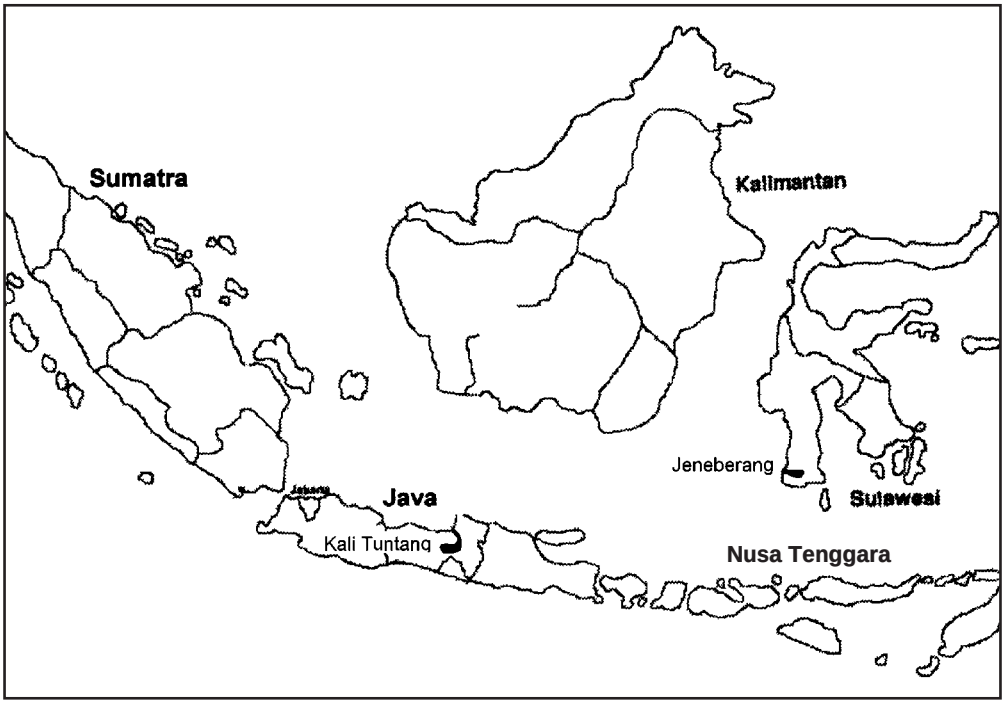
Indonesia

Indonesia-9: Kali Tuntang

Indonesia-10: Jeneberang River



Introduction

The Indonesia archipelago, situated in South-east Asia, consists of five main islands (Sumatra, Kalimantan, Sulawesi, Java and Irian Jaya) and some 13,667 other smaller islands with a total area of 1.9×10^6 km^2. Geographically, Indonesia is located between the latitudes 6° 08' N - 11° 15' S, and longitudes 94° 45' E - 141° 05' E. The total population according to the 1990 census was 179.4 million with the forecast increase at about 1.98 % per year. Population distribution is uneven throughout the country. Java Island has the highest population density whereas the outer islands have very much lower densities.

Politically, Indonesia is divided into 27 provinces, 241 districts, 55 urban municipalities, 3,625 sub-districts and 67,033 villages. Most of the rivers are short, steep and productive in sedimentation. Indonesia is a tropical country affected by tropical monsoon rainfall and has distinct dry and wet seasons. In the wet season, heavy rainfall occurs, ranging from 2,500 up to 6,000 mm/year. The dry season is normally between July and September.

The two rivers catalogued in this volume are the Kali Tuntang located in Java Island, and the Jeneberang River located in Sulawesi Island. They are representative rivers of flood, urban megalopolis conditions, industrial development and agricultural areas.

The Kali Tuntang is located in the Central Java Province, Java Island. The river leaves the lake of Rawa Pening to the northeast, and then changes direction to flow to the northwest before flowing out into the Java Sea on the north coast of Java. The main problem caused by the river is flooding especially downstream of the Glapan Weir. The water of Rawa Pening Lake is used for irrigation, hydropower, fisheries, tourism and water sport, and domestic water supply.

The Jeneberang River is located in the South Sulawesi Province, Sulawesi Island. A major reservoir and a number of small irrigation ponds have been constructed in this basin. It has a long history of flooding and provides water for agricultural and urban needs

Acknowledgements

A working group was established for the preparation of the catalogue, and a number of Institutes and individuals collaborated. The working group, chaired by Supardijono Sobirin, Director of the Research Institute for Water Resources, consisted of:

Joesron Loebis (Ass.Res.Professor), Nana Terangna Ginting (Head of Environment and Water Quality Division), Sutjipto and Conny Amalia.

