Kali Cisadane

Map of River

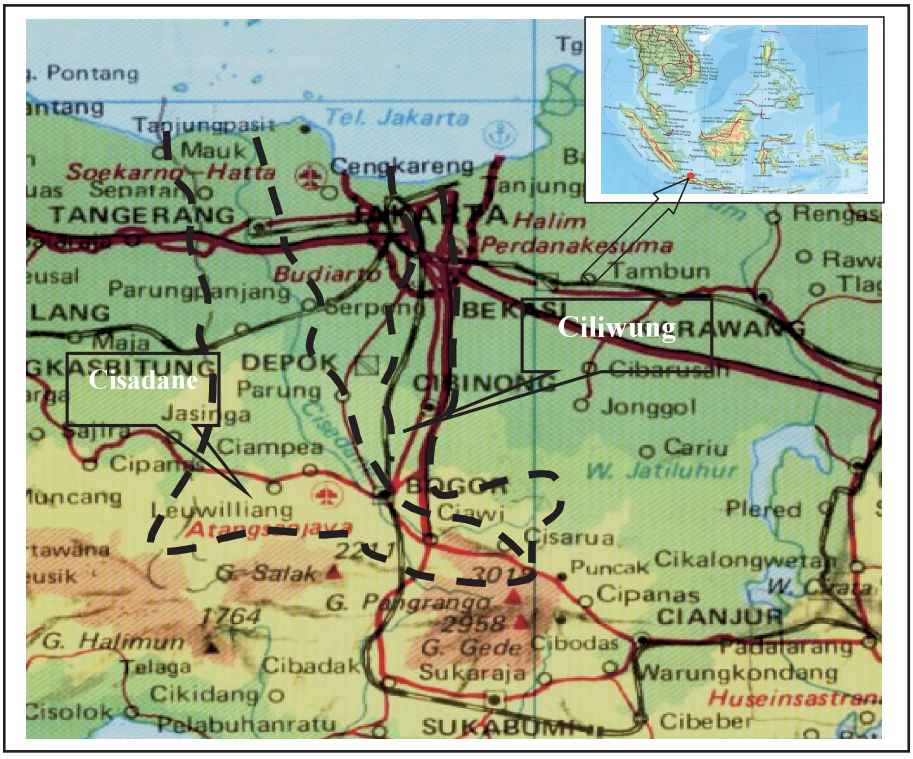


Table of Basic Data

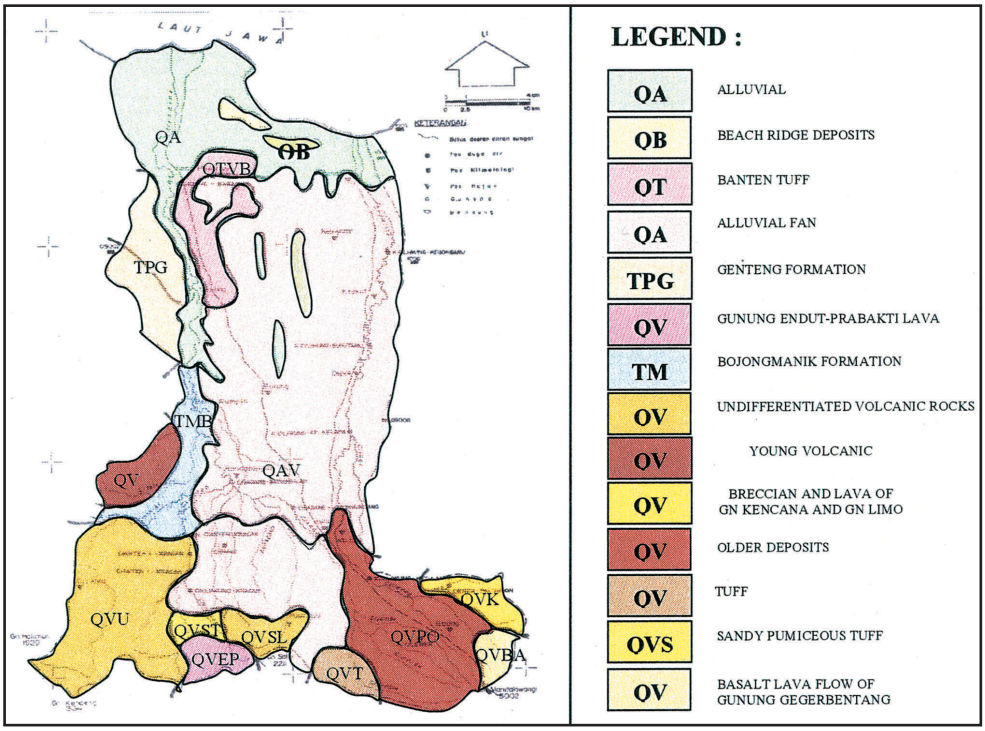
Name: Cisadane		**Serial No. :** Indonesia-12
Location: West Java - Indonesia, DKI Jakarta, Banten Propvince	S 06° 03' 00" - 06° 45' 00"	E 106° 25' 00" - 107° 00' 00"
Area: 1,366.6 km^2	**Length of the main stream:** 137.6 km	
Origin: Mt. Mandalawangi	**Highest Pt.:** 3,002 m	
Outlet: Java Sea	**Lowest:** 0 m	
Main base rocks: Breccia, andesite, basaltic, alluvial		
Main tributaries: Cianten River (426.5 km^2), Ciapus River (58.15 km^2)		
Main Reservoirs: None		
Mean annual precipitation: 3,137 mm		
Mean annual runoff: 95.1 m^3/s		
Population: 5,520,000 (2000)	**Main cities:** Bogor, Tanggerang	
Land use: Agriculture (48.52%), Forest (16.34 %), Lake, river, marsh (1.15%), Paddy field (22.77%), Urban (11.22%)		

