

## Kali Ciliwung

### Map of River



### Table of Basic Data

<b>Name:</b> Ciliwung		<b>Serial No. :</b> Indonesia-11
<b>Location:</b> West Java-Indonesia, DKI Jakarta	S 06° 07' 00" - 06° 46' 00"	E 106° 49' 00" - 107° 00' 00"
<b>Area:</b> 476.2 km <sup>2</sup>	<b>Length of main stream:</b> 97 km	
<b>Origin:</b> Mt. Mandalawangi	<b>Highest pt:</b> 3,002 m	
<b>Outlet:</b> Java Sea	<b>Lowest:</b> 0 m	
<b>Main base rocks:</b> Tuffaceous breccia, alluvial fans from quarternary and volcanics rocs, and alluvial and beach ridge deposit		
<b>Main tributaries:</b> Ciesek River (27.15 km <sup>2</sup> ), Ciluar River (35.25 km <sup>2</sup> )		
<b>Main Reservoirs:</b> None		
<b>Mean annual precipitation:</b> 3,125 mm		
<b>Mean annual runoff:</b> 95.1 m <sup>3</sup> /s		
<b>Population:</b> 4,088,000 (2000)	<b>Main cities:</b> DKI Jakarta, Bogor	
<b>Land use:</b> Forest (9.80%), Paddy Field (9.40%), Agriculture (48.0%), Urban (32.8%)		