Dyah Rahayu Pangesti (Research Professor), Darjanta Budihardja, Syaifuddin (Experimental Station for River and Sabo)

The organizations that have contributed include:

Badan Pertanahan Nasional *(National Board for Land Administration)*.
Badan Perencanaan dan Pembangunan Daerah *(Provincial Development Planning Board)*.
Badan Meteorologi dan Geofisika *(Agency for Meteorology and Geophysics)*.
Direktorat Geologi *(Directorate of Geology)*
Kantor Statistik Propoinsi Jawa Tengah *(Central Java Provincial Office of Statistics)*.
Proyek Induk Pengembangan Wilayah Sungai Jratunseluna *(Jratunseluna River Basin Development Project)*.
Proyek Induk Pengembangan Wilayah Sungai Jeneberang *(Jeneberang River Basin Development Project)*.
Pusat Penelitian dan Pengembangan Sumber Daya Air *(Research Institute for Water Resources)*.

Jeneberang River

Map of River

Table of Basic Data

Name: Jeneberang River		**Serial No. :** Indonesia-10
Location: South Sulawesi	S 5° 10' 00" - 5° 26' 00"	E 119° 23' 50" - 119° 56' 10"
Area: 727 km^2	**Length of the main stream:** 78.75 km	
Origin: Mt. Bawakaraeng (2,833 MSL)	**Highest point:** Mt.Lompobatang (2,876 MSL)	
Outlet: Makassar Strait	**Lowest point:** River mouth (0 m)	
Main geological feature : Latosol		
Main tributaries: Jenelata river (220 km^2)		
Main lakes: none		
Main reservoir : Bili-bili (1998) and Jenelata (2000)		
Mean annual precipitation: 3,707 mm (Malino)		
Mean annual runoff: 43.5 m^3/s (Patalikang)		
Population: 982,248 (1993)	**Main cities:** Ujung Pandang, Malino, Bili-bili, Sungguminasa	
Land use: Forest (40%), Paddy field (20%), Urban (13%), Other agriculture (27%)		

1. General Description

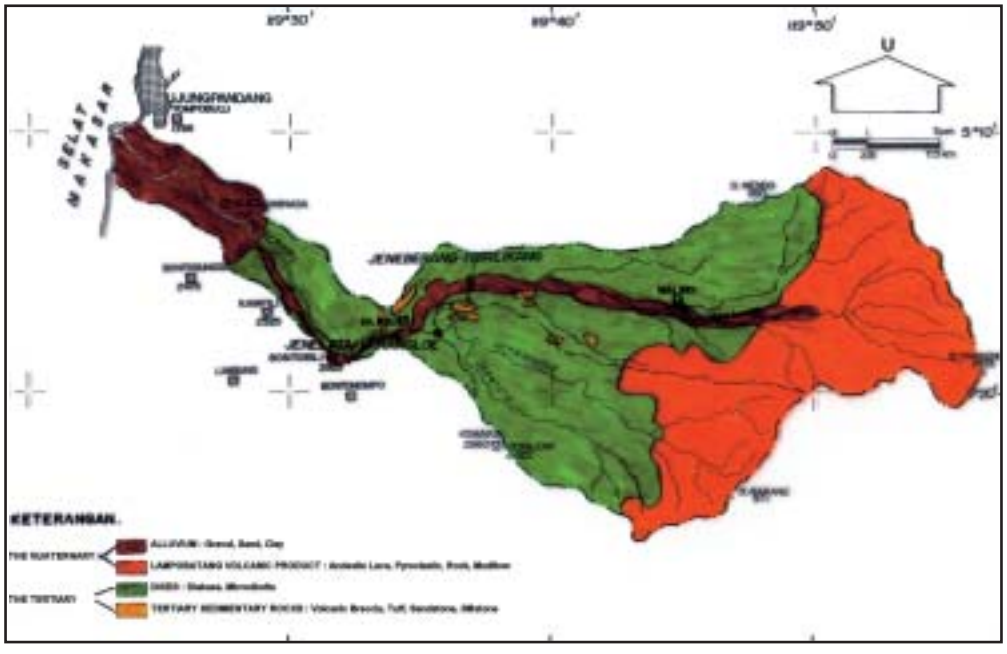
The Jeneberang River is one of the main rivers in South Sulawesi, flowing east to west across the province. Originating from Mt. Bawakaraeng (2,833 m), it flows to the Makassar Strait. The river is 90 km long with a catchment area of 727 km^2. The main tributary is the Jenelata River (220 km^2). Forest covers about 69% of the total basin area.