1. General Description

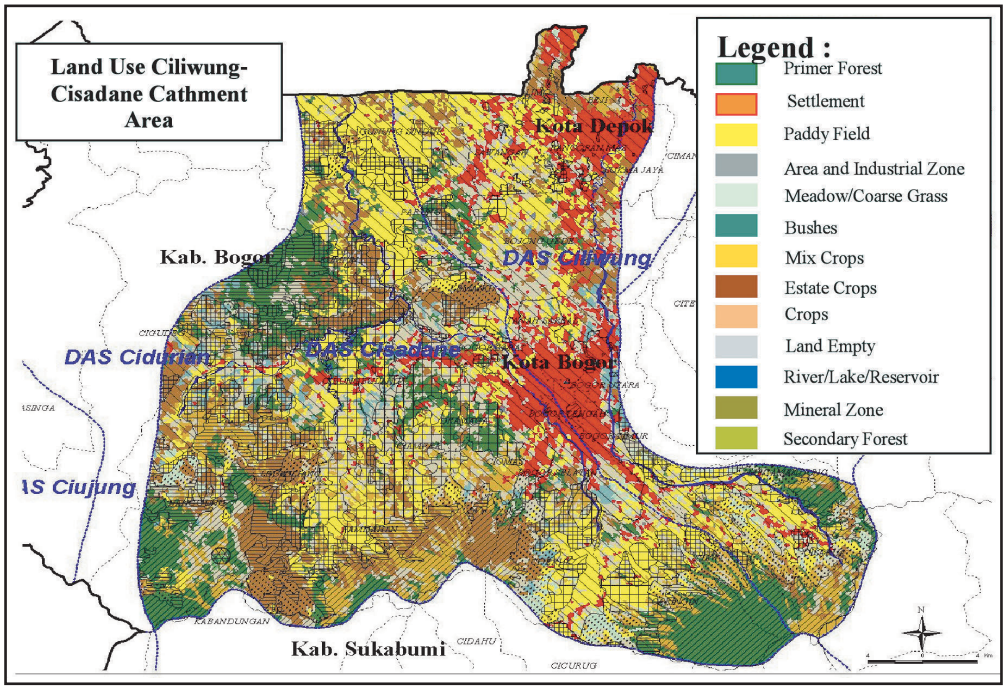
The Cisadane River which is next to Ciliwung River has a 1,367 km^2 river basin and a length of 137.6 km. It originates from the same source as the Ciliwung, Mt. Mandalawangi in Kabupaten Bogor with a highest peak of 3,002 m and Mt. Salak at 2,211 m, and flows northward through valleys to empty at Tanjungburung river mouth in to the Java Sea. Similar to the Ciliwung, the Cisadane crosses two Kabupaten in two Provinces, Kabupaten Bogor in West Java Province and Kabupaten Tangerang in Banten Province. The river flows through the cities of Bogor and Tangerang. Tributaries are mostly found in the upstream region with the largest tributaries being the Cianten and Ciapus with respective lengths of 49.2 km and 27 km and covering areas of 426.5 km^2 and 58.15 km^2. The upper part of the Cisadane River basin has a round shape and from the middle reach to downstream is long and narrow. The upper 10.1 km has steep slopes of 0.228, the 25 km middle reach has slopes of 0.032, and the downstream 102.5 km has flat slopes of 0.00195. In general, the geological condition of the Cisadane river basin comprises breccia, lava flow of mainly andesite, lava flow basaltic with piroxine and older deposit lahar. The middle reach consists mainly of Genteng Formation, Bojongmanik Formation, alluvial fan beaded fine tuff, sandy tuff interspersed with conglomeratic tuff. The downstream geological condition is dominated by banten tuff with alluvial deposits (clay, silt, sand gravel pebble and boulder) at the river mouth. Mean rainfall for the Cisadane is 3,137 mm, with an annual mean discharge of 92 m^3/sec as observed at observation station Cisadane Batubelah (819.6 km^2). The population density in this area is around 5.520 million (census 2000) and is considered as relatively densely populated.

