FLOOD DISASTERS IN CHINA

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CHINA

1. Introduction.

China is located at East Asia and the west coast of the Pacific, between 03°12′ and 53°43′N, 73°39′and 135°05′E. Her land covers an area of 9.6 mil.km^2 with a population of about 1.1 bil.(Fig.1, Map of China)

Meteologically, most of the regions belong to East Asia monsoon climate. The average annual rainfall in southeast coast line and southwest areas are over 2,000 mm. In middle and lower reaches of Yangtze River, the amount are around 1,000 mm. North-China Plain and Northeast China are 400-800 mm, the whole nation about 648 mm.(Fig.2, Annual Rainfall Map)

Topographically, her western part is high and eastern part low. From west to east, topographic change range from above 4,000 to 2,000--1,000 to below 1,000--50 m A.S.L. Of the total territory, mountain areas account for 33%, plateau areas 26%, hilly areas

10%, basin areas 19%, plain areas 12%.(Fig.3, Topography of China)

Geologically, she is near the junction of the circum-Pacific seismic belt and the Eurasia seismic belt.

Vast land areas, huge population and complicated natural condition make the country subject to various natural disasters,such as floods, drought, earthquakes, typhoon, ice damage, snowfall and windstorm. Among them, floods, drought and earthquakes are the most common disasters which often threaten the Chinese people.

2.Floods

Floods are regarded as a traditional disasters in China. Historically, from 206 BC to 1936 AD, of 5,150 natural disasters,floods took up 1,037. During 2,155 years from 206 BC to 1949 AD,floods appeared in 1,092 years, i.e. flood disasters occurred every two years. Frequent floods,imperiling about 1 mil. km^2 land, have always led to severe damages . Since 1949 , statistics demonstrated that average annual flood affected area was 0.12 bil. mu (1 mu=666.6 m^2),and damaged area about 68 mil. mu. (Table 1)

Table 1. Flood Areas in China

(1949-1989) (mil. mu)

Year	Affected Area	Damaged Area	Year	Affected Area	Damaged Area
1949		139.23	1971	59.83	22.22
1950	98.38	70.65	1972	61.25	18.89
1951	62.60	22.14	1973	93.52	38.65
1952	41.91	23.21	1974	96.46	41.06
1953	107.80	49.27	1975	102.26	52.01
1954	241.97	169.58	1976	62.96	19.93
1955	78.70	46.00	1977	136.43	74.84
1956	215.66	163.58	1978	42.30	13.86
1957	121.24	90.48	1979	101.63	43.05
1958	64.19	21.62	1980	137.19	75.38
1959	72.19	27.26	1981	129.37	59.59
1960	152.32	74.62	1982	125.41	66.95
1961	133.65	80.34	1983	182.43	86.21
1962	147.15	94.77	1984	159.48	80.92
1963	211.07	157.19	1985	212.96	134.24
1964	224.00	150.57	1986	137.33	84.02
1965	83.81	42.19	1987	130.29	61.56
1966	37.62	14.25	1988	179.24	91.92
1970	46.93	18.51	1989	169.92	88.75

China has about 50,000 rivers whose drainage area over 100 km^2, 1,500 rivers whose drainage area over 1,000 km^2. Most of these rivers are situated in the southern and eastern parts of the nation. So, floods in China are most likely to occur in these areas, mainly at the middle and lower reaches of the seven major rivers, the Yangtze River(flood induced by heavy rain), the Yellow River(by heavy rain and icemelt), the Songhua River(by heavy rain and icemelt), the Pearl River(by heavy rain, tropical storm and typhoon), the Liaohe River(by heave rain), the Haihe River(by heave rain), the Huaihe River(by plum rains and typhoon). Table 2 shows some information about these rivers.

Table 2. Seven Major Rivers in China

River	Length(km)	Drainage Area(km^2)	Flow Into
Yangtze	6,300	1,808,500	East China Sea
Yellow	5,464	752,443	Bohai Sea
Songhua	2,308	557,180	Heilongjiang
Pearl	2,214	453,690	SouthChina Sea
Liao	1,390	228,960	Bohai Bay
Haihe	1,090	263,631	Bohai Bay
Huaihe	1,000	269,283	Yangtze River

The list below is flood loss from major rivers:

----Aug. 1933, the Yellow River, 18,000 person dead, 0.23 bil. silver dollar loss, inundated cultivated land 16.5 mil.mu.

