

Nam-gang

Map of River



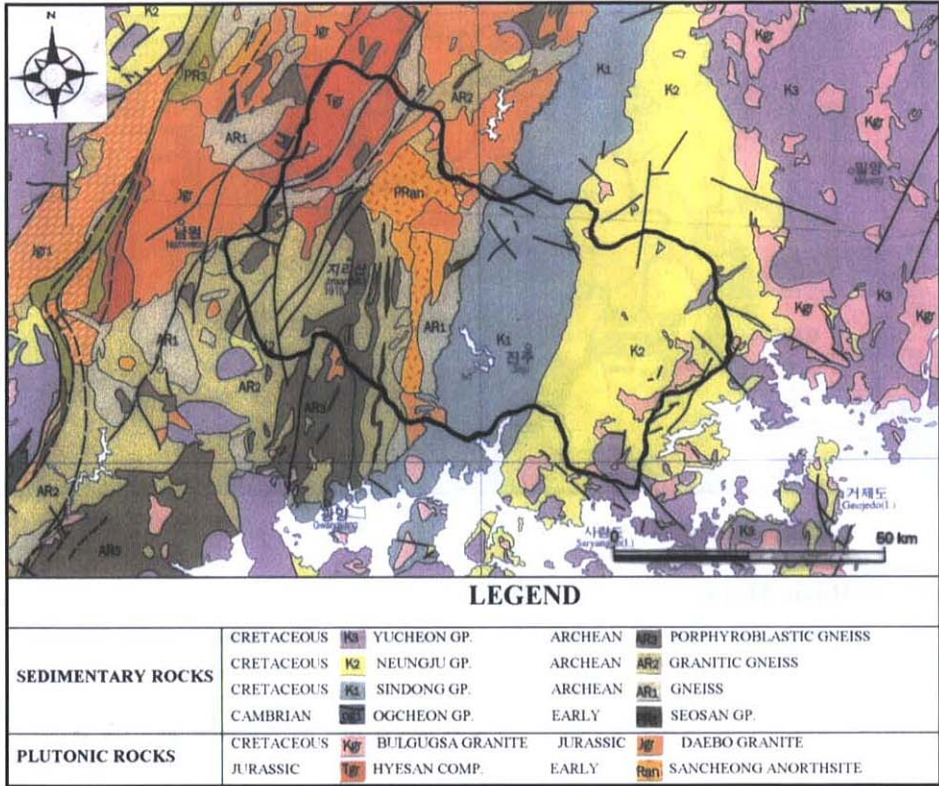
Geographical Survey, MOC, Korea

Table of Basic Data

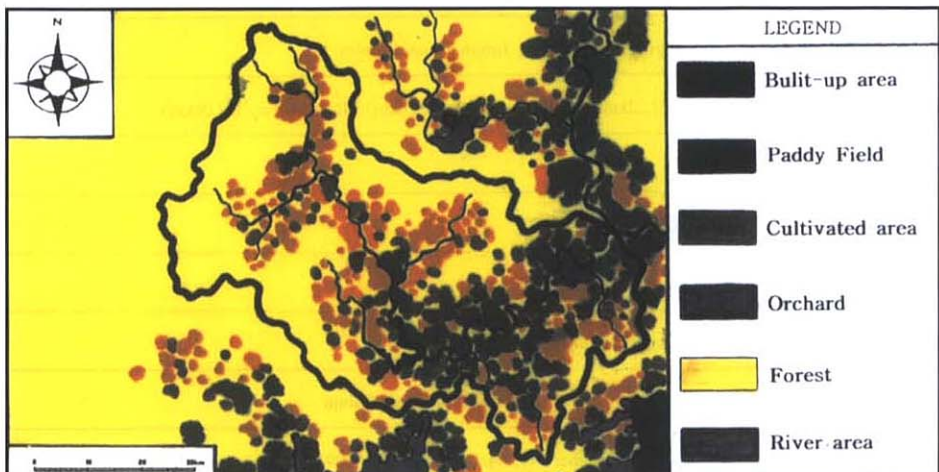
Name: Nam River (in Nakdong River)		Serial No. : Korea (R. of) - 5
Location : Kyongnam province, Korea	N 35° 00' - 35° 46'	E 127° 30' - 128° 28'
Area : 3,466km ²	Length of main stream : 186.3km	
Origin : Mt. Namduckyu (1,503m)	Highest point : Mt. Namduckyu (1,503m)	
Outlet : Nakdong River	Lowest point : Confluence (14.2m)	
Main geological features : Gneissose granite to Jurassic ; Jirisan gneiss complex		
Main tributaries : Hamyang River (177.22km ³), Duckchun River (461.16km ³), Haman River (152.06km ³)		
Main lakes : None		
Main reservoirs : Namgang (109x10 ⁶ m ³ , 1969)		
Mean annual precipitation : 1,490mm (1960-94) (basin average)		
Mean annual runoff : 48.4m ³ /s at Dongchon (2,984km ³) (1960 ~ 94)		
Population : 589,700 (1993)	Main cities : Chinju	
Land use : Forest (69.2%), Rice paddy (13.2%), Other (10.5%), Urban (7.1 %) (1993)		