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map

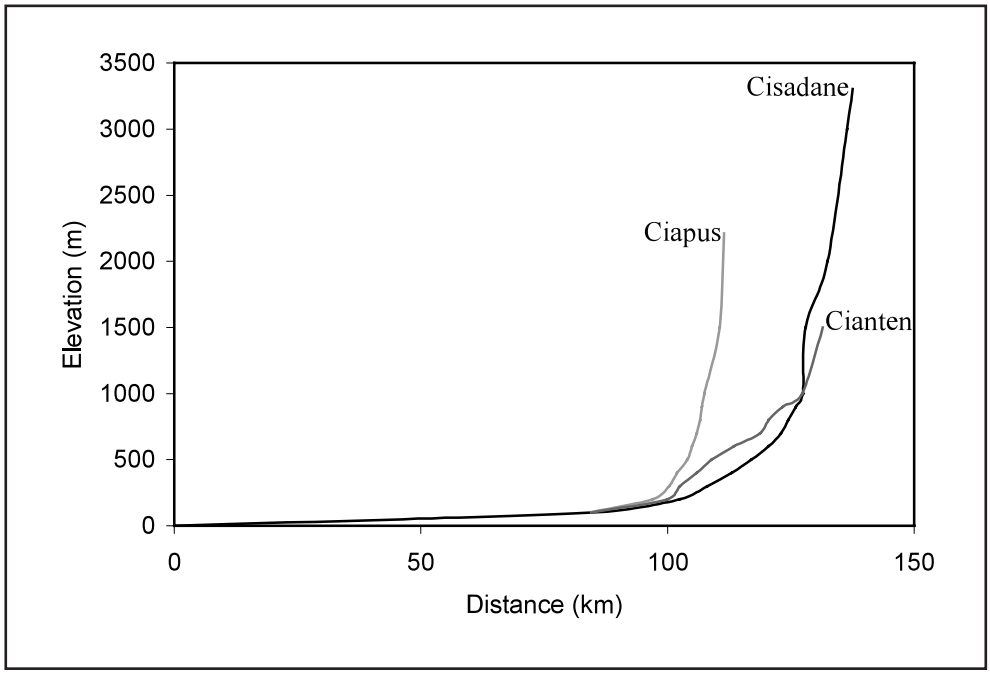


2.3 Characteristics of River and Main Tributaries

No.	Name of river	Length (km) Catchment area (km^2)	Highest peak (m) Lowest point (m)	Cities Population (Million)*	Land use (%)
1	Cisadane (Main River)	137.6 1,366.6	3,002 0	Bogor (4.018) Tangerang (1.502)	A (48.52) F (16.34) L (1.15) P (22.77) U (11.22)
2	Cianten (Tributary)	49.2 426.5	1,699 125		
3	Ciapus (Tributary)	27.0 58.15	2,211 147		