----July,1935, the Yangtze River, 140,000 person dead, inundated cultivated land 22.0 mil.mu.

----Aug. 1951, the Liaohe River, affected population 876,000, inundated cultivated land 6.5 mil. mu.

----July,1954, the Yangtze River, 30,000 person dead, affected public 18.8 mil., inundated cultivated land 47.6 mil. mu.

----Aug.1954, the Huaihe River, affected public 20 mil. inundated cultivated land 79.0 mil. mu.

----Aug. 1957, the Songhua River, affected population 4 mil., 22,800 houses collapsed, inundated cultivated land 7.9 mil. mu.

----Aug. 1960, the Liaohe River, 796 person dead, 617 missing, affected public 555,000, inundated cultivated land 4.3 mil. mu.

----July,1962, the Liaohe River,affected public 1.1 mil inundated cultivated land 3.8 mil. mu.

----Aug.1963, the Haihe River,5,800 person dead, 49,000 injured, 116 km railway ruined, 53.6 mil.mu cultivated land inundated, 6 bil. yuan loss.

----June, 1968, the Pearl River, inundated 1.2 mil. mu cultivated land.

----Aug.1975, the Huaihe River, tens of thousand person dead, affected public 10.29 mil., 100 km railway ruined, 15 mil.mu cultivated land inundated.

----July, 1981, the Yangtze River, 1,300 person dead, affected public 20 mil., 13 mil.mu cultivated land inundated, 1.5 bil. yuan loss.

3. Flood control measures:

a.----About 200,000 km river banks which can protest cultivated land 0.483 bil. mu, population 0.322 bil.were built and reinforced.New entry to the sea were excavated for the Huaihe River and the Haihe River, making the discharge capacity increase to 24,000 m^3/s and 24,680 m^3/s from 8,000 m^3/s and 2,420 m^3/s, respectively.

b.----About 86,000 reservoirs with total capacity of 450 bil. m^3 were built, including 355 large ones with 325 bil.m^3 capacity and 2,400 intermediate ones with 67 bil.m^3 capacity.

c.----Along the major rivers,flood diversion and retention areas, flood flowing districts were opened up.

d.----Non-engineering methods are used, such as flood forecast and flood control communication.

e.----Soil and water conservation, reduced the deposit of the river's lower reaches.(Fig.4--10)

By taking above measures, flood control systems on the major rivers have been formed. These systems can keep the regions concerned away from the ordinary floods.

Flood Control Standard in China

city,town,mining industrial areas	cultivated land(mil.mu)	return period(year)
most important	>5	>100
important	1-5	50-100
intermediate	0.3-1	20-50
ordinary	<3	10-20

4.Flood Defense.

In China, owing to longer flood seasons(southern parts:May-Aug., northern parts: June-Sept.) but lower flood control standard and imperfect non-engineering measures, flood defense plays an important role in flood control.

a. Organization.

National Flood Defense General Headquarter(FDGH) is headed by Vice-Premier of the State Council as its chief commander. Minister of the Water Resources, Vice-Secretary-General of the State Council and Vice-Minister of the State Planning Commission as its deputy-chief-commander. Its members include the heads from the Ministries of: the Public Security, the Civil Affairs, the Finance, the Construction, the Energy Resources, the Communications, the Posts and Telecommunications, the Agriculture, the Commerce, the Materials and Equipments, the Public Health, the Geology and Mineral Resources,the State Bureau of Civil Aviation, the State Meteorological Bureau, the Department of Operation-PLA.

Flood Defense Headquarter(FDH) in each province, city, prefecture and county is directed by governor, mayor, commissioner, magistrate, respectively, and vice directors of the FDH are the heads from relevant level's the Water Resources Bureau. The members consist of the leaders in related departments.

The tasks of FDGH and FDH are to keep informed on flood situation,to formulate the flood operational plan , to inspect flood defense preparations, to decide on

emergency measures, to supervise the fulfillment of the flood defense orders.

b. Flood Defense Policy:

With stress on prevention and averts peril by preparedness.

5. Relief Policy.

According to the conditions of China, relief policy depends on people's self-saving, help each other necessary relief from the State Government and international relief.