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map



1. General Description

The Nam is one of the main tributaries of the Nakdong river flowing through the south-eastern part of the Korean peninsula. Originating from Mt. Namdukyu (1,503 m) and flowing into the downstream part of the main stream of Nakdong river, the Nam river is 186.3 km long and drains an area of 3,466 km². The average annual precipitation is 1,490 mm over the basin while the average annual discharge at Jungam (2,984 km²) has been 48.4 m³/s (1.62 m³/s/km²) during the period 1960 to 1993. The population of the basin was 589,700 in 1993. The Namgang Dam, one of the main hydraulic structures in the basin, was built in 1969 to store 162x10⁶m³. The river segment above Chinju is considered the upper stream, which is in the mountains with narrow and hillside paddy fields. Between Chinju and Jungam is the middle stream and below Jungam is the downstream. The middle and downstream reaches flow through the narrow plain between the high mountain areas in the east and west.

2.3 Characteristics of River and Main Tributaries

No.	Name of river	Length [km] Catchment area [km ²]	Highest peak [m]	Cities Population (1992)	Land use [%] (1991)					
					F	L	P	O	A	U
1	Nam (Main river)	145.4 3,446	Mt. Namdukyu 1,503m	Chinju City 256,554	69.2	3.3	13.2	0.1	7.1	7.1
2	Hamyang (Tributary)	9.6 177.22	Mt. Namdukyu 1,503m	Hamyang County 53,892						
3	Dukchun (Tributary)	11.8 461.16	Mt. Samsin 1,284m	Samchung County 48,762						
4	Haman (Tributary)	9.6 52.06	Mt. Saebuk 739 m	Haman County 70,247						