The annual precipitation for the catchment varies along the main stream. The average annual precipitation for the upper basin is about 3,700 (3,707 mm at the Malino station) and is about 2,160 mm (2,166 mm at the Bontosunggu station) in the lower stream. Climate conditions in this catchment are influenced by the monsoon, which has two seasons each year, a dry season between March and August and wet season between September and April. The mean annual discharge at the Patalikang station is 43.5 m^3/s and at the Jenelata station is 12.8 m^3/s.

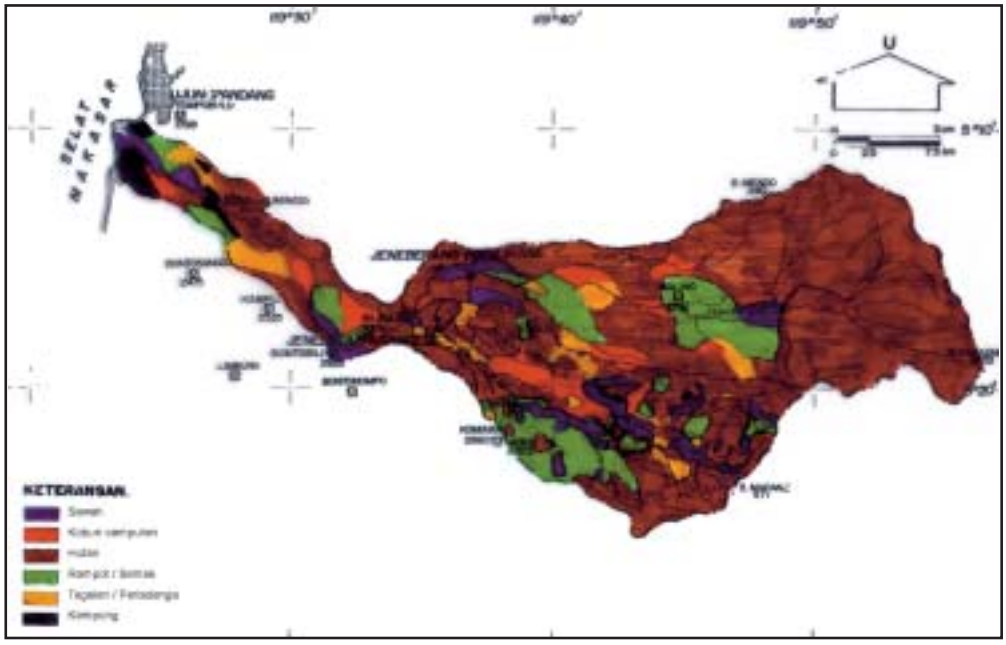
There are two reservoirs, which are now under construction in the catchment, the Bili-bili Reservoir located on the Jeneberang River and the Jenelata Reservoir located on the tributary Jenelata River. Floods are normally caused by rainstorms in the wet season, and often flash floods are experienced. The population living in the catchment was 982,248 in 1993. There is a very little arable land for paddy rice and the area under irrigation area is 17,600 ha.

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map

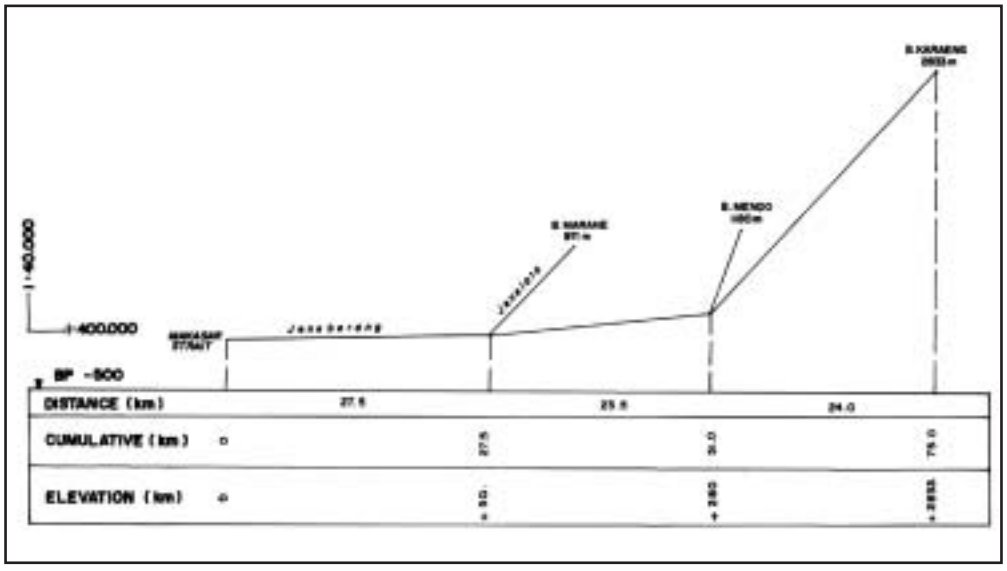


2.3 Characteristics of the River and the Main Tributaries

No	Name of Rivers	Length (km) and Catchment Area (km^2)	Highest Peak (m) Lowest Point (m)	Cities Population	Land Use (%)				
					F	L	P	A	U
1	Jeneberang	78.8 727	2,833 0	Ujung Pandang 926,393	69	-	5	12	14
2	Jenelata	40 220	971 150	22,154	43	-	15	22	19