6. Conclusion.

After 40 year's unremitting efforts to harness flood, the Chinese people have established the relatively complete flood control systems along the major rivers. Flood from intermediate and small rivers have already got initial control. A large area of hazards have been reduced evidently. But with the increase of population and the rapid development of economy, floods are still one of the main threats to the Chinese people In order to enhance flood control ability in China,further works should be done in the following as:

a.--build dams to raise the ability to regulate and operate floods.

b.--improve river training works and river banks.

c.--control soil erosion.

d.--improve the management of flood control projects and equipments.

e.--combine engineering and non-engineering measures for flood control.

f.--use and extend new technology.

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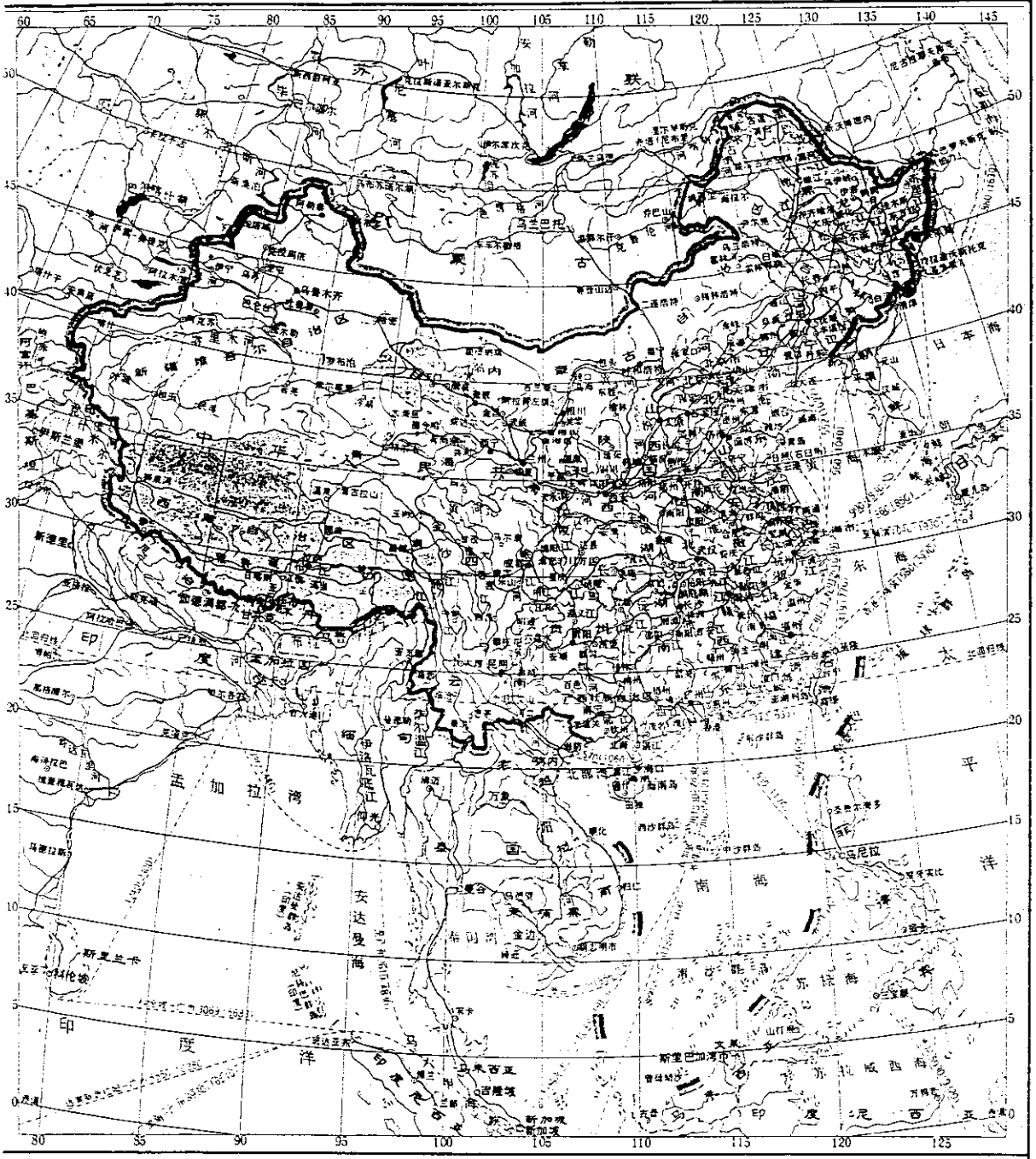
Reference.