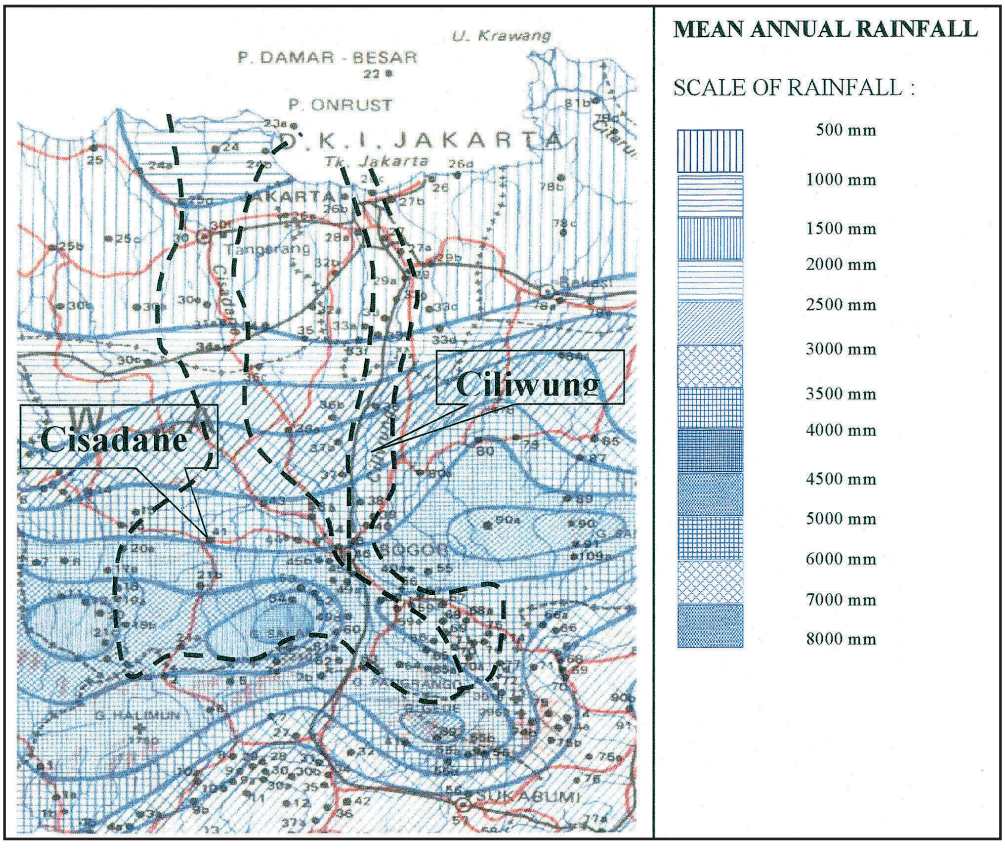
F: Forest; P: Paddy field; A: Agriculture (vegetable field, grass field); U: Urban; L: Lake, River, Marsh *: census 2000

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[1)]
1	**Curug**	46	S 07° 23' 18" E 109° 43' 00"	1971 - 1989	1,917.3	RH, T, R, DS
2	**Dermaga**	250	S 06° 30' 00" E 106° 45' 00"	1971 - 1989	3,192.4	RH, T, R, DS

1) RH: Relative Humadity, T: Temperature, R: Rainfall, DS: Duration of sunshine

3.3 Monthly Climate Data

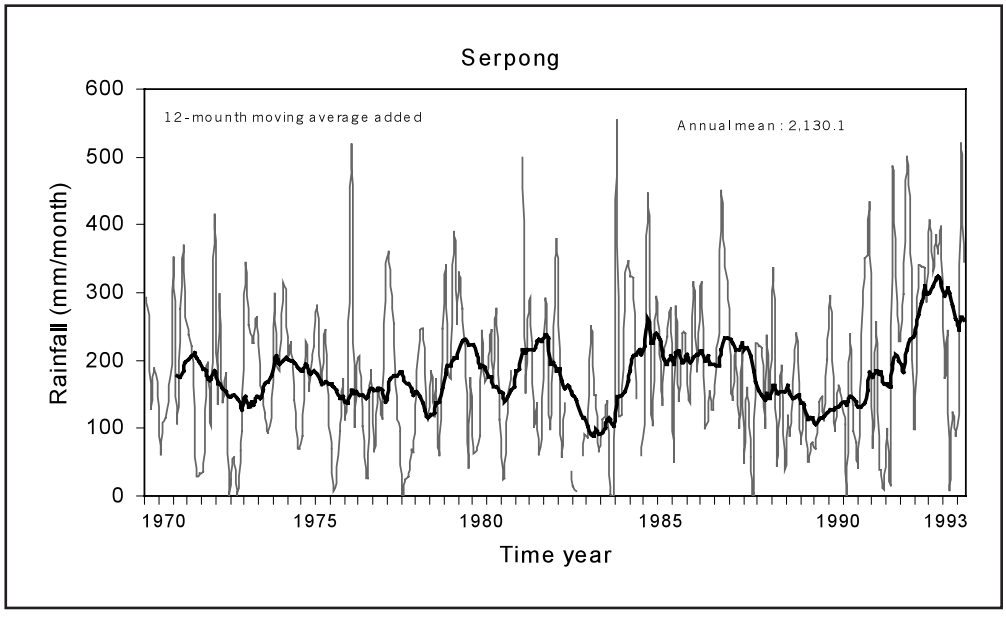
Station: Curug

Observation Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature (°C)	25.6	25.7	26.3	26.8	26.8	26.4	26.1	26.2	26.4	26.7	26.6	26.5	26.3	1971 - 1989
Precipitation (mm)	381.3	261.8	268.3	210.9	190.6	107.3	91.0	84.7	129.0	198.7	188.3	197.7	192.5	1971 - 1989
Relative Humidity (%)	82	85	84	83	82	80	79	78	77	79	81	82	81	1971 - 1989
Duration of Sunshine (%)	32	45	50	64	72	67	78	77	90	64	54	78	64	1971 - 1989