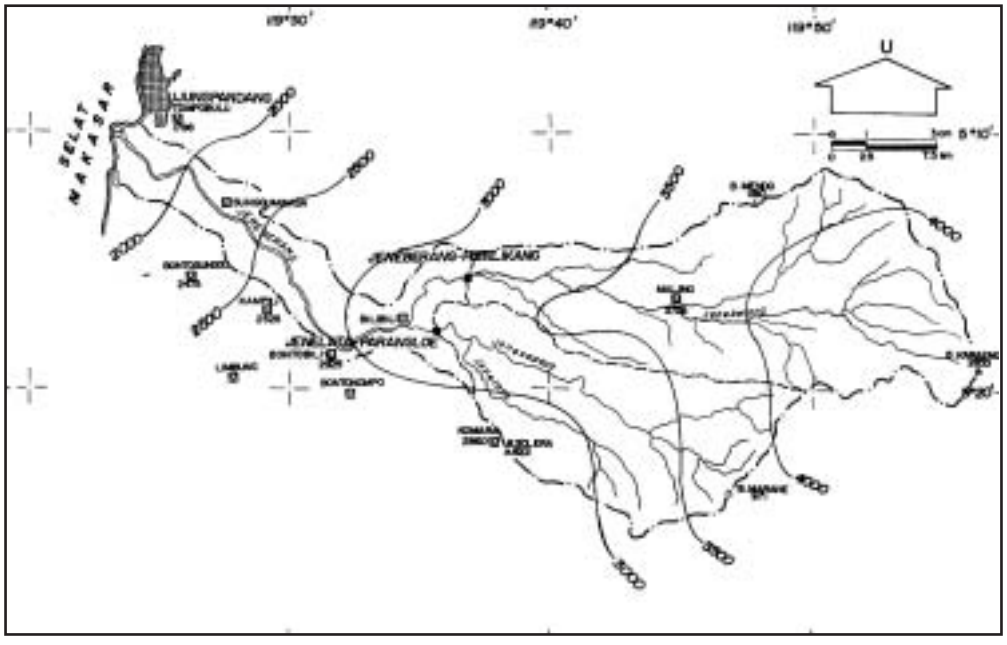
F: Forest L: Lake P: Paddy Field A: Agriculture U: Urban

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]	Mean annual evaporation [mm]	Observation items
711001	**Bontosunggu**	10	S 05° 15' 00" E 119° 26' 10"	1975 - 1992	2,166	54	DS, E, P, RH, SR, T, WV
711007	**Bontobili**	-	S 05° 18' 00" E 119° 32' 00"	1980 - 1996	1,810	62	DS, E, P, RH, SR, T, WV

T: Temperature RH: Relative Humidity E: Evaporation WV: Wind Velocity
SR: Solar Radiation DS: Duration of Sunshine P: Precipitation