Qian,Z.Y.,Water Conservancy in China. (in Chinese) 1990

中　国　政　区



全　国　行　政　区　划　统　计　表

截至1988年6月30日止

自治区、直辖市	省、自治区、直辖市	地区	市	县	自治州	自治县	旗	自治旗	林区	特区	合计
北京			1								1
天津			1								1
河北	9	6	11	136							162
山西		8	9	85							102
内蒙古		3	9	70			3	1			86
辽宁			13	59							72
吉林		1	6	36	2						45
黑龙江		4	10	64					1		79
上海			1	10							11
江苏			11	54							65
浙江			9	60							69
安徽		2	9	56							67
福建		7	6	60							73
江西		3	6	70							79
山东		5	17	82							104
河南		5	9	84							98
湖北	1	5	19	67							92
湖南		6	16	65							87
广东		1	1	67							69
海南			1	16							17
广西壮族自治区		1	6	74							81
四川		1	11	136							148
贵州		3	5	79							87
云南		3	9	111							123
西藏自治区		8	1	66							75
陕西			10	91							101
甘肃		7	14	75							96
青海		6	4	36							46
宁夏回族自治区			5	17							22
新疆维吾尔自治区		5	14	75							94
台湾省											1
合计	10	86	222	1793	2	3	3	1	1	1	2133