Station: Darmaga

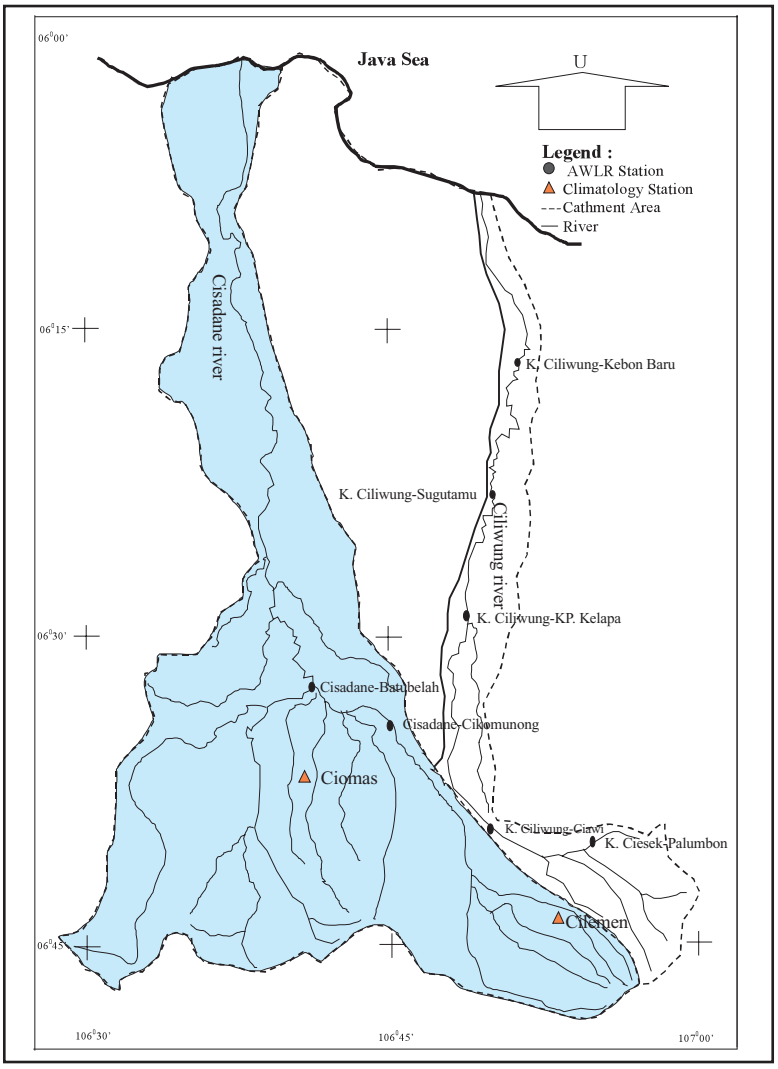
Observation Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature (°C)	24.6	24.7	25.0	25.6	25.5	25.5	25.1	25.3	25.4	25.7	25.5	25.1	25.3	1973 - 1989
Precipitation (mm)	444.1	329.7	383.5	355.5	370.4	240.1	236.9	289.1	310.9	305.7	344.0	302.4	326.0	1971 - 1979
Relative Humidity (%)	90	90	89	88	87	87	85	83	83	82	83	86	86	1971 - 1989
Duration of Sunshine (%)	32	37	46	66	70	72	78	76	69	64	54	43	59	1971 - 1989

