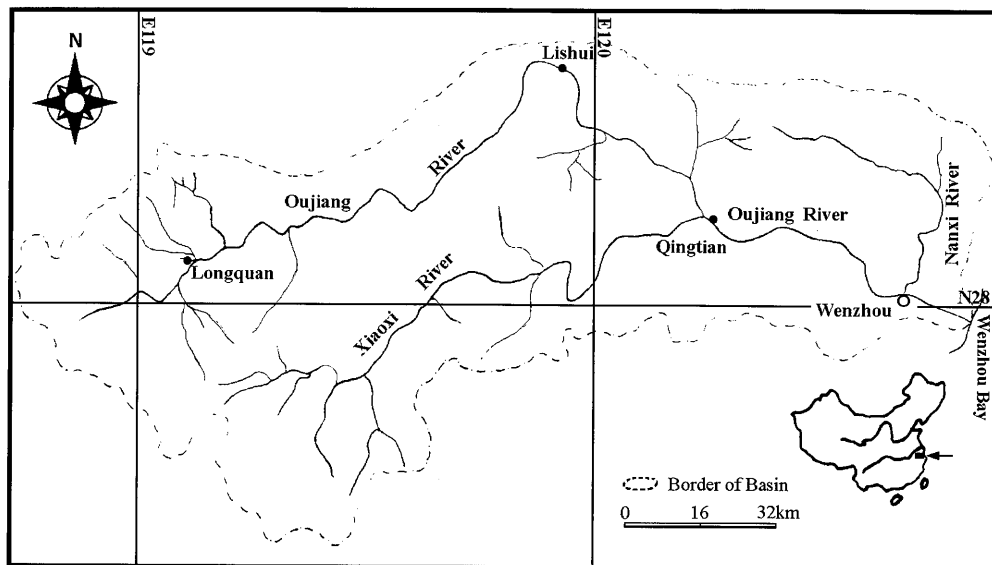


# Oujiang

## Map of River



## Table of Basic Data

<b>Name:</b> Oujiang River		<b>Serial No. :</b> China-6
<b>Location:</b> Zhejiang Province, South-eastern China	N 27°31' ~ 28°30'	E 118°45' ~ 120°48'
<b>Area:</b> 17,859 km <sup>2</sup>	<b>Length of main stream:</b> 388 km	
<b>Origin:</b> Mt. Donggong (1,133 m)	<b>Highest point:</b> Mt. Huangmaojian (1,921m)	
<b>Outlet:</b> East Sea	<b>Lowest point:</b> River mouth (0m)	
<b>Main geological features:</b> Friable Rock		
<b>Main tributaries:</b> Xiaoxi (1,156 km <sup>3</sup> ), Nanxi (433 km <sup>3</sup> )		
<b>Main lakes:</b> None		
<b>Main reservoirs:</b> Longquan (1,393×10 <sup>6</sup> m <sup>3</sup> , 1986)		
<b>Mean annual precipitation:</b> 1,746 mm (1950 ~ 1985) (basin average)		
<b>Mean annual runoff:</b> 612 m <sup>3</sup> /s at Yuren (13,560 km <sup>3</sup> ) (1950 ~ 1985)		
<b>Population:</b> 8,998,000 (1990)	<b>Main cities:</b> Longquan, Wenzhou, Lishui	
<b>Land use:</b> Forest (58%), Rice paddy (14.5%), Other agriculture (6.5%), Water surface (6.4%), Urban (14%) (1989)		

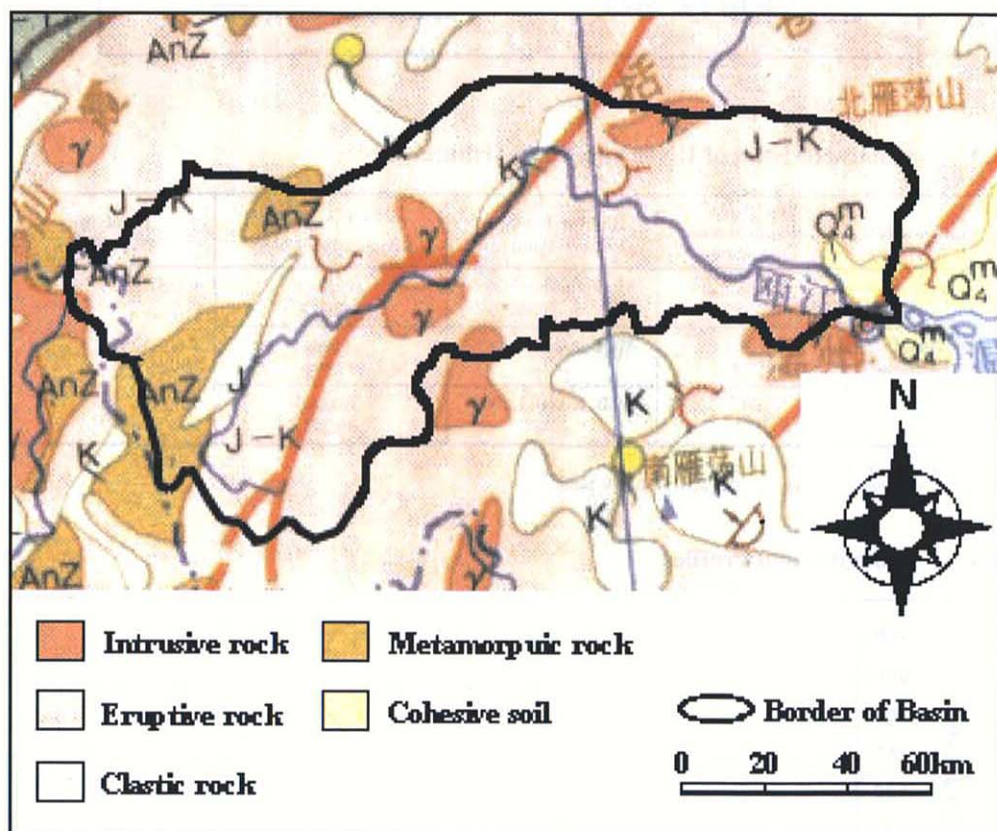
## 1. General Description

Oujiang is located in the southern part of Zhejiang province. The river which originates from Mt. Donggong (1,133m) and Mt. Yandang (1,056m) is 388 km long and drains an area of 17,859 km<sup>2</sup> before flowing out into the East Sea. It is the second largest river in the province. It is one of the highly mountainous streams in the country, taking up about 80% of the basin area and thus abundant in hydropower resources. The mean annual precipitation for the catchment is 1,746 mm, and the annual discharge at Yuren was 23,000 m<sup>3</sup>/s in 1952. The river above Qiantian is considered the upper reach and has a large tributary, Xiaoxi, while that below Qiantian is considered the downstream. The catchment below Qiantian is called Oujiang plain.

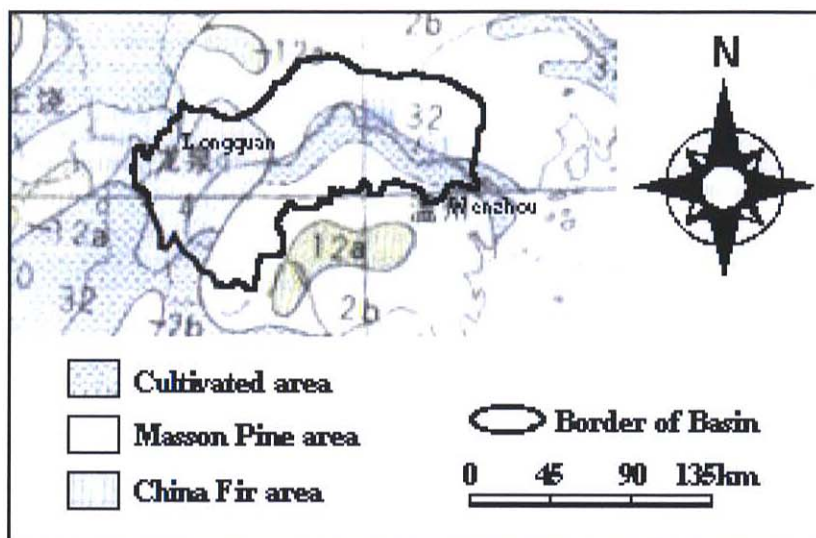
One large reservoir, named Longquan, was completed in the main stream for flood control and electricity generation. Up to now the water related problems in the basin have been control of flash floods and hydropower development in the upper stream, and drought and logging disasters reduction in down stream. The population of the catchment in 1990 has been 8,998,000.

## 2. Geographical Information

### 2.1 Geological Map



## 2.2 Land Use Map

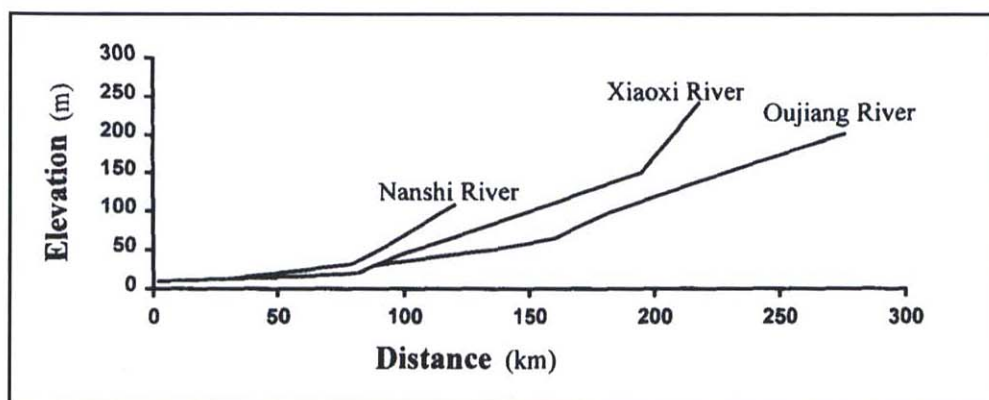


## 2.3 Characteristics of River and Main Tributaries

Name of River	Length [m] Catchment Area [km <sup>2</sup> ]	Highest Peak [m] Lowest Point [m]	Cities Population (1990)	Land use [%] (1980)
Oujiang (Main river)	338 17,859	Mt. Piyunshan 1,657 River mouth 0	Wenzhou 971,122	F (58) L (6.4)
Xiaoxi (Tributary)	131 1,156	Mt. Baishanzu 1,857 -----	Jinning 11,694	P (14.5) OA (6.5)
Nanxi (Tributary)	24 433	Mt. Xikou 1,500 -----	Yongjia 49,247	U (14)

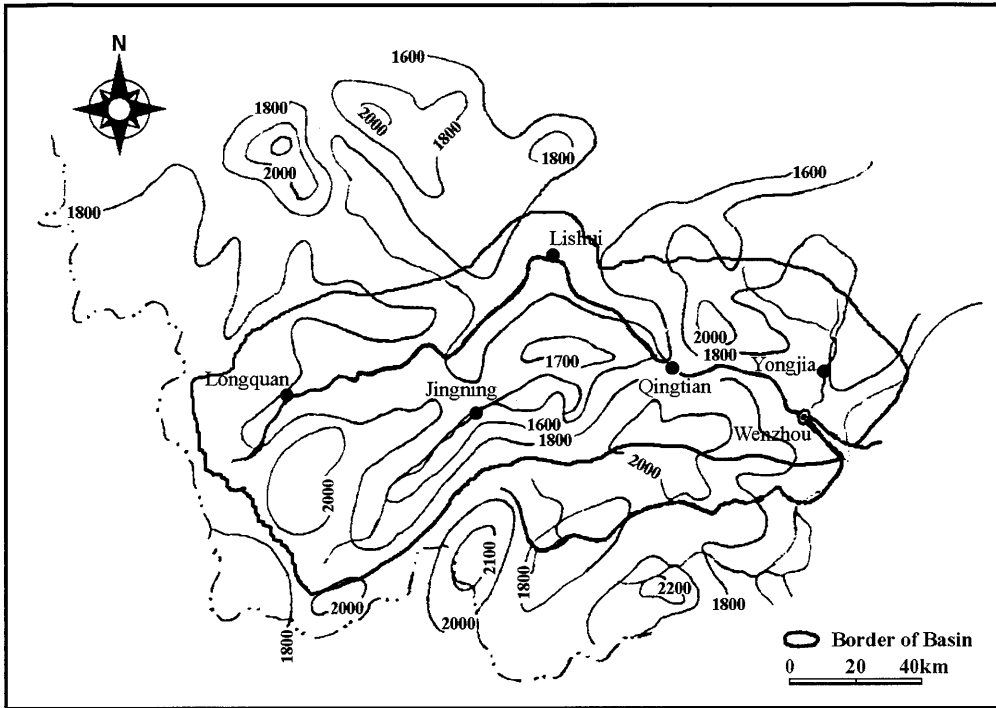
F: Forest L: Lake, River, Marsh P: Paddy Field  
OA: Other agricultural field (vegetable field, grass field) U: Urban

## 2.4 Longitudinal Profiles



### 3. Climatological Information

#### 3.1 Mean Annual Isohyetal Map and Observation Stations



#### 3.2 List of Meteorological Observation Stations

No.*	Station	Elevation [m]	Location	Observation period	Mean annual precipitation <sup>1)</sup> [mm]	Mean annual evaporation <sup>1)2)</sup> [mm]	Observation items <sup>3)</sup>
138	Yuren	19	N 28°09' E 120°20'	1932 - present	1,663	1,006	P(TB),E
119	Wuliting	43	N 28°20' E 120°01'	1954 - present	1,500	-----	P(TB)
74	Longquan	201	N 28°05' E 119°07'	1934 - present	1,555	1,001	P(TB),E
129	Shawan	242	N 27°51' E 119°28'	1933 - present	1,523	-----	P(TB)
135	Dashun	150	N 28°05' E 119°53'	1957 - present	1,526	-----	P(TB)
165	Bilian	77	N 28°19' E 120°34'	1956 - present	1,717	1,032	P(TB),E

\*: These numbers are assigned by the provincial hydrological service

1) Period of the mean is from 1960 to 1989.

2) Evaporation measured by E601(diameter 601mm) evaporation pan.

3) E: Evaporation, P: Precipitation, TB: Tipping bucket with recording chart

### 3.3 Monthly Climate Data

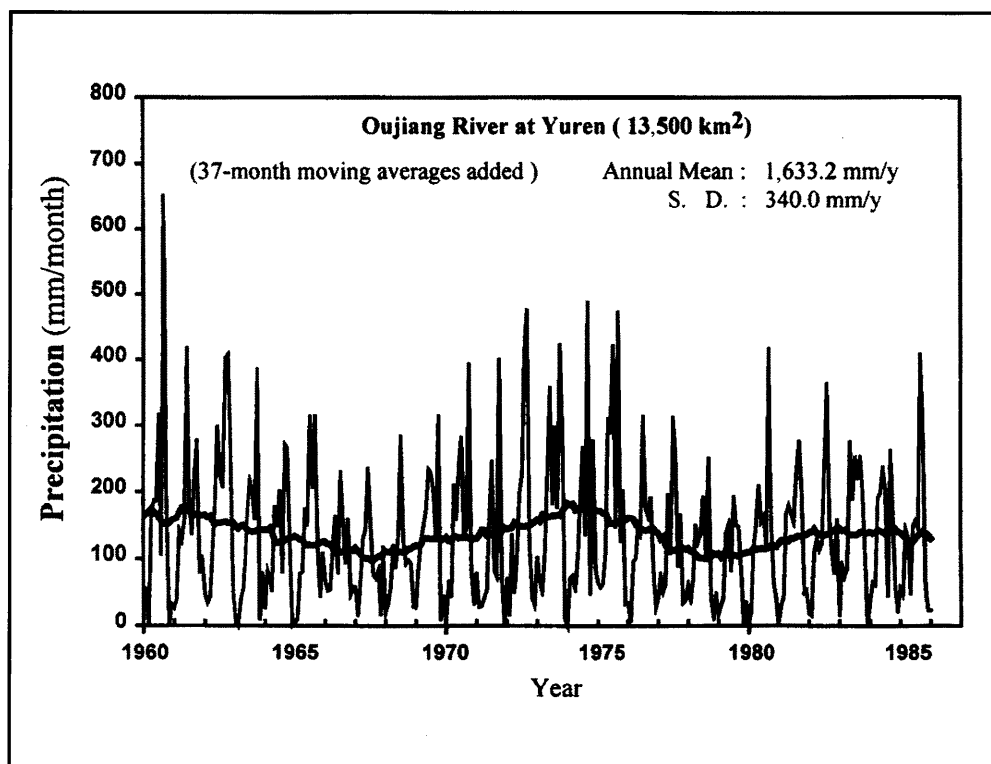
Station: Longquan

Observation item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C]**	7.6	8.1	11.2	16.1	20.4	24.3	27.9	27.9	24.5	20.1	15.4	10.4	17.9	1951 ~ 80
Precipitation [mm]*	43.1	81.8	120.1	154.0	209.9	267.5	207.9	238.9	231.8	87.4	48.8	35.2	1,726.4	1970 ~ 89
Evaporation <sup>1)</sup> [mm]	36.8	35.0	53.8	79.4	91.8	112.8	155.5	152.5	115.0	81.7	50.6	36.1	1,001.0	1970 ~ 89
Solar radiation [MJ/m <sup>2</sup> /d]														
Duration of sunshine [hr]	120.5	99.2	108.4	131.0	126.5	147.5	253.0	236.1	191.9	174.1	138.5	123.1	1,849.5	1953 ~ 80

\* Observed at Yuren. \*\* Observed at Wenzhou.

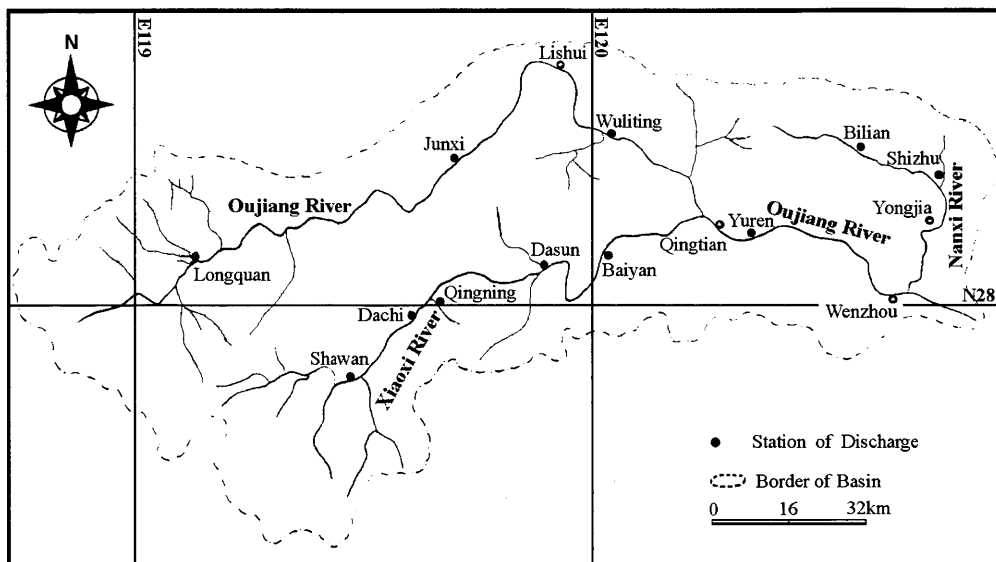
1) Evaporation measured by E601 (diameter 601mm) evaporation pan

### 3.4 Long-term Variation of Monthly Precipitation



## 4. Hydrological Information

### 4.1 Map of Streamflow Observation Stations



### 4.2 List of Hydrological Observation Stations

No.*	Station	Location	Catchment area(A) [km <sup>2</sup> ]	Observation period	Observation items** (frequency)
138	Yuren	N 28 ° 09' E 120 ° 20'	13,560	1932 ~ present	H2,Q
119	Wuliting	N 28 ° 20' E 120 ° 01'	8,870	1954 ~ present	H2,Q
129	Shawan	N 27 ° 51' E 119 ° 28'	1,156	1933 ~ present	H2,Q
165	Bilian	N 28 ° 19' E 120 ° 34'	433	1956 ~ present	H2,Q

No.*	$\bar{Q}$ <sup>1)</sup> [m <sup>3</sup> /s]	$Q_{max}$ <sup>2)</sup> [m <sup>3</sup> /s]	$\bar{Q}_{max}$ <sup>3)</sup> [m <sup>3</sup> /s]	$\bar{Q}_{min}$ <sup>4)</sup> [m <sup>3</sup> /s]	$\bar{Q}/A$ [m <sup>3</sup> /s/100km <sup>2</sup> ]	$Q_{max}/A$ [m <sup>3</sup> /s/100km <sup>2</sup> ]	Period of statistics
138	417	15,800	8,204	28.1	3.1	116.5	1970 ~ 1989
119	248	11,300	5,533	16.4	2.8	127.4	1970 ~ 1989
129	43.5	3,230	1,573	2.45	3.8	279.4	1970 ~ 1989
165	15.3	3,050	1,029	0.53	3.5	704.4	1970 ~ 1989

\* These numbers are assigned by the provincial hydrological service

\*\* H2: water level by manual,

Q: discharge

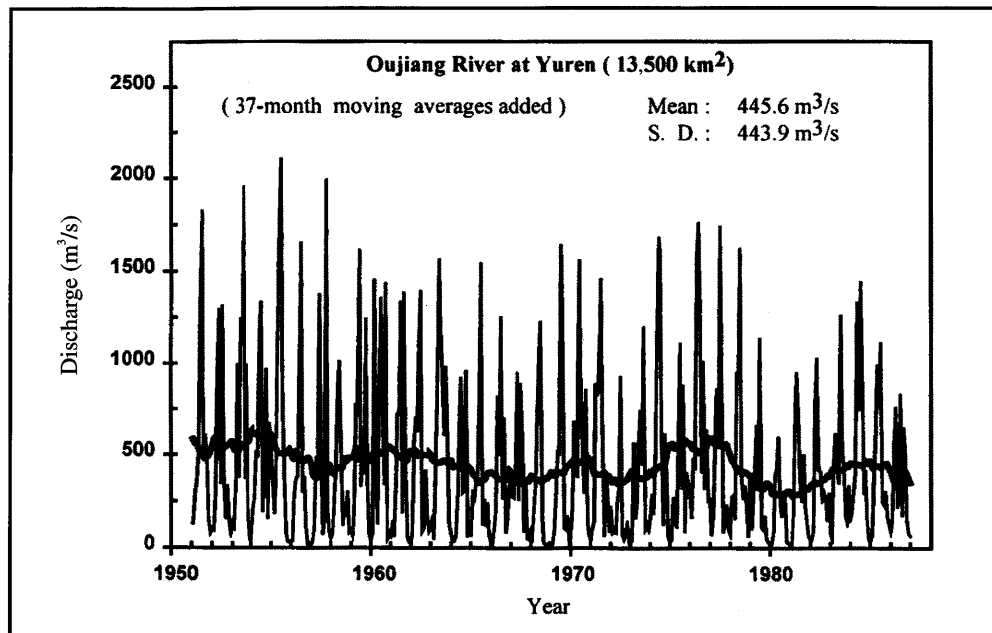
1) Mean annual discharge

2) Maximum annual discharge

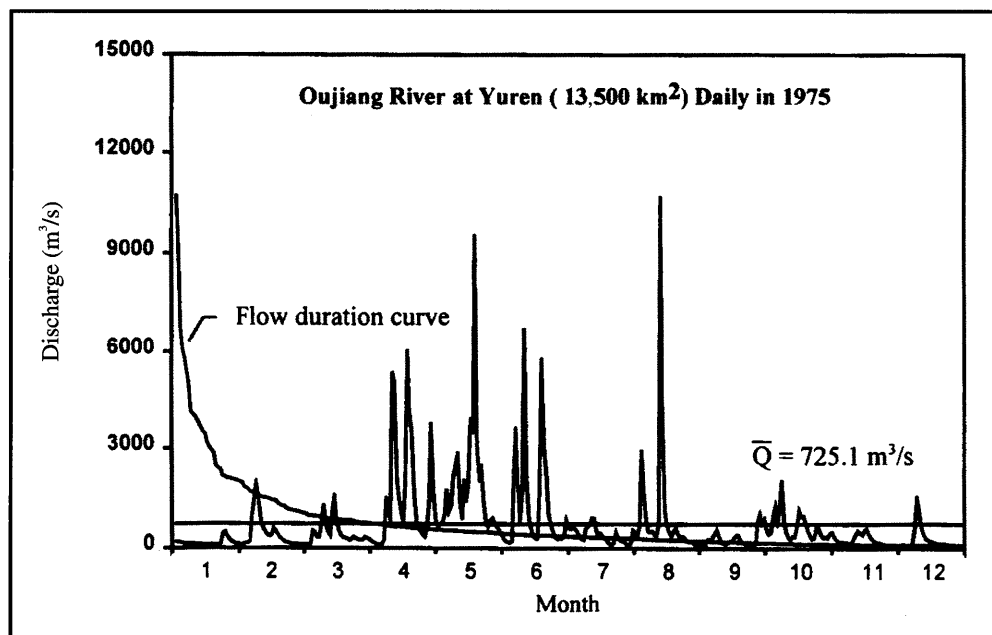
3) Mean maximum discharge

4) Mean minimum discharge

#### 4.3 Long-term Variation of Monthly Discharge



#### 4.4 Annual Pattern of Discharge



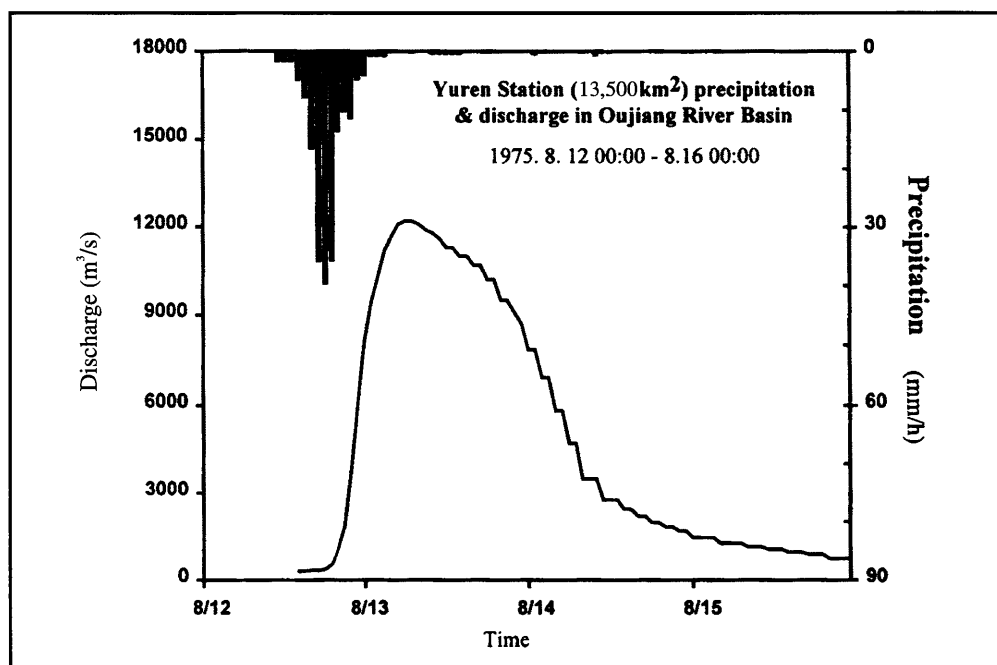
#### 4.6 Annual Maximum and Minimum Discharges

At Yuren [13,560 km<sup>2</sup>]

Year	Maximum <sup>1)</sup>		Minimum <sup>2)</sup>		Year	Maximum <sup>1)</sup>		Minimum <sup>2)</sup>	
	Date	[m <sup>3</sup> /s]	Month	[m <sup>3</sup> /s]		Date	[m <sup>3</sup> /s]	Month	[m <sup>3</sup> /s]
1968	6.25	9,710	1	15.3	1979	5.02	3,670	12	14.4
1969	9.28	15,800	12	29.2	1980	4.29	6,990	1	16.4
1970	6.27	12,100	1	27.0	1981	4.06	4,720	1	27.1
1971	9.24	12,200	9	23.0	1982	6.18	9,260	2	37.4
1972	8.18	8,770	1	22.2	1983	6.11	6,120	12	26.2
1973	6.01	11,000	12	23.4	1984	5.16	5,420	1	28.1
1974	8.20	6,960	1	18.3	1985	8.24	9,240	12	45.2
1975	8.13	12,200	1	89.0	1986	5.03	4,560	8	23.5
1976	6.03	10,100	9	39.0	1987	9.11	7,870	2	23.8
1977	6.20	6,020	12	27.8	1988	6.21	5,870	12	18.4
1978	6.18	3,710	12	15.1	1989	5.28	7,980	1	25.3

1), 2) Instantaneous observation by recording chart

#### 4.7 Hyetographs and Hydrographs of Major Floods





## 5. Water Resources

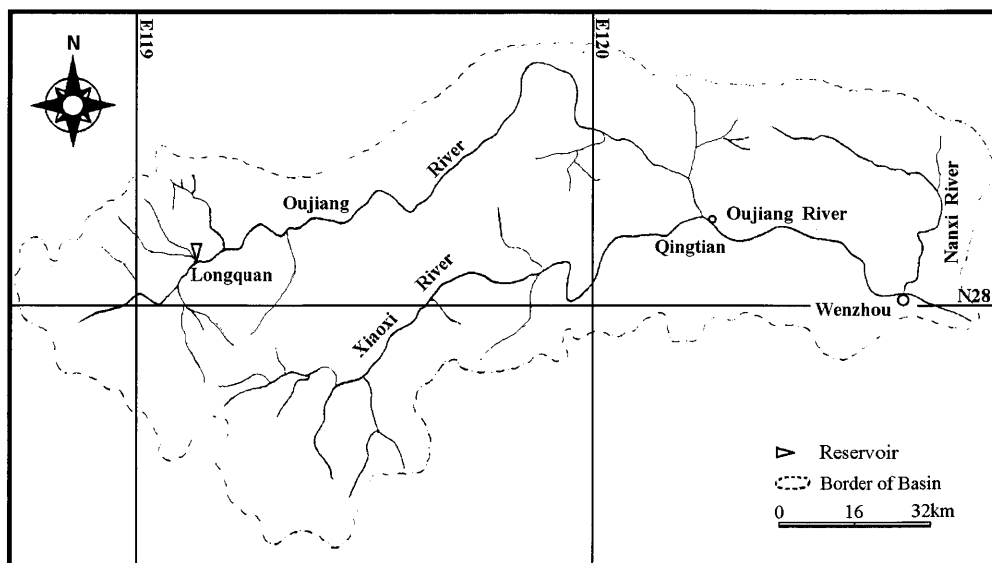
### 5.1 General Description

The Oujiang is the second largest river in the Zhejiang province. The slope of river bed is very steep with speedy flow in the upper stream. Except for a relatively small area of plains along the river in the valley, cultivated land in the basin is decentralised. The cultivated area is at a higher elevation than the water level elevation making it difficult to construct storage reservoirs for irrigation. The water use is about 3.4% of natural sources. The downstream of Oujiang is frequently influenced by tides. Since there are no large control projects in the upstream, the downstream area suffers either flooding or drought. Pumping stations along the river have been constructed for providing water supply to cities by the river.

The precipitation distribution in the basin is closely related to the climate. "Meiyu", which means "plum rain", is the dominant rainfall from May to June. It covers the entire basin with long duration and accounts for up to about 40% of the annual precipitation. In July and August, the weather is clear and hot since it is under subtropical high pressure. The basin has in the past experienced frequent typhoons and storms from July to October. In 1992, Wenzhou which is the largest city in the basin suffered a severe disaster caused by typhoon storms and tide.

The groundwater distribution in the basin is highly related to rainfall and runoff. Rainfall being the main recharge source, the groundwater potential capacity is about one third of surface water. Generally the water resources development is still quite low in the province.

### 5.2 Map of Water Resources System



### 5.3 List of Major Water Resources Facilities

#### Major Reservoirs

Name of river	Name of dam (reservoir)	Catchment area [km <sup>2</sup> ]	Gross capacity [10 <sup>6</sup> m <sup>3</sup> ]	Effective capacity [10 <sup>6</sup> m <sup>3</sup> ]	Purpose <sup>1)</sup>	Year of completion
Oujiang	Longquan	2,761	1,393	1,040	P, F	1986.6

1) F: Flood control, P: Hydro-power

### 5.4 Major Floods and Droughts

#### Major Floods at Yuren (Catchment area 13,500 km<sup>2</sup>)

Date	Peak discharge [m <sup>3</sup> /s]	Rainfall [mm] Duration	Meteorological cause	Dead and missing	Major damages (Districts affected)
1952.7.20	23,000	201 7.18~20	Frontal	---	Wenzhou, Yongjia city etc.
1962.9.6	16,100	247 9.3~6	Frontal	---	Wenzhou, Yongjia city etc.

## 6. Socio-cultural Characteristics

Zhejiang is an important cultural province in China. Every year many students go to universities from rural areas of this province. In the basin, the city of Qingtian is famous as a hometown of overseas Chinese who in the past, have migrated to European and Southeast Asian countries. The Qingtian stone is widely known in the country for carving. The city of Wenzhou, newly developed, is the capital of button and shoe industries. Yandang mountain is a national natural and bird protection area with famous scenic spots and antiques. Parts of this area are open to tourists.

## 7. References, Databooks and Bibliography

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Geology Press (1973): *The atlas of geology in China*.

Zhejiang Hydrological Service (1985): *Zhejiangxi Hydrology Handbook*.

Zhejiang Water Resources and Hydropower Survey and Design Institute (1985), *Water resources development for Zhejiang province*.