图　例

★ 我国首都

○ 外国首都和首府

● 省、自治区、直辖市人民政府驻地

· 市：外国重要城市同上

· 城镇

Fig.1 Map of China

Fig.2 Annual Rainfall Map

中　国　地　形

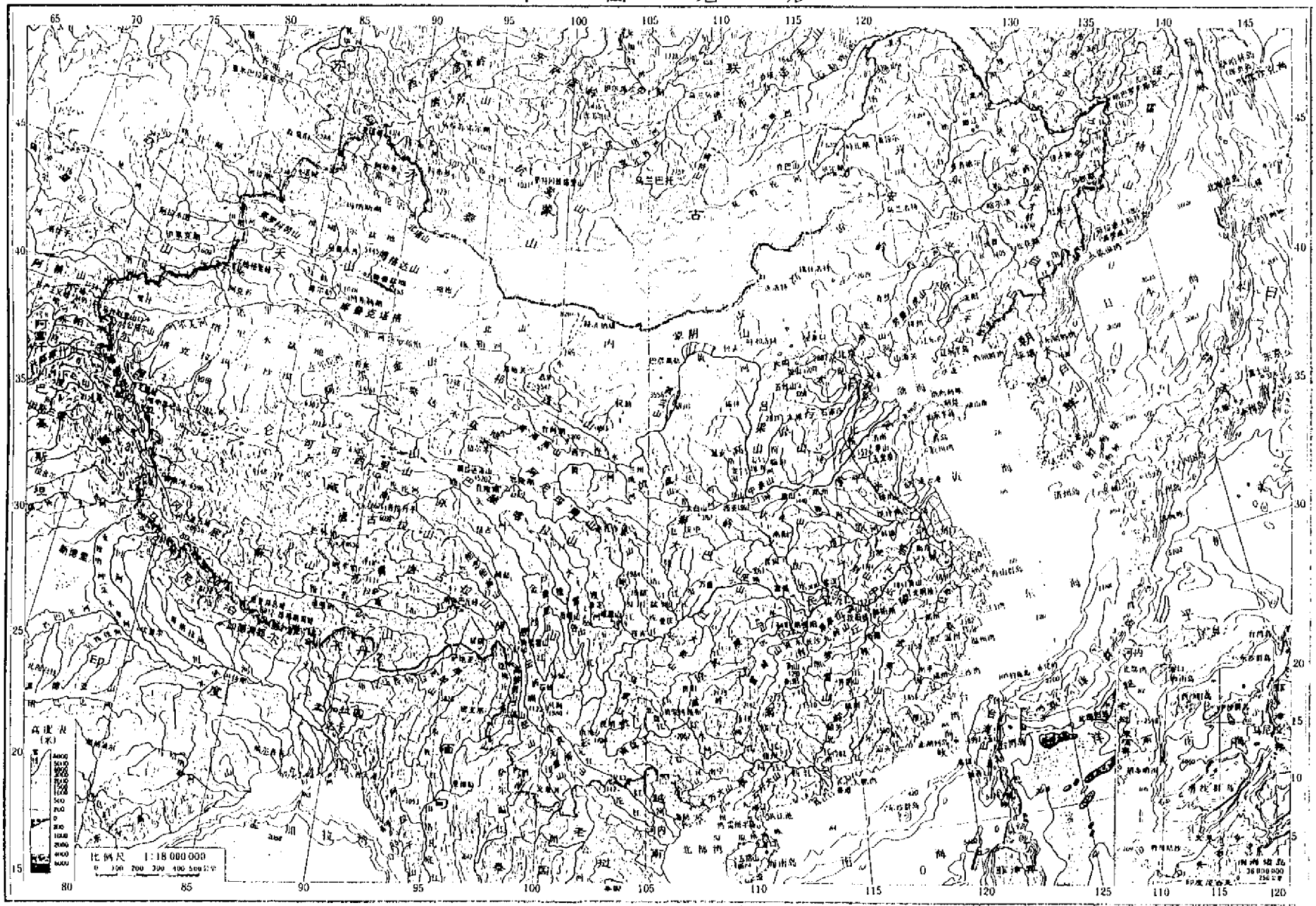