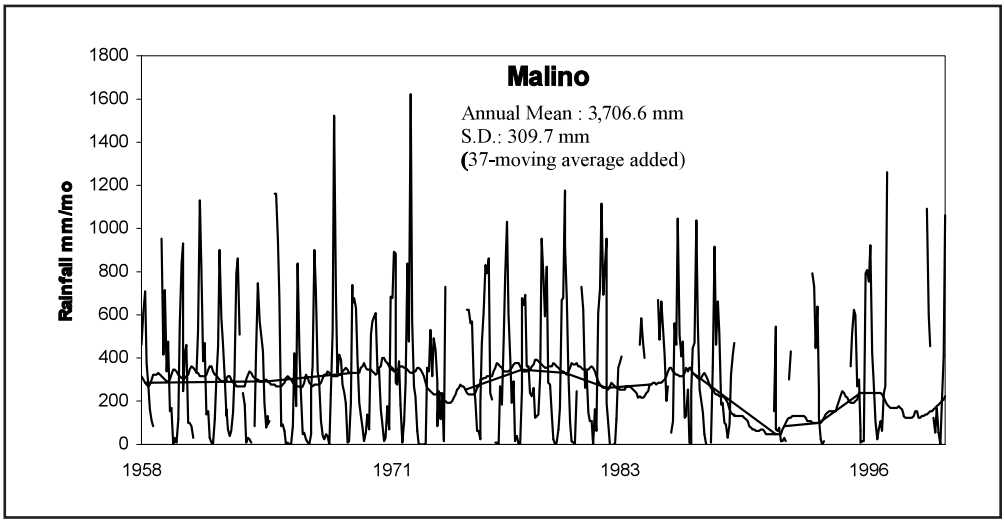
3.3 Monthly Climate Data

Station: Bontosunggu

Observation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Relative humidity [%]	91.2	90.6	89.2	85.8	84.2	81.2	82	82.6	79.2	83.4	85	88	85.2	1975-1992
Temperature [°C]	27.1	27.4	27.5	28.1	28.1	27.1	26.9	26.6	28.1	27.8	27.8	26.9	27.4	1975-1992
Evaporation* [mm]	133.2	121.9	136.4	147.3	143.7	139.6	156.3	182	211.2	206.7	153.4	129.2	1,861.2	1975-1992
Solar radiation [MJ/m^2/d]	3.2	3.4	3.3	3.5	3.3	3.3	3.4	3.9	3.8	4.0	3.5	3.1	3.5	1975-1992
Duration of sunshine [hr]	153.4	154.1	190.8	218.9	241.9	217.4	266.4	300.9	256.3	241.2	206.6	182.2	2,630.2	1975-1992

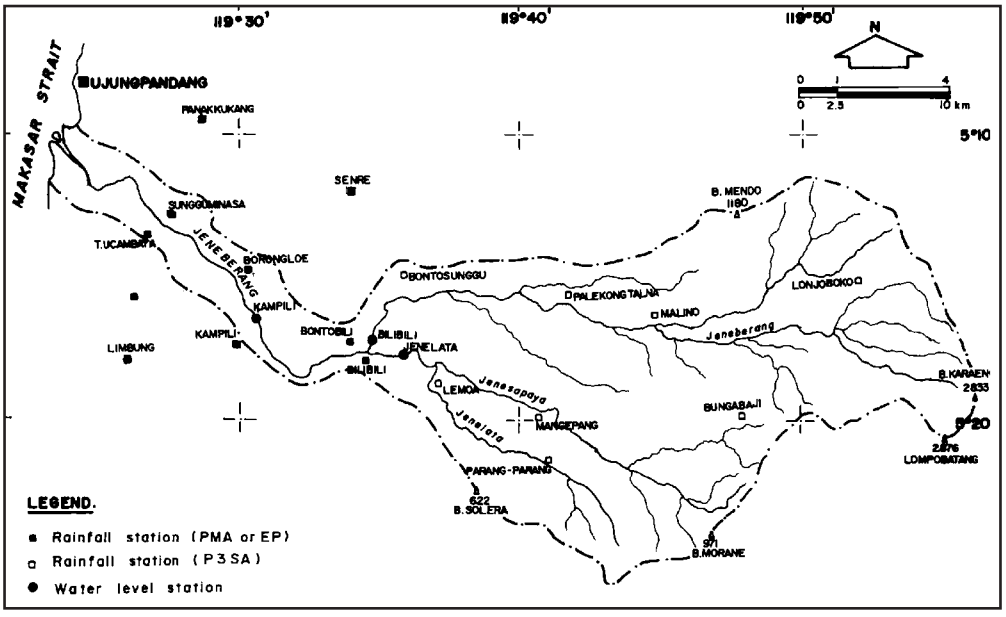
* Average Class A Pan

3.4 Long-term Variation of Monthly Precipitation Series



4. Hydrological Information

4.1 Map of Stream Observation Stations



4.2 List of Hydrological Observation Stations

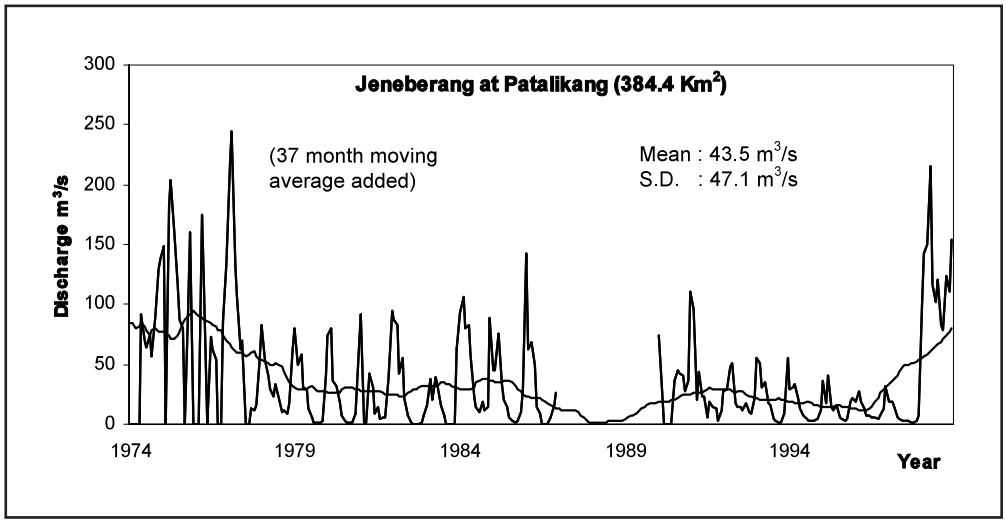
No.	Station	Location	Catchment area (A) [km^2]	Observation period	Observation items (frequency)
4-805-0-1	**Patalikang**	S 05° 16' W 119° 36'	384.4	1974 - present	H2, Q
4-805-0-2	**Parangloe**	S 05° 17' W 119° 36'	318.3	1987 - present	H2, Q