3.4 Long-term Variation of Monthly Rainfall Series



4. Hydrological Information

4.1 Map of Streamflow Observation Stations



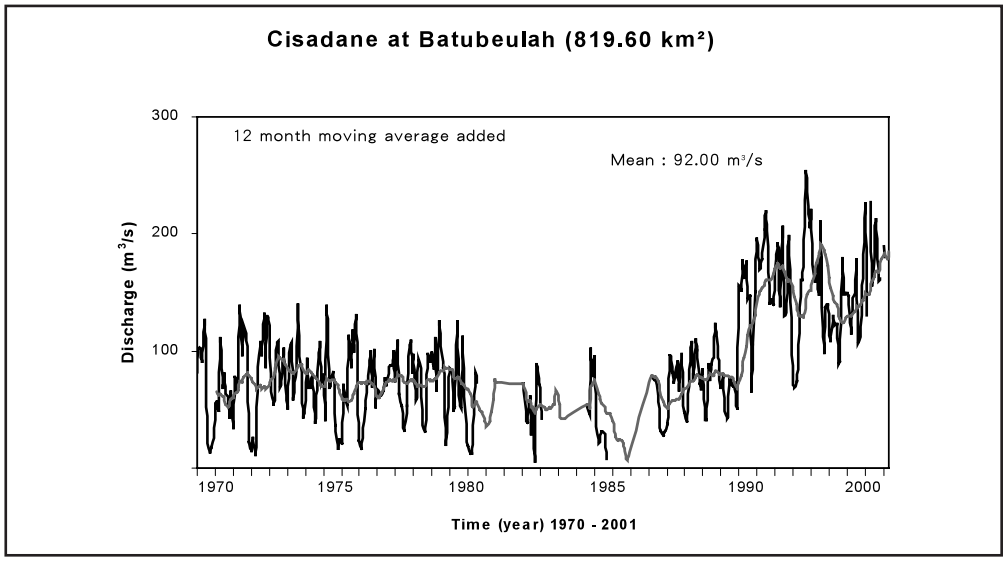
4.2 List of Hydrological Observation Station

No.	Station	Location	Catchment area [A] (km^2)	Obsevation period	Obsevation item[1] (frequency)
1	Batubeulah	S 06° 29' 00" E 106° 41' 00"	819.60	1968 - 2000	Q (d)
2	Genteng	S 08° 38' 20" E 106° 48' 20"	185.00	1994 - 2000	Q (d)
3	Babakan	S 06° 29' 45" E 106° 48' 00"	1,146.00	1994 - 2000	Q (d)
4	Legokmuncang	S 06° 29' 00" E 106° 41' 00"	196.0	1985 - 1998	Q (d)

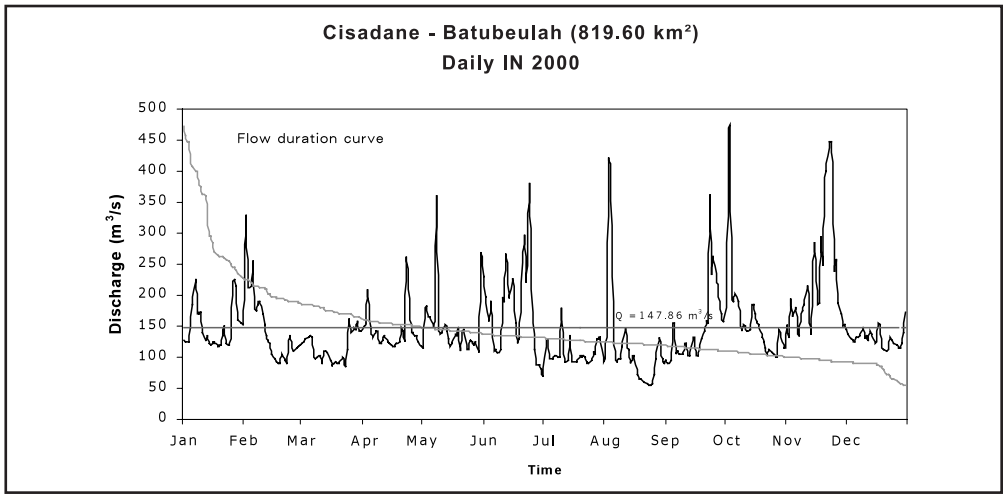
No.	$\overline{Q}$[2] (m^3/s)	Qmax[3] (m^3/s)	$\overline{Q}$max[4] (m^3/s)	$\overline{Q}$min[5] (m^3/s)	$\overline{Q}$max/A ($m^3/s/100km^2$)	Qmax/A ($m^3/s/100km^2$)	Period of statistics
1.	95.1	254	111.704	61.041	11.603	30.991	1970 - 2001
2.	12.8	32.5	15.67	3.19	6.919	17.568	1994 - 2000
3.	54.64	72.5	61.33	36.51	4.768	6.326	1994 - 2000
4.	11.98	105	27.1	10.4	6.112	53.571	1985 - 1998