Fig.3 Topography of China

SCHEMATIC DRAWING OF FLOOD CONTROL MAP

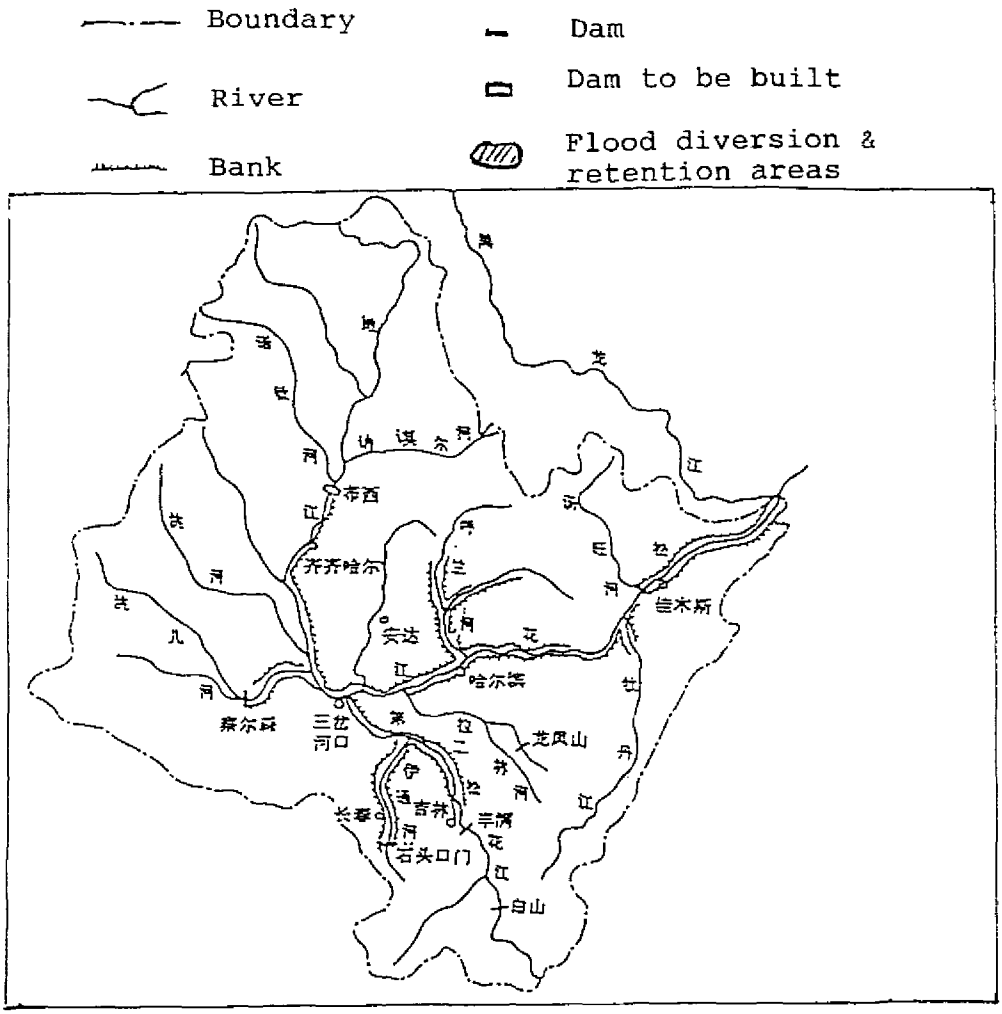


Fig.4 Songhua River

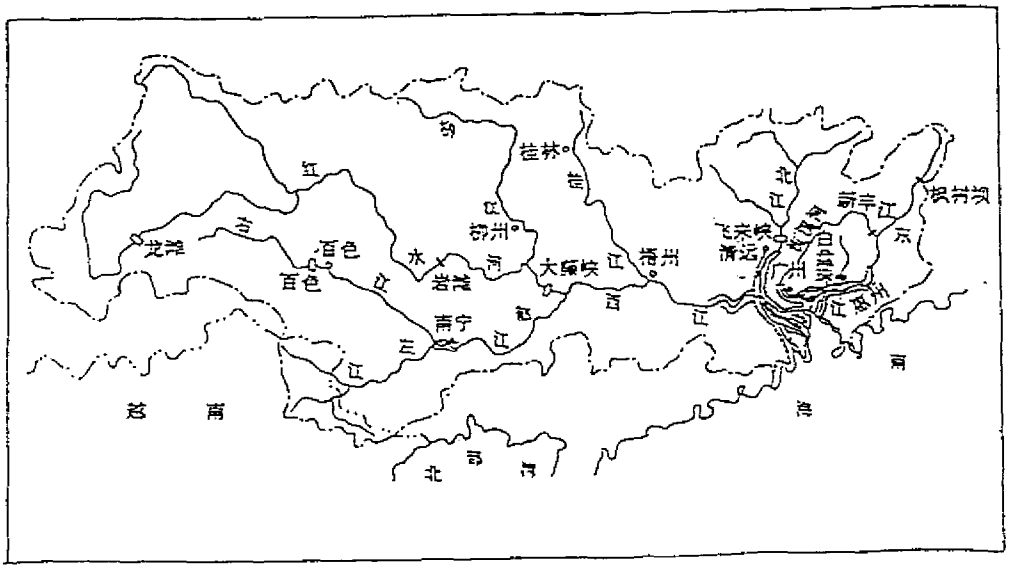


