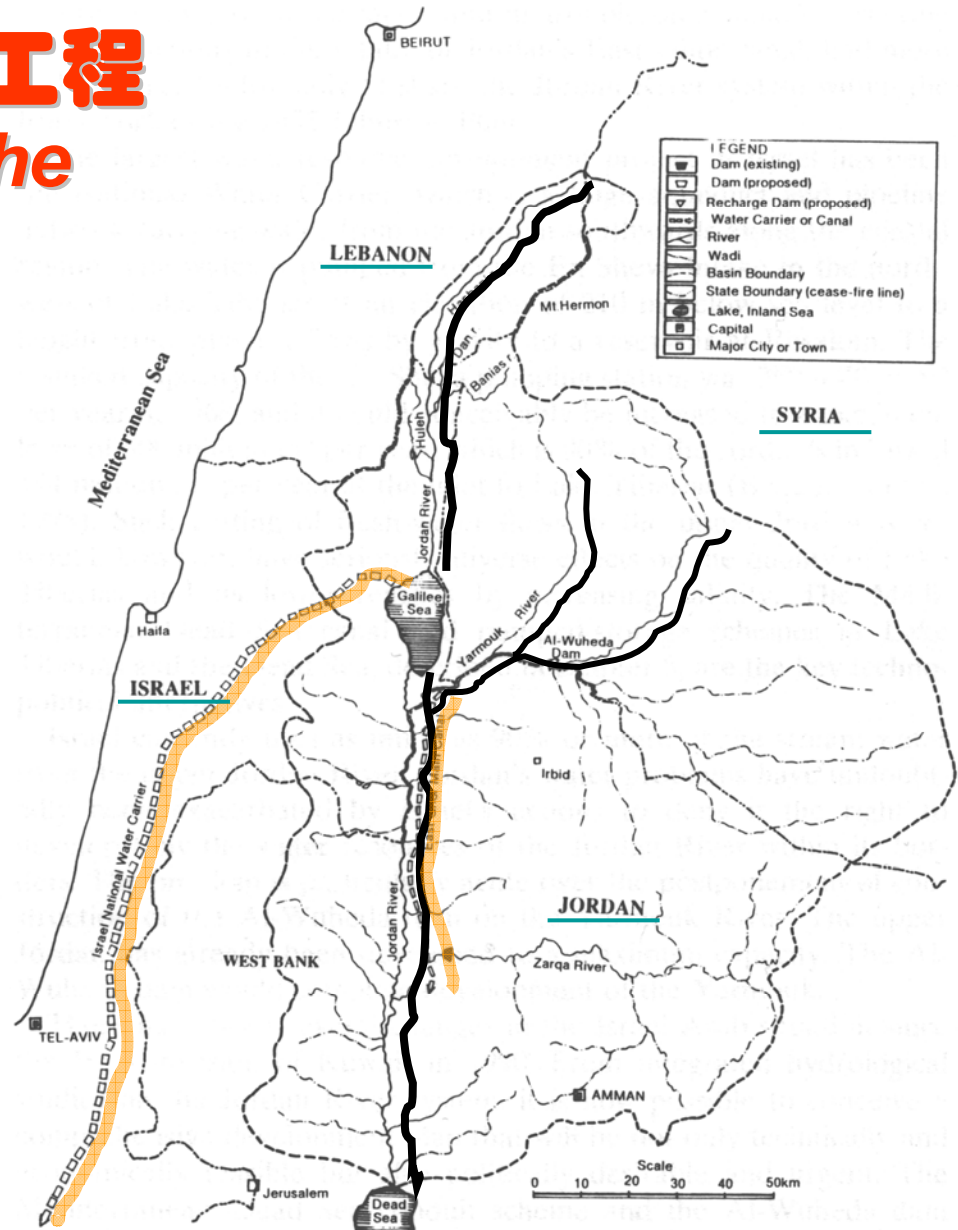
Water Projects Implemented by Riparian Countries

Lebanon: small scale
projects

Syria: construction of
dams on Yarmouk river

Israel: construction of
National Water Carrier

Jordan: construction of
East Ghor Main Canal



The Upper Jordan River System and Water Projects

表4: 约旦河流域的水战争 (Water conflicts in the Jordan River basin)