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

4.3 Long-term Variation of Monthly Discharge Series



4.4 Annual Pattern of Discharge



4.5 Unique Hydrological Features

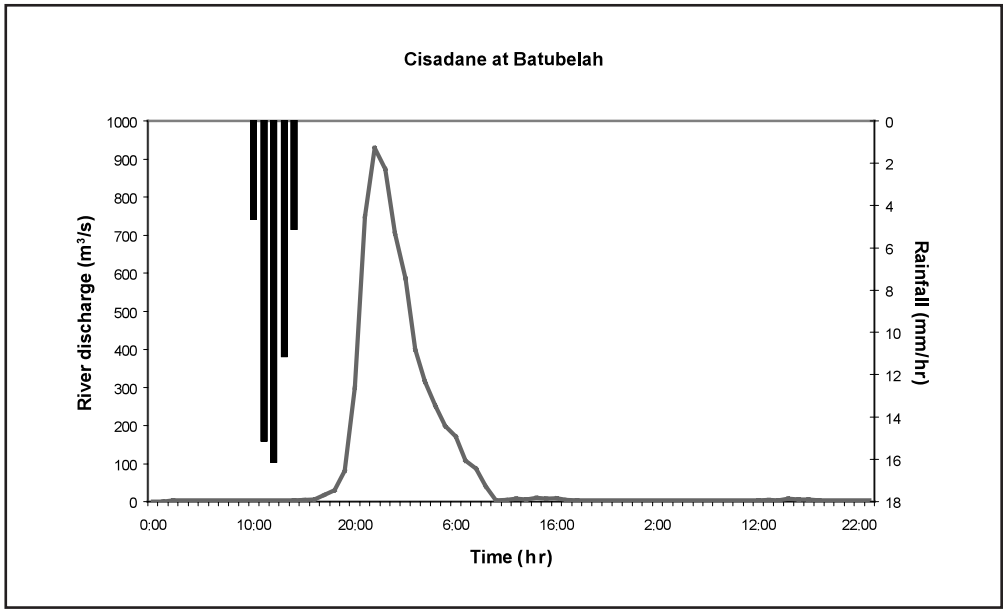
The upper part of the Cisadane Rive has a round shape with steep slopes and has a long and narrow shape with flatter slopes in the middle reach and downstream. Such features are often a cause of flooding because heavy rainfall upstream is immediately accumulated in the middle reach that is narrower in shape. Obstruction follows the constriction, however because the Cisadane is relatively long from the middle reach to river mouth, about 100 km, floods occurring naturally can be routed and flooding of the area in the vicinity of the Cisadane can be prevented.

4.6 Annual Maximum and Minimum Discharge at Batubeulah (819.60 km^2)

Year	Maximum		Minimum		Year	Maximum		Minimum	
	Date	Discharge[1] (m^3/s)	Month	Discharge[2] (m^3/s)		Date	Discharge[1] (m^3/s)	Month	Discharge[2] (m^3/s)
1970	04.30	704.00	09	0.70	**1985**	02.06	883.8	02	11.3
1971	08.14	968.00	02	1.00	**1988**	04.11	821.06	07	8.03
1972	12.10	747.00	10	5.80	**1991**	02.23	1,047.00	07	22.20
1973	04.13	564.00	07	46.00	**1992**	11.15	713.00	04	21.90
1974	09.15	652.00	12	14.60	**1993**	11.10	380.0	07	24.00
1975	09.19	391.00	12	15.60	**1994**	01.26	178.00	10	26.54
1976	01.19	501.00	07	5.85	**1995**	12.80	1,097.30	08	41.72
1977	05.11	562.00	08	5.85	**1996**	01.06	484.40	12	69.27
1978	12.21	545.00	04	19.70	**1997**	05.14	476.00	08	63.10
1979	10.20	620.00	09	10.50	**1998**	05.11	415.70	12	78.19
1980	12.13	469.00	08	15.10	**1999**	10.21	728.00	08	43.21
1981	03.18	754.00	12	8.78	**2000**	04.23	992.50	11	38.25
1982	04.24	645.00	09	3.50					