Fig.5 Pearl River

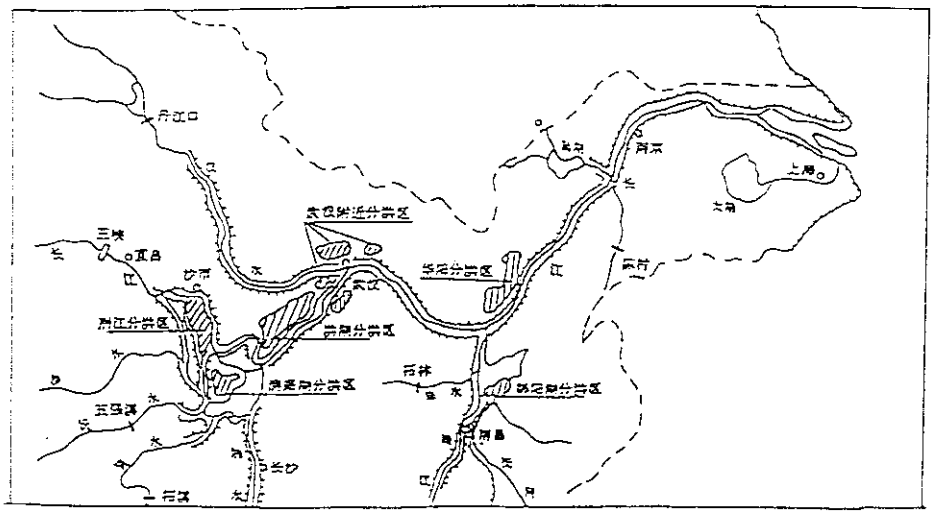


Fig.6 Yangtze River

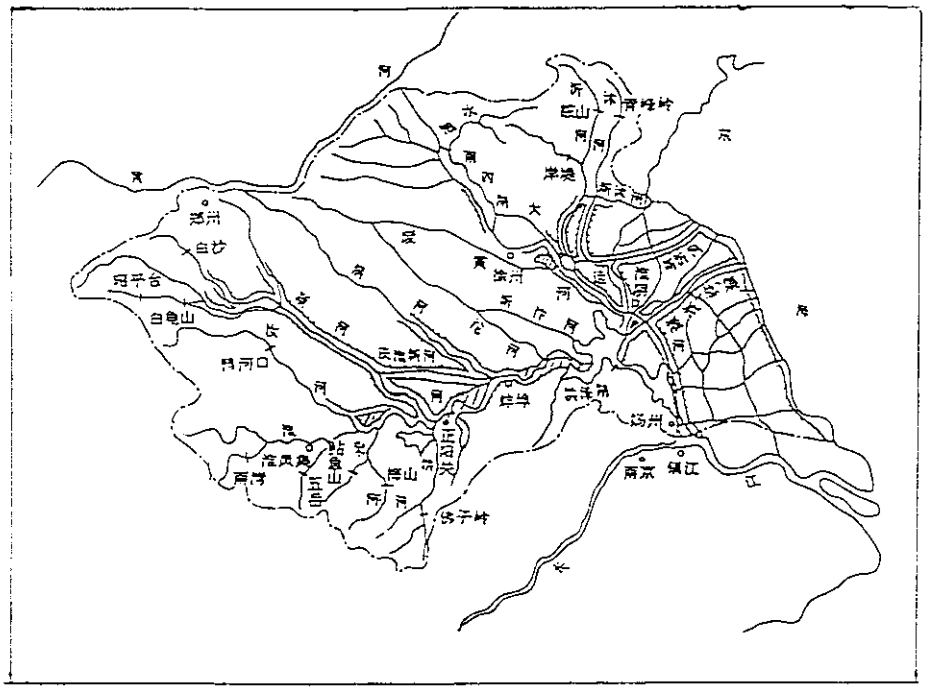


Fig.7 Huaihe River