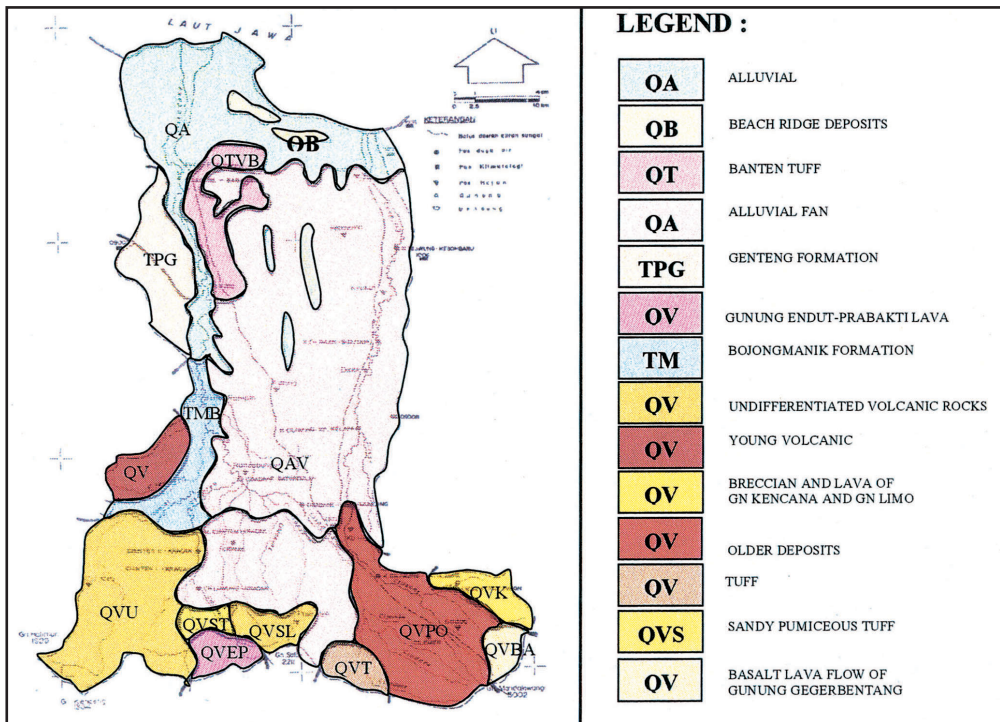
# 1. General Description

Ciliwung river is 97 km long, has a catchment area of 476 km<sup>2</sup>, and is located in the western region of Java where it flows through two provinces, West Java and the special region of Jakarta. The Ciliwung river has its source at Mt. Mandala Wangi in Kabupaten Bogor with the highest peak at 3,002 m. The river flows in a northern direction passing several active volcanoes, Mt. Salak (2,211 m), Mt. Kendeng (1,364 m), and Mt. Halimun (1,929 m), crosses two main cities Bogor and Jakarta before finally flowing into the Java Sea. The main tributaries are located in the upper catchment and are the Ciesek and Ciluar with respective lengths 9.7 km and 21.0 km and catchment areas of 27.15 km<sup>2</sup> and 35.25 km<sup>2</sup>.

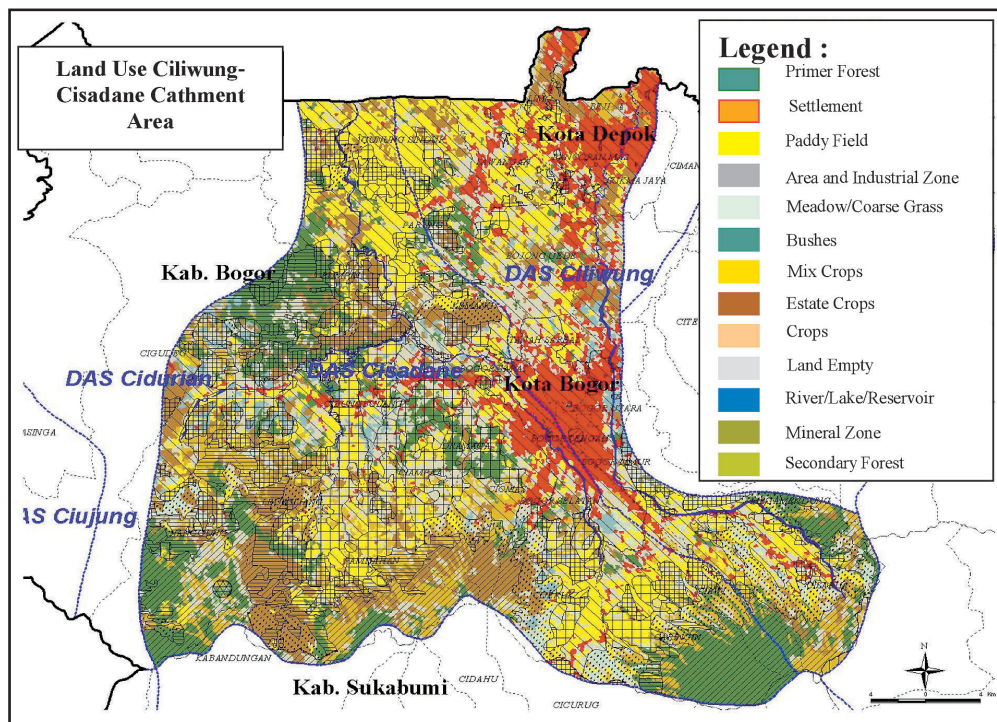
The Ciliwung basin is a narrow and elongated shape of which 17.2 km upstream has a very steep slope (0.08), 25.4 km in the middle reach has a slope of 0.01 and the downstream, 55 km has a flat slope of 0.0018. In general the geology of the Ciliwung river basin is dominated by Tuffaceous Breccia and older deposits lahar and lava in the upstream area. The middle reach consists mainly of alluvial fans from quaternary and volcanic rocks, and the downstream area is dominated by alluvial and beach ridge deposits. Mean rainfall reaches 3,125 mm, with mean annual discharge of 16 m<sup>3</sup>/sec. as measured at Ciliwung Ratujuaya observation station (231 km<sup>2</sup>). With such topographical, geological and hydrological features the Ciliwung river is often overflowing and inundating parts of Jakarta city. The population along the Ciliwung river basin reaches 4.088 million (Census 2000) and can be regarded as the most densely populated area.