1), 2) Instantaneous observation by recording chart

4.7 Hyetographs and Hydrographs of Major Floods

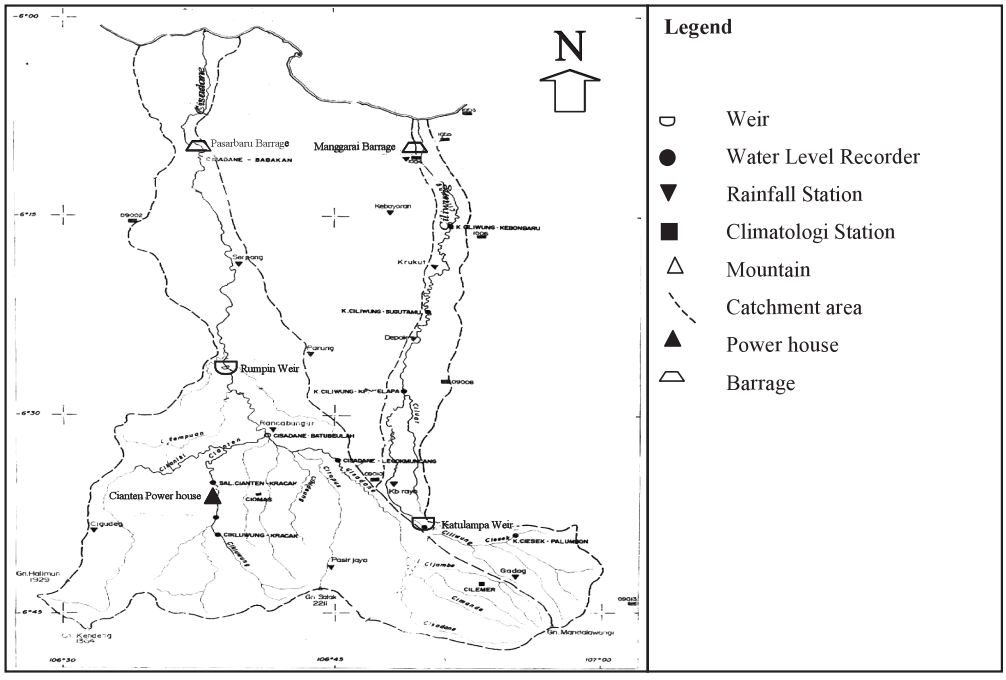


5. Water Resources

5.1 General Description

The Cisadane River basin with an area of 1,367 km^2 covers only 1.045 % of Java island (130,777 km^2). Similar to the Ciliwung River, the Cisadane River water in used for agricultural purposes upstream. Downstream in Pasarbaru Tangerang a barrage functions as a water intake and also as a flood control structure. Water taken from the barrage at Tangerang is used to irrigate agricultural land in Kabupaten Tangerang, northern part up to the coast. A power house generating electric power has been built and uses mainly water from the Cianten tributary. The river is also used as a source of raw water for drinking water and for the many industries located in the region.

5.2. Map of Water Resources System



5.3 List of Major Water Resources Facilities

Major Reservoirs

Name of river	Name of dam	Catchment area (km^2)	Flood capacity (10^6 m^3)	Effective capacity (10^6 m^3)	Purpose[1)]	Year of completation
Cisadane	**Pongkor**	3.0	1,950	1,830	A	1996

1) A: Agricultural use

Others

Name of River	Facility	Purpose[1)]	Capacity (m^3/s)	Year of complection
Cianten (Tributaries)	Dam	P		1935
Rumpin	Weir	A		1940
Empang	Weir	I	2	
Serpong	Free Intake	I, W	6.17	
Pasarbaru	Barrage	A, W,I	24.1	1935

1) A: Agricultural use F: Flood control I: Industrial use P: Hydropower W: Municipal water supply

5.4 Water Quality

River Water Quality at Batubeulah in 2003

Date	Jul	Aug	Sep	Oct	Nov
pH	7.7	7.5	7.7	7.2	7.2
DO (mg/l)	6.9	7.0	7.1	5.5	6.3
COD (mg/l)	10	6.1	6.6	8.0	6.4
SS (mg/l)	10	134	40	28	110
Discharge (m^3/sec)	4.58	71.5	5.72	18.2	3.1

6. Socio-cultural Characteristics

The Cisadane flows through two provinces, with the upper part of river flowing through West Java and lower stream through the province of Banten. The upper region in the Kabupaten of Bogor is inhabited predominantly by the Sundanese people and the lower river region in Banten is inhabited by a mixture of Sundanese, and Banten Javanese descended from former solders of the Mataram Kingdom under the reign of Sultan Agung during a war against Dutch colonization. In the past, two kingdoms ruled in the Bogor area (upper Cisadane) respectively the Tarumanegara Kingdom, 4^{th}-5^{th} Century, with its famous King Purnawarman and the Padjadjaran Kingdom, 15^{th}-16^{th} Century, with its most powerful King Sri Baduga. Remains of both kingdoms are shown from among others ancient inscriptions at Ciaruteun (Tarumanegara) and Batutulis (Padjadjaran).

Culture is represented by dances and music of which the Ketuk Tilu dance is a traditional dance and the Jaipong more modern, sensual and lively. Specific traditional Sundanese music is the Degung, Calung, Angklung, and Kecapi Suling.

In the area of Tangerang, in the past ruled by the Banten Kingdom, a mixture of Sundanese and Javanese dances and music is found. Known in the area is the Gamelan music accompanying a singer who is also the dancer. Such events can still be attended, especially during harvest time when farmers are celebrating circumcision or marriage of their children.

7. Reference, Data-books and Bibligraphy

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