A: Agricultural field (vegetable field, grass field)
O: Orchard

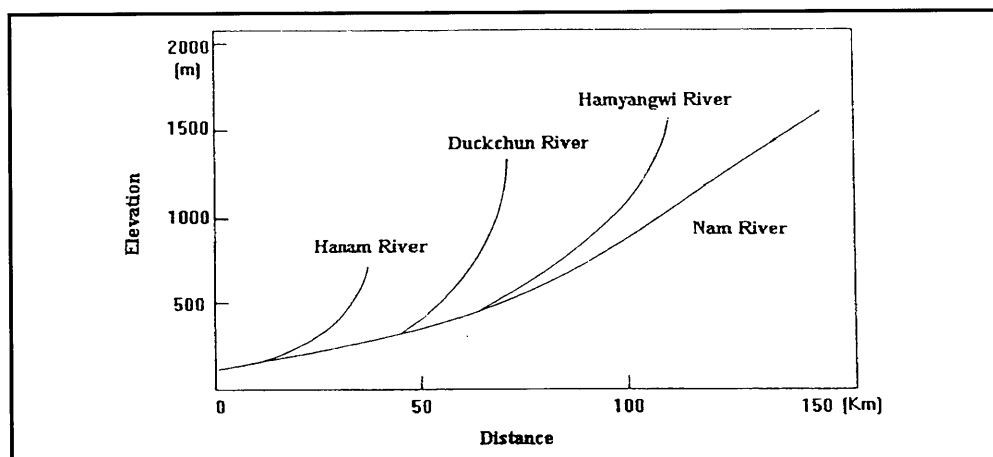
F: Forest

L: Lake, River, Marsh

P: Paddy Field

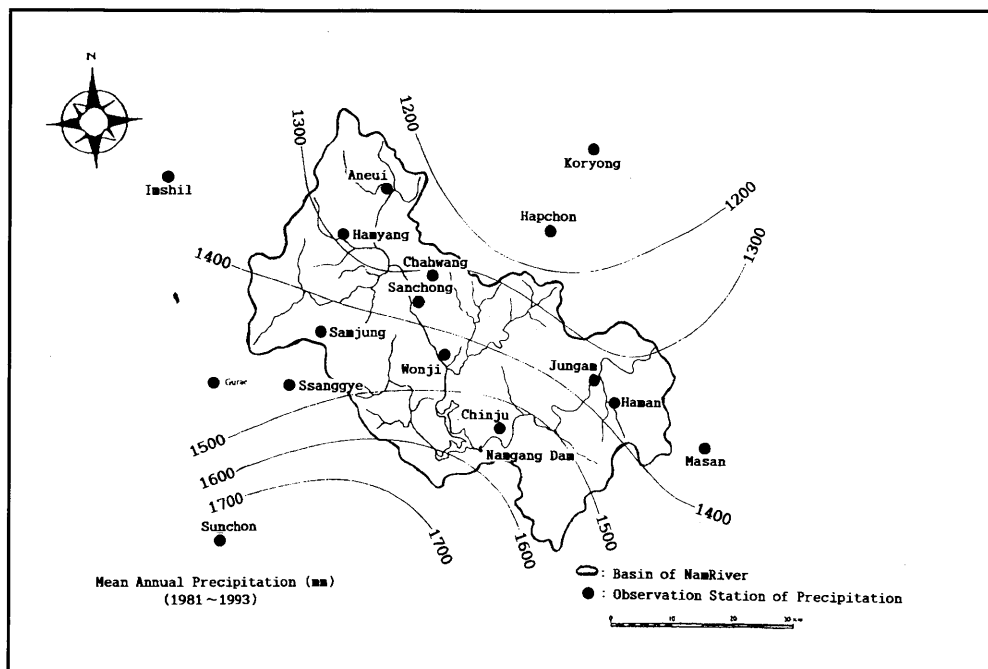
U: Urban

2.4 Longitudinal Profiles



3. Climatological Information

3.1 Annual Isohyetal Map and Observation Stations



Based on the data of Ministry of Construction and Transportation

3.2 List of Meteorological Observation Stations

No.	Station	Elevation [m]	Location	Observation period	Mean annual precipitation ¹⁾ [mm]	Mean annual evaporation ²⁾	Observation items***
000192**	Chinju	18.2	N 35° 11' 20" E 128° 53' 40"	1960 ~ present	1,489.7	1,129.6	P(TB)
000289**	Sanchung	86.0	N 35° 24' 45" E 127° 52' 10"	1976 ~ present	1,492.8	1,159.5	P(TB)
021100*	Haman	18.0	N 35° 17' 24" E 128° 24' 11"	1988 ~ present	1,097.5	980.7	P
022400*	Saesang	450.0	N 35° 40' 50" E 127° 41' 20"	1961 ~ present	1,249.0		P
021850*	Chahwang	340.0	N 35° 27' 40" E 127° 55' 45"	1965 ~ present	1,316.8		P

*: Serial number used by Ministry of Construction

** : Weather Office, Korean Meteorological Agency

***: P: Precipitation, TB: Tipping bucket with recording chart

1) Period for the mean is from the beginning of the observation period to 1990

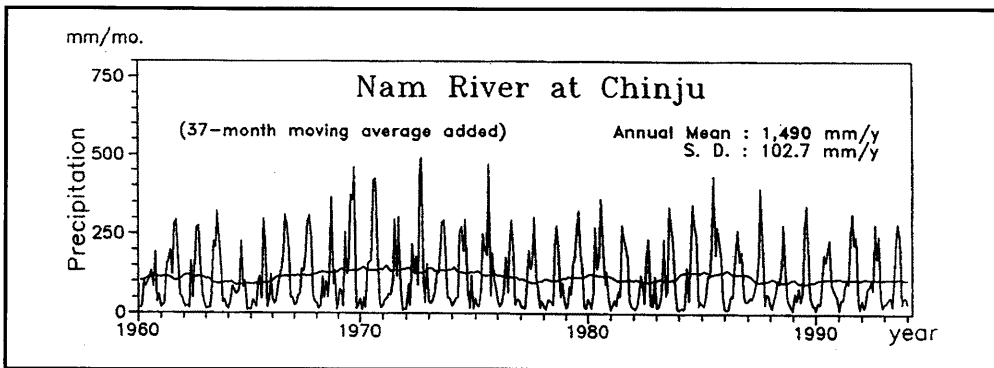
2) Measured by 20cm pan

3.3 Monthly Climate Data

Observation item	Observation station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C]	Chinju	0.1	2.1	6.5	12.8	17.5	21.4	25.2	25.7	21.0	14.7	7.9	2.2	13.1	1960~1994
Precipitation [mm]	Chinju	32.4	50.1	72.1	145.7	119.9	209.4	306.5	285.0	152.3	46.1	47.2	23.1	1,489.7	1960~1994
Evaporation [mm]*	Chinju	51.8	58.0	88.7	111.3	133.0	121.6	122.7	131.9	101.9	93.6	62.6	52.4	1,129.6	1960~1994
Solar radiation [MJ/m ² /d]	Chinju	9.5	11.9	14.1	17.7	18.5	16.6	14.3	16.1	14.2	13.9	10.1	8.9	165.9	1960~1994
Duration of sunshine [hr]	Chinju	187	176	206	211	208	165	174	190	162	205	166	181	2,241	1960~1994

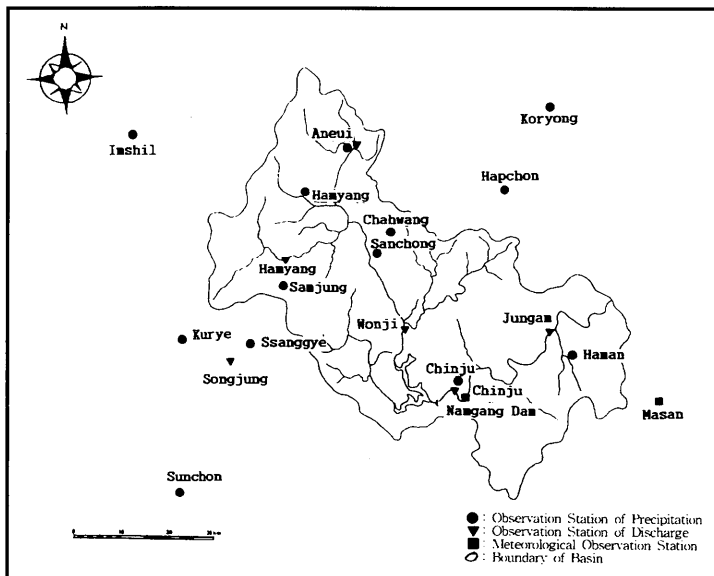
*measured by 20cm pan

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