# 2. Geographical Information

## 2.1 Geological Map



## 2.2 Land Use Map

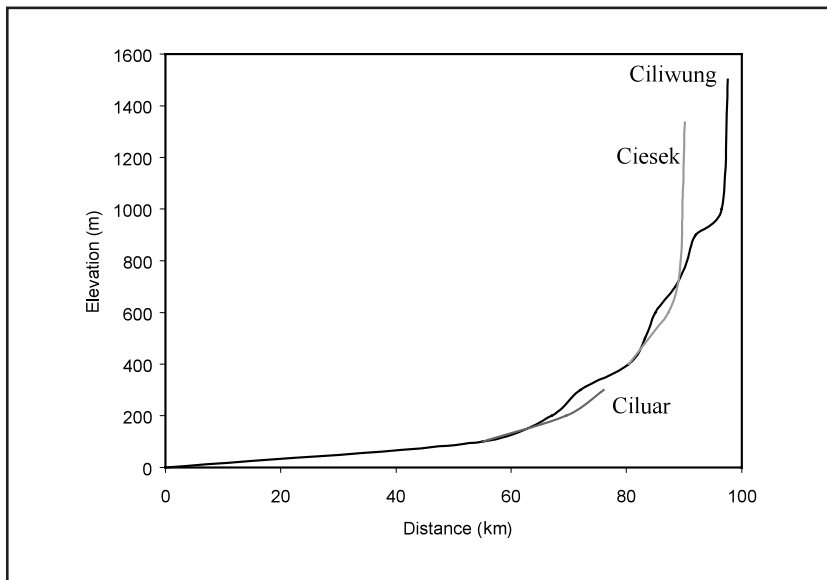


## 2.3 Characteristics of River and Main Tributaries

No.	Name of river	Length (km) Catchment area (km <sup>2</sup> )	Highest peak (m) lowest point (m)	Cities Population (Million)*	Land use (%)
1	<b>Ciliwung</b> (Main River)	97.00 476.20	3002 0	Bogor (1.419) DKI (2.433)	F (9.80) P (9.40) A (48.0) U (32.8)
2	<b>Ciesek</b> (Tributary)	9.70 27.15	1334 495		
3	<b>Ciapus</b> (Tributary)	21.00 35.25	300 119		

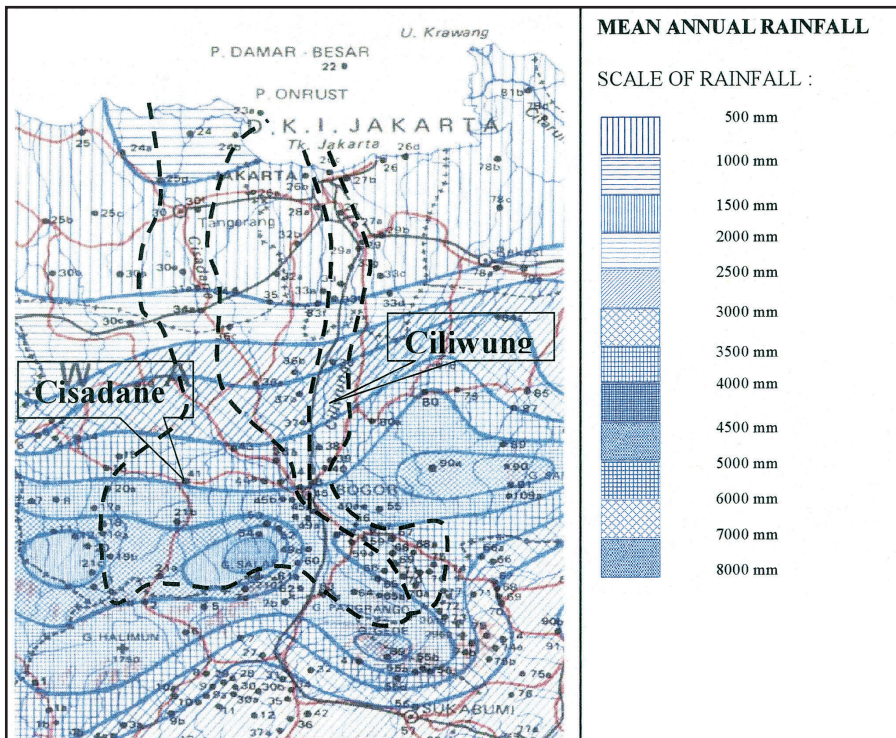
F: Forest; P: Paddy field; A: Agriculture (vegetable field, grass field); U: Urban (Census 2000)

## 2.4. Longitudinal Profiles



## 3. Climatological Information

### 3.1 Annual Isohyetal Map and Observation Stations



### 3.2 List of Meteorological Observation Stations

No.	Station	Elevation (m)	Location	Observation period	Mean annual precipitation (mm)	Obsevation item <sup>1)</sup>
1.	Cipanas	1,100	S 06° 44' 00" E 106° 59' 00"	1972 - 1979	1,125.39	RH, T, R, DS
2.	Cibinong	125	S 06° 28' 00" E 106° 53' 00"	1971 - 1989	2,862.63	RH, T, R, DS
3.	Jakarta Obs.	07	S 06° 10' 00" E 106° 49' 00"	1971 - 1989	2,105.9	RH, T, R, DS

RH: Relative Humadity, T: Temperature, R: Rainfall, DS: Duration of Sunshine

### 3.3 Monthly Climate Data

#### Station: Cipanas

Observation Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature (°C)	19.6	19.9	20.2	21.2	21.3	20.5	20.3	20.5	20.8	21.3	21.2	20.6	71.0	1973 - 1989
Precipitation (mm)	441.3	324.3	470.1	289.5	284.2	136.2	105.2	106.3	296.3	261.1	259.2	227.0	1,125.4	1971 - 1979
Relative Humidity (%)	87	87	85	83	83	79	80	78	78	79	80	79	191	1971 - 1989
Duration of Sunshine (%)	12	14	33	49	52	-	59	47	53	35	22	27	-	1971 - 1989

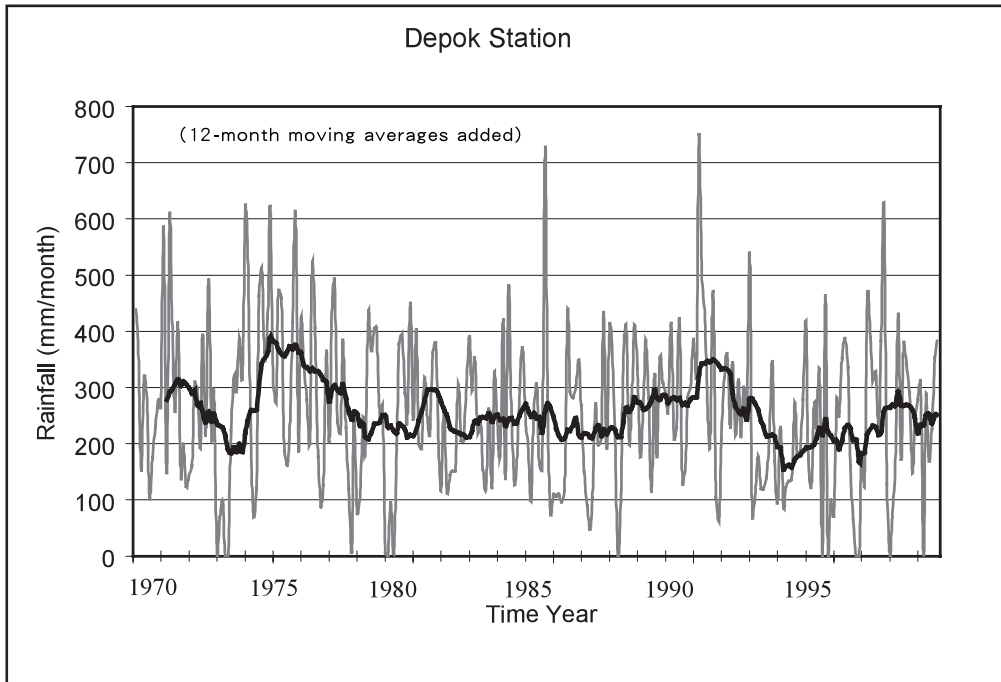
#### Station: Cibinong

Observation Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature (°C)	25.4	25.5	25.9	26.2	26.3	26.2	25.9	26.1	26.3	26.5	26.3	25.9	26.0	1971 - 1989
Precipitation (mm)	353.9	337.0	377.3	359.8	309.7	191.7	165.5	171.9	189.3	290.1	299.4	391.0	286.4	1971 - 1989
Relative Humidity (%)	86	86	84	84	83	81	80	77	76	78	80	83	82	1971 - 1989
Duration of Sunshine (%)	37	50	57	67	72	71	79	80	76	71	59	51	64	1971 - 1989

#### Station: Jakarta Obs

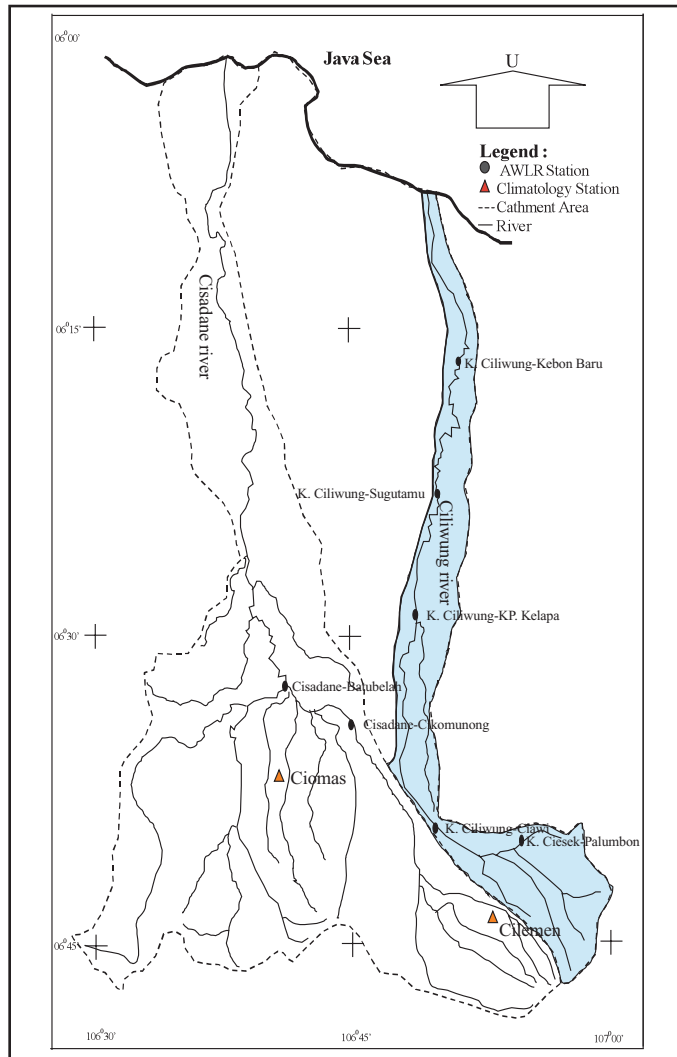
Observation Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature (°C)	26.2	26.5	26.9	27.6	27.6	27.4	27.3	27.4	27.5	27.6	27.5	26.8	27.2	1971 - 1989
Precipitation (mm)	404.6	289.3	234.0	111.8	131.2	115.4	57.8	58.5	78.6	112.1	229.4	283.3	1,825.9	1971 - 1989
Relative Humidity (%)	82	81	80	76	76	74	72	70	69	72	75	78	76	1971 - 1989
Duration of Sunshine (%)	37	43	50	61	61	61	66	69	65	61	50	45	56	1971 - 1989

### 3.4 Long-term Variation of Monthly Rainfall Series



## 4. Hydrological Information

### 4.1 Map of Streamflow Observation Stations



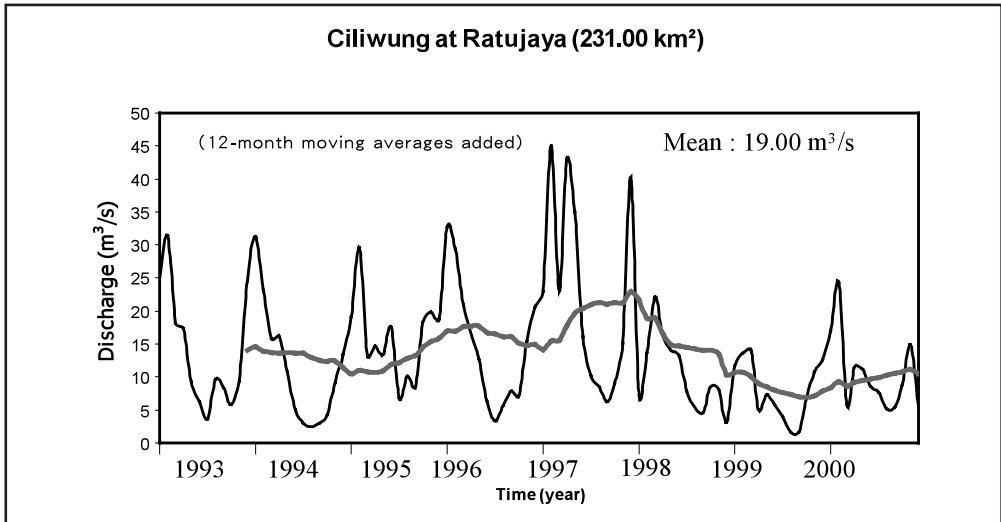
### 4.2 List of Hydrological Observation Stations

No.	Station	Location	Catchment area (km <sup>2</sup> )	Obsevation period	Obsevation item <sup>1)</sup> (frequency)
1.	Katulampa	S 06° 36' 07" E 106° 47' 38"	158.0	1993 - 2001	Q (d)
2.	Ratu Jaya	S 06° 19' 50" E 106° 50' 13"	231.0	1991 - 2001	Q (d)
3.	Kp. Kelapa	S 06° 27' 22" E 106° 48' 12"	211.0	1988 - 2001	Q (d)
4.	Sugutamu	S 06° 26' 20" E 106° 44' 00"	266.6	1992 - 2001	Q (d)

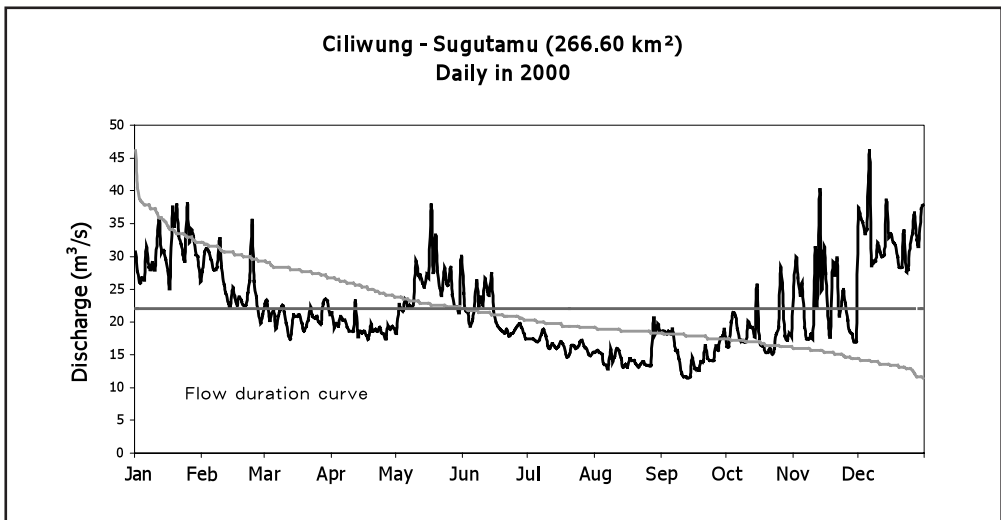
No.	$\bar{Q}^{2)}$ (m <sup>3</sup> /s)	Qmax <sup>3)</sup> (m <sup>3</sup> /s)	$\bar{Q}max^{4)}$ (m <sup>3</sup> /s)	$\bar{Q}min^{5)}$ (m <sup>3</sup> /s)	$\bar{Q}max/A$ (m <sup>3</sup> /s/100km <sup>2</sup> )	Qmax/A (m <sup>3</sup> /s/100km <sup>2</sup> )	Period of statistics
1.	6.14	37.2	14.11	1.90	3.886	23.544	1993 - 2000
2.	11.22	105	34.50	5.35	4.857	45.454	1993 - 2000
3.	10.3	32.3	18.2	3.70	4.881	15.308	1992 - 2000
4.	23.95	80.5	39.05	14.02	8.983	30.195	1992 - 2000

<sup>1)</sup> Q: discharge; d: daily measurement; <sup>2)</sup> Mean annual discharge; <sup>3)</sup> Maximum discharge; <sup>4)</sup> Mean maximum discharge; <sup>5)</sup> Mean minimum discharge.

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



### 4.4 Annual Pattern of Discharge





#### 4.5 Unique Hydrological Features

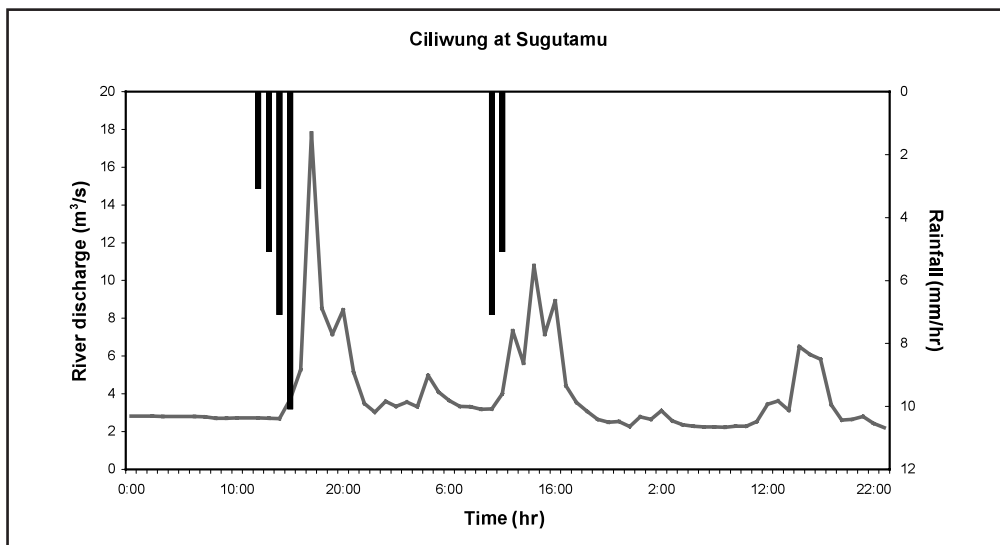
As explained in the general description, the Ciliwung river basin has a long and narrow shape with steep slopes in the upstream and middle reaches. Rainfall is very high and the recharge area is very small because of the densely populated and settled areas downstream. The relatively short duration of rainfall in the upper areas of the river basin and local inflows downstream cause floods and inundation of the Jakarta area. This condition is aggravated when floods occur during a full moon when the ocean tides are highest. To avoid inundation of the city area, a flood channel to direct flows to the west is being built and called “Banjir Kanal Barat”.

#### 4.6 Annual Maximum and Minimum Discharge at Sugutamu (266.6 km<sup>2</sup>)

Year	Maximum		Minimum	
	Date	Discharge <sup>1)</sup> (m <sup>3</sup> /s)	Month	Discharge <sup>2)</sup> (m <sup>3</sup> /s)
1992	10.20	84.20	07	7.20
1993	-	-	-	-
1994	05.11	73.45	07	7.15
1995	02.10	130.40	10	6.46
1996	02.10	58.5	08	3.31
1997	12.17	163.00	11	8.28
1998	-	-	-	-
1999	03.13	93.00	08	15.14
2000	03.24	46.50	09	0.24

<sup>1),2)</sup> Instantaneous observation by recording chart

#### 4.7 Hyetographs and Hydrographs of Major Floods





### 5.3 List of Major Water Resources Facilities

#### Major Major Diversions and Canals

Name of rivers	Location	Maximum capacity (m <sup>3</sup> /s)	Purpose <sup>1)</sup>
Ciliwung	Banjir Kanal Barat	350	F

1) F: Flood control

#### Others

Name of River	Facility	Purpose <sup>1)</sup>	Capacity (m <sup>3</sup> /s)	Year of completion
Katulampa	Weir	A	4.9	1940
Manggarai	Barrage	F	350	1935
Bantarjati	Weir	A	0.03	
PDAM Bogor	Free Intake	W	0.06	
PDAM Cibinong	Free Intake	W	0.05	
PDAM Citayam	Free Intake	W	0.06	
PDAM Depok	Free Intake	W	0.03	

1) A: Agriculture use F: Flood control W: Municipal water supply

### 5.4 Water Quality

#### River Water Quality at Ciliwung-Katulampa in 2003

Date	Jul	Aug	Sep	Oct	Nov
pH	8.0	7.4	7.5	7.0	7.1
DO (mg/l)	7.0	6.4	8.7	7.0	7.0
COD (mg/l)	7.1	7.6	12	8.5	7.1
SS (mg/l)	10	22	52	28	36
Discharge (m <sup>3</sup> /sec)	0.1	3.46	3.46	4.5	1.22

## 6. Socio-cultural Characteristics

The Ciliwung River flows through two provinces, West Java and the Special Region of Jakarta. Two main races dominate the region namely, the Sundanese (West Java) and Orang Betawi (Jakarta), therefore socio cultural characteristics differ from one area to the other.

In the Bogor area (Upper Ciliwung River) in the past were found two famous ancient kingdoms; Tarumanegara (4<sup>th</sup>-5<sup>th</sup> Century) with its great King Purnawarman and Padjajaran (15<sup>th</sup>-16<sup>th</sup> Century) with its King Sri Baduga. The existence of these Kingdoms is found from ancient inscriptions at Ciaruteun (Tarumanagara) and Batutulis (Padjajaran).

Culture in the Bogor area is mainly Sundanese, such as can be observed from traditional dances, the Ketuk Tilu or the Jaipongan which is modern, sensual and full of spirit. Specific Sundanese music can be observed from the Degung, Calung, Angklung and Kecapi Suling.

The upper part of the Ciliwung in the Jakarta region was once famous for a kingdom (Banten) with Pangeran Jayakarta as King. The Yapong is a favourite dance in the area and Gambang Kromong as well as Kroncong music can still be found at Tugu, north of Jakarta. Also famous is a humorous play, the Lenong, using a special Betawi dialect.

## **7. References, Data-books and Bibliography**

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