H2: water level Q: discharge A: area

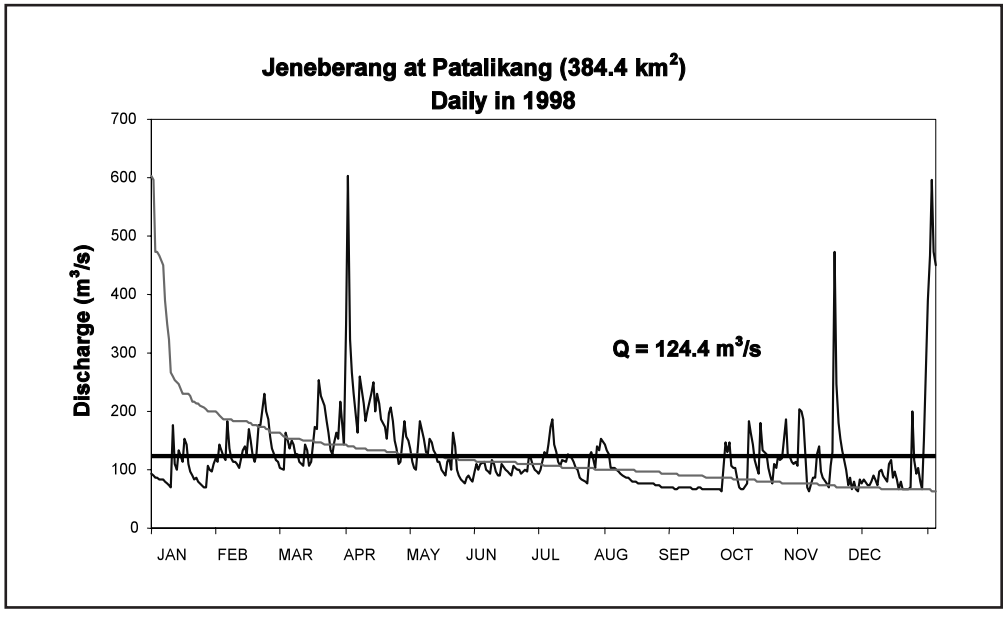
No.	$\overline{Q}$[1)] [m^3/s]	Qmax[2)] [m^3/s]	$\overline{Q}$max[3)] [m^3/s]	$\overline{Q}$min[4)] [m^3/s]	$\overline{Q}$/A [m^3/s/100km^2]	Qmax/A [m^3/s/100km^2]	Period of statistics
4-805-0-1	43.5	701	352.2	0.3	11.3	182.4	1974 ~ 1999
4-805-0-2	28.9	130.8	89.7	0.04	9.07	41.9	1987 - 1999

1) Mean annual discharge 2) Maximum discharge
3) Mean maximum discharge 4) Mean minimum discharge

4.3 Long-term Variation of Monthly Discharge Series



4.4 Annual Pattern of Discharge Series

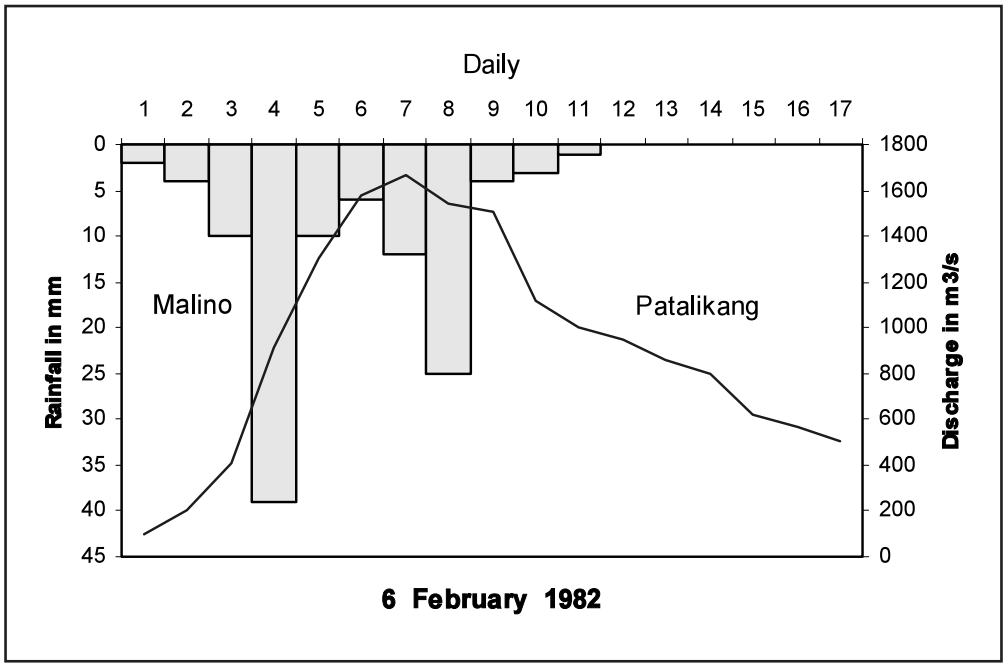


4.5 Annual Maximum and Minimum Discharges at Patalikang (384.4 Km^2)

Year	Maximum[1)]		Minimum[2)]		Year	Maximum[1)]		Minimum[2)]	
	Date	[m^3/s]	Date	[m^3/s]		Date	[m^3/s]	Date	[m^3/s]
1974	13 - 12	212	30 - 9	49.6	**1987**	20 - 11	354	24 - 7	0.8
1975	24 - 4	495	2 - 10	64.4	**1988**	15 - 3	381	23 - 9	0.5
1976	20 - 3	322	20 - 10	51.8	**1989**	26 - 12	92	27 - 9	3.0
1977	17 - 2	564	4 - 11	11.2	**1990**	10 - 1	165	14 - 10	40.1
1978	11 - 1	307	26 - 8	8.3	**1991**	24 - 1	498	7 - 11	0.7
1979	11 - 1	258	28 - 9	0.5	**1992**	7 - 3	259	6 - 11	1.3
1980	9 - 1	246	7 - 10	0.5	**1993**	23 - 11	486	28 - 7	0.9
1981	17 - 11	456	21 - 10	1.7	**1994**	12 - 3	377	26 - 9	0.3
1982	6 - 2	701	10 - 11	0.9	**1995**	14 - 2	466	22 - 9	2.7
1983	30 - 12	355	31 - 7	3.8	**1996**	29 - 12	87	30 - 9	3.5
1984	29 - 12	516	29 - 8	6.9	**1997**	23 - 1	73	11 - 10	1.1
1985	6 - 3	245	29 - 10	1.2	**1998**	1 - 4	470	23 - 9	64.1
1986	13 - 1	663	1 - 10	3.6	**1999**	20 - 12	110	23 - 9	5.6

1), 2) Instantaneous observation

4.6 Hyetographs and Hydrographs of Major Floods



5. Water Resources

5.1 General Description

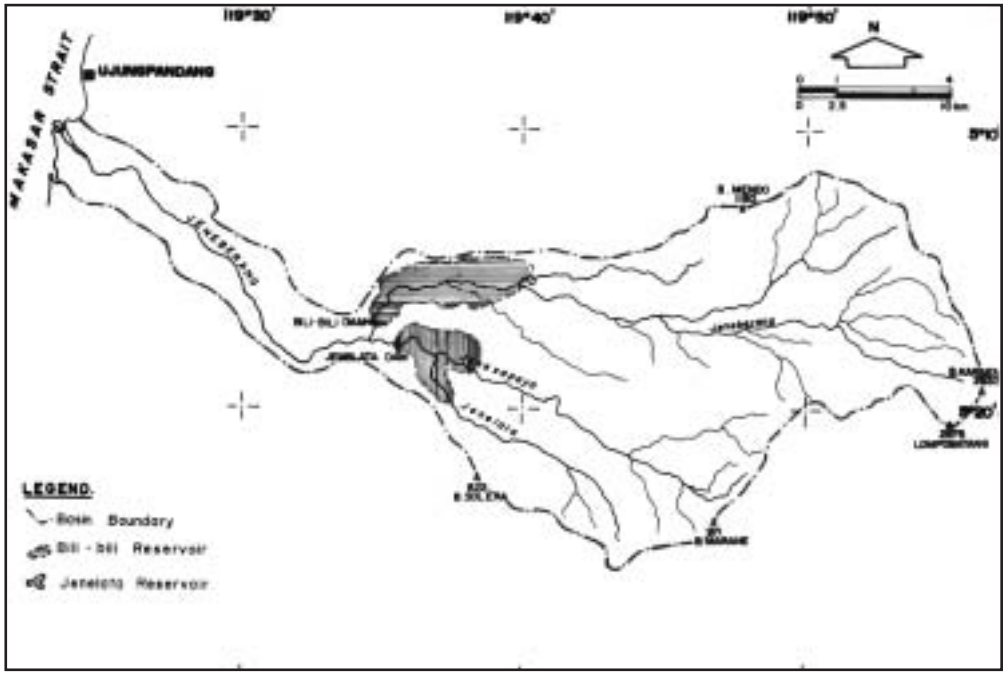
The Jeneberang river has a catchment area of 727 km^2 and is located in the Province of South Sulawesi. Ujung Pandang is the capital city and the centre of economy for both South Sulawesi itself and the eastern part of Indonesia. The population growth of this area is 2.93% per year.

The fresh waters of the Jeneberang River have been used since 1926, and water from the Kampili Dam irrigates 17,600 ha of rice field. To protect the city of Ujung Pandang from flooding, the government constructed a flood control structure at the down stream end of the Jeneberang River in 1978, the Bili-bili Dam between 1988 and 1998, and finally the Jenelata Dam which was expected to be completed in 2000.

The Bili-bili reservoir is multi-purpose, with its main objective being to supply drinking water to Ujung Pandang. However, it has also been designed to control floods up to a 50 year return period, irrigate 19,200 ha of land, and generate 69,000 MWh of electric power each year.

The Jenelata River is an important tributary with a catchment area of 220 km^2. This river has the potential for a 65 m high dam, with a reservoir of 221 x 10^6 m^3 and a effective volume of 210 x 10^6 m^3. The Jenelata dam is planned to control floods up to a 50 year return period and supply drinking water to Ujung Pandang by 2005.

5.2 Map of Water Resources Systems



5.3 List of Major Water Resources Facilities

Major Reservoirs

Name of River	Name of Dam	Catchment Area [km^2]	Gross Capacity [$10^6 m^3$]	Effective Capacity [$10^6 m^3$]	Purpose[1)]	Year of Completion
Jeneberang	Bili-bili	384	375	346	F, W, I	1998
Jenelata	Jenelata	220	240	233	F, W, I	2000

F: Flood Control, W: Water Supply, I: Irrigation

5.4 Major Floods and Droughts

Major Flood at Kampili (Catchment area 624 km^2)

Date	Peak Discharge [m^3/s]	Rainfall [mm] Duration	Meteorological cause	Dead and missing	Major damages (Districts affected)
January 1977	2,130		rainstorm	none	35 km^2

5.5 Water Quality

River Water Quality at Jeneberang (December 01, 1995)

Parameter	Units	Location		
		Lebang	Bantojai	Sunggu
pH		7.2	7.2	7.0
Chemical Oxygen Demand (COD)	mg/l	2.9	2.9	2.2
Suspended Solid	mg/l	13	15	41

6 Socio-cultural Characteristics

The Jeneberang River is in Sulawesi Island (previously called Celebes Island). Ujung Pandang (previously called Makassar) is one the biggest cities on the island and is the capital city of South Sulawesi Province.

Not only is the Jeneberang River the main water resource for the area of Ujung Pandang, but it is also the source of prosperity and happiness for the Makassar and Bugis tribes. The pride of the people in this river is shown by a popular folk song often song by young people. This song, ‘Maranno-ranno ri binangae Jeneberang’ means ‘making a happy-day together in the Jeneberang River’. ‘Jene’ is Makassaran for water, while ‘binanga’ is jargon for river. ‘Uwwae’ meaning river water and ‘saloo’ meaning river are the corresponding words used by the Bugis tribe of the area.

Recently, the Bili-bili and Jenelata dams have been built in the Jeneberang River and its Jenelata tributary. These dams should increase the prosperity and happiness of the people living near the river.

7 References, Databooks and Bibliography

Bili-bili Multipurpose Dam Project, (1988): Directorate General of Water Resources Development, CTI Engineering Co., Ltd. in Associate with P.T. Indah Karya and P.T. Exsa International, Jakarta, Indonesia.

Study Kelayakan Bendungan Jenelata (1995): Proyek Induk Pengembangan Wilayah Sungai Jeneberang, P.T. Darma Didana Cipta Consultant, Jakarta.

Buku Publikasi Debit (Year Book): Pusat Penelitian dan Pengembangan Sumber Daya Air, Bandung.