Date	Countries Involved	Basis of Conflict	Violent Conflict?	Description
1948	Arabs, Israelis	Military tool	Yes	Arab forces cut off West Jerusalem's water supply in first Arab-Israeli war.
1951	Israel, Jordan, Syria	Political tool, Military tool, Development disputes	Yes	Jordan makes public its plans to irrigate the Jordan Valley by tapping the Yarmouk River; Israel responds by commencing drainage of the Huleh swamps located in the demilitarized zone between Israel and Syria; border skirmishes ensue between Israel and Syria.
1953	Israel, Jordan, Syria	Development dispute, Military target, Political tool	Yes	Israel begins construction of its National Water Carrier to transfer water from the north of the Sea of Galilee out of the Jordan basin to the Negev Desert for irrigation. Syrian military actions along the border and international disapproval lead Israel to move its intake to the Sea of Galilee.
1965-1966	Israel, Syria	Military tool, Political tool, Control of water resources, Development dispute	Yes	Fire is exchanged over "all-Arab" plan to divert the Jordan River headwaters and presumably preempt Israeli National Water Carrier; Syria halts construction of its diversion in July 1966.
1967	Israel, Syria	Military target and tool	Yes	Israel destroys the Arab diversion works on the Jordan River headwaters. During Arab-Israeli War Israel occupies Golan Heights, with Banias tributary to the Jordan; Israel occupies West Bank.
1969	Israel, Jordan	Military target and tool	Yes	Israel, suspicious that Jordan is overdiverting the Yarmouk, leads two raids to destroy the newly-built East Ghor Canal; secret negotiations, mediated by the US, lead to an agreement in 1970.

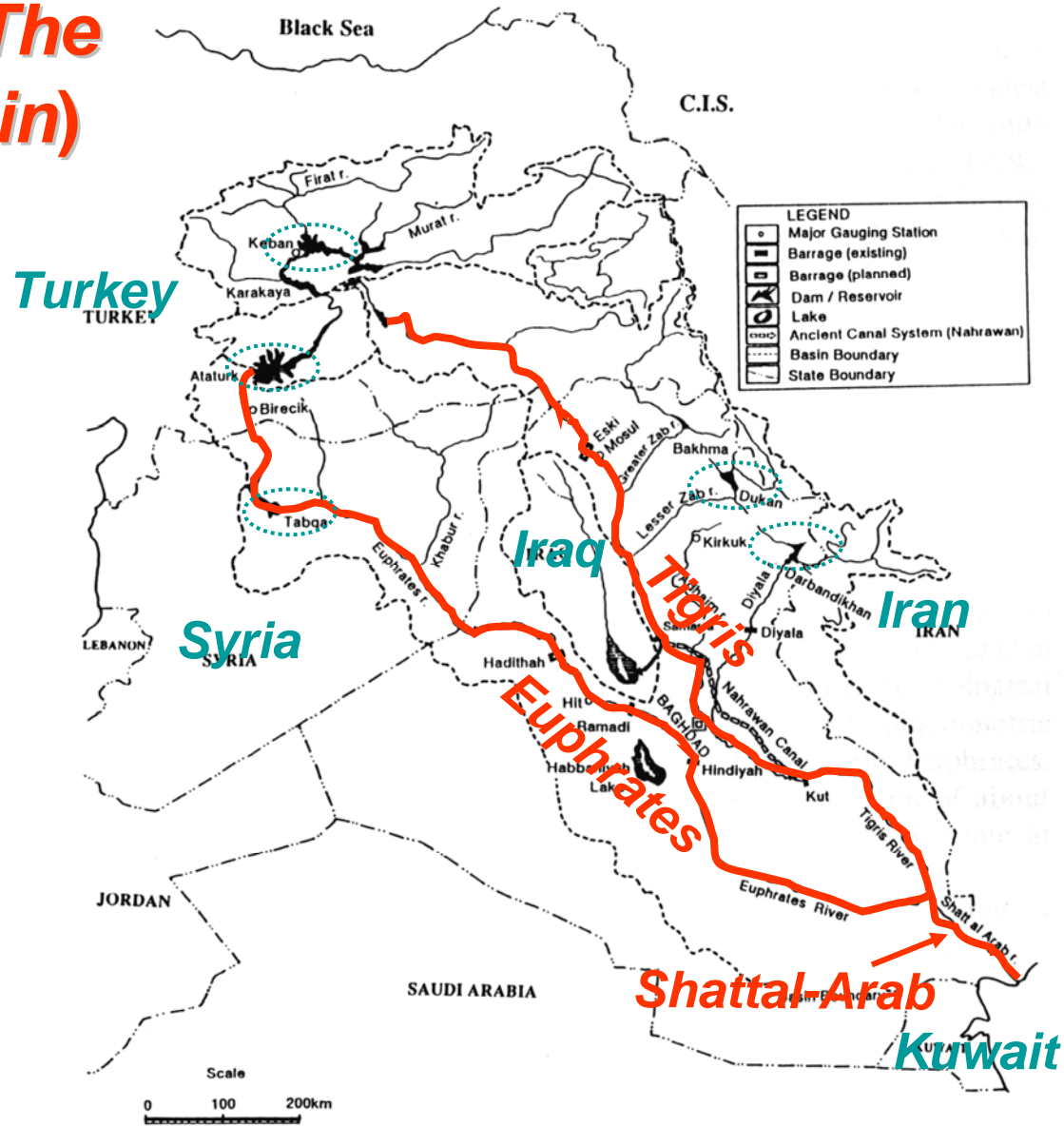
图15: 底格里斯与幼发拉底河 (*The Tigris and Euphrates*)



图16: 流域水系 (The rivers in the basin)

Basic Data –

- Length:
 - Tigris 1718 km
 - Euphrates 2330 km
 - Shattal-Arab 190 km
- Riparian countries:
 - Turkey
 - Syria
 - Iraq
 - Iran (near)
 - Kuwait (near)
- Catchment area:
 - 423,800 km²
- Mean annual flow:
 - Tigris 48.7×10^9 m³/yr
 - Euphrates 35.2×10^9 m³/yr



The Tigris-Euphrates Basin

表5: 底格里斯与幼发拉底河流域的水战争 (Water conflicts in the Tigris and Euphrates basin)

- Conflict occurred in 1990 between *Turkey, Iraq* and *Syria* as Turkey finished construction of the Ataturk Dam with a gross reservoir storage volume of more than $40 \times 10^9 \text{ m}^3$.
- In mid-1990s *Turkey* threatened to restrict water flow to *Syria* to force it to withdraw support for Kurdish rebels in southern Turkey.
- Waters became military targets or military tools during the *Iran-Iraq War* and *Gulf War*.

表6: 和平调水的构想 (*Imagination of “Peace Pipeline”*)

Reasons for “Peace Pipeline”:

- The abundant water in the Tigris-Euphrates basin are precious resource for not only the riparian countries, and also for the Middle-East region.
- With several large dams, Turkey has more water than its demand and therefore wants to gain benefit from “water selling”.

图17: 和平调水计划 (The Peace Pipeline scheme)

Western Pipeline:

Turkey – Syria –
Jordan – Saudi
Arabia (Mecca)

Gulf Pipeline:

Turkey – (Syria) –
(Jordan) – Saudi
Arabia – Kuwait –
Bahrain – Qatar –
U.A.E. – Oman



The Peace Pipeline Scheme

表7: 和平调水的分配方案 (Water distribution plan through the "Peace Pipeline")

State	City	(m ³ /day)	State	City	(m ³ /day)
Western Pipeline			Gulf Pipeline		
Turkey		300,000	Kuwait		600,000
Syria	Aleppo	300,000	Saudi Arabia	Jubail	200,000
	Hama	100,000		Damman	200,000
	Homs	100,000		Al-Khobar	200,000
	Damascus	600,000		Hofuf	200,000
Jordan	Amman	600,000	Bahrain	Manama	200,000
Saudi Arabia	Tabuk	100,000	Qatar	Doha	100,000
	Medina	300,000	U.A.E.	Abu Dhabi	280,000
	Yanbu	100,000		Dubai	160,000
	Jeddah	500,000		Sharjah/Ajman	120,000
	Mecca	500,000		Umm al-Qaiwain/ Ras al-Khaimah/ Fujarah	40,000
Oman				Muscat	200,000
Total		3,500,000	Total		2,500,000

表8: 和平调水计划的障碍 (*Constraints to the Peace Pipeline*)

- **Project cost: US\$ 20 x 10⁹ (1990 price)**
- **Water politics of different countries**
- **Unwillingness of Syria to implement the project**
- **Relationship of Arabic countries with Israel**

However, it is an option for consideration in the ongoing peace process.