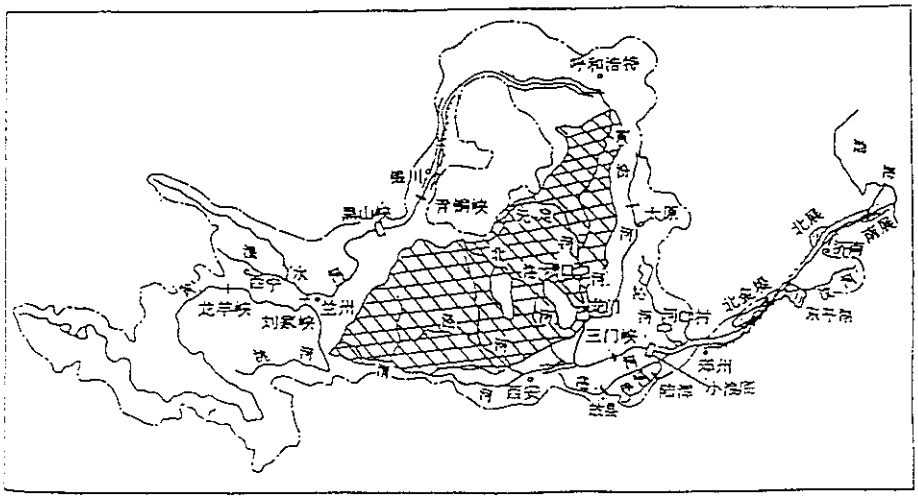


Fig.8 Yellow River

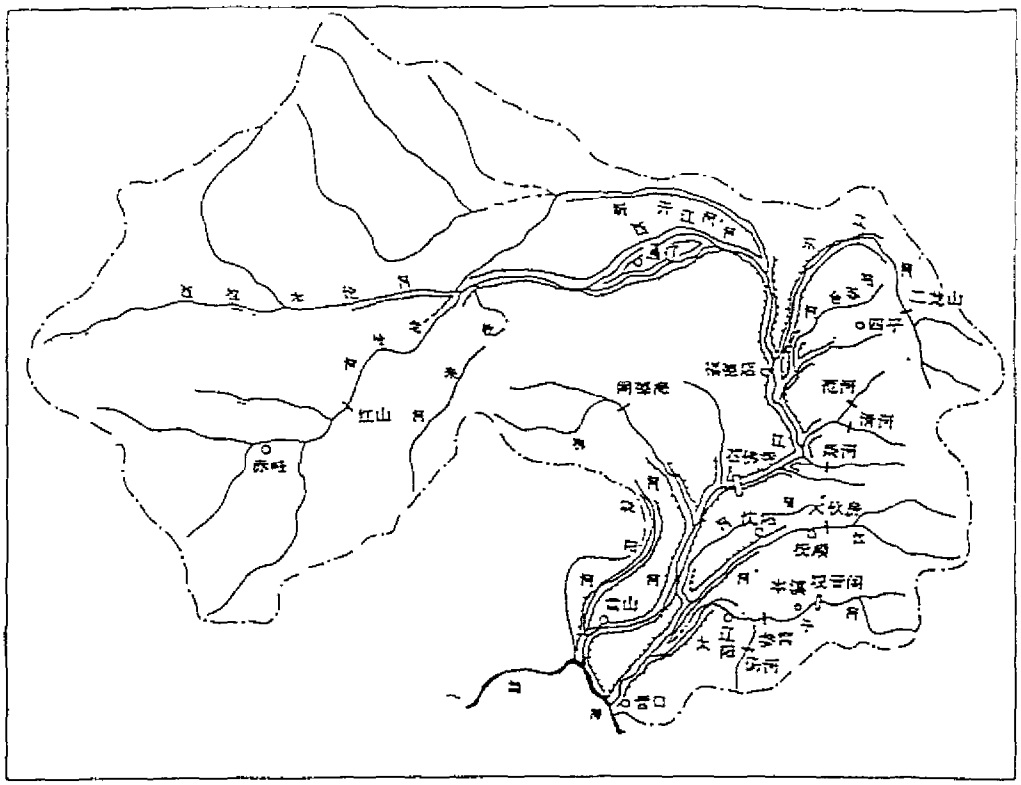


Fig.9 Liaohe River

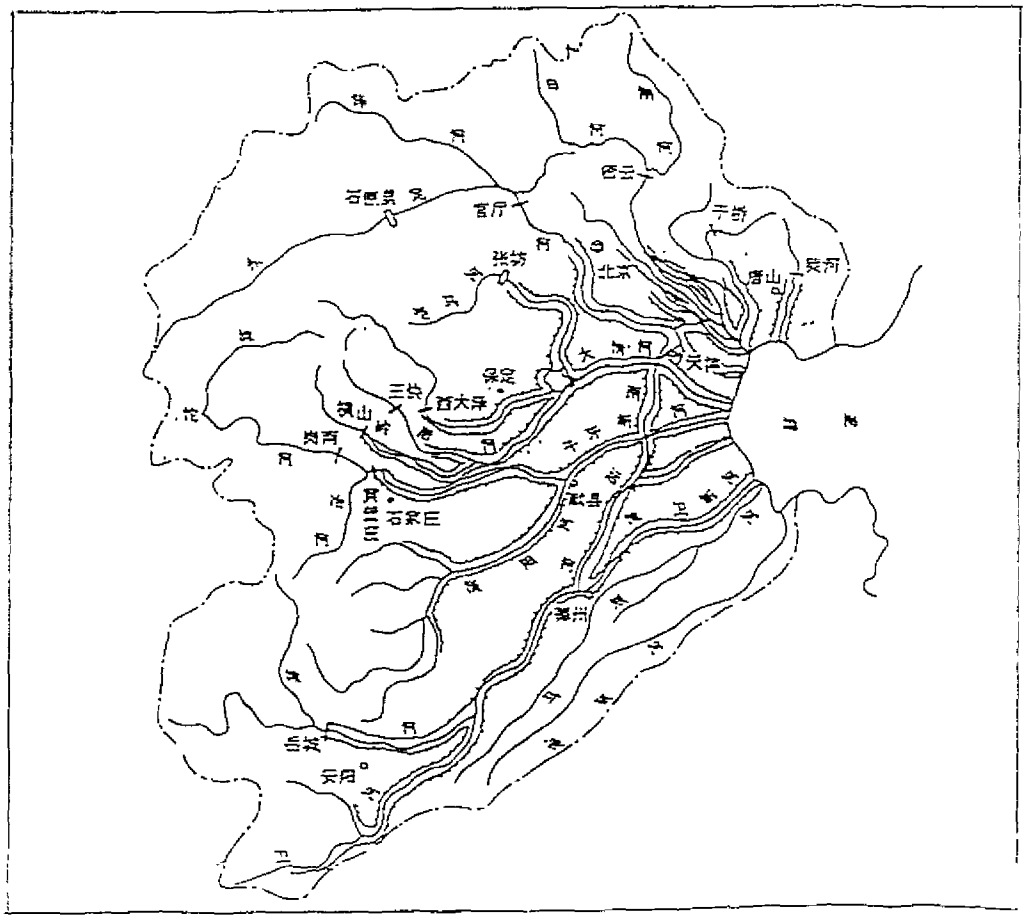


Fig.10 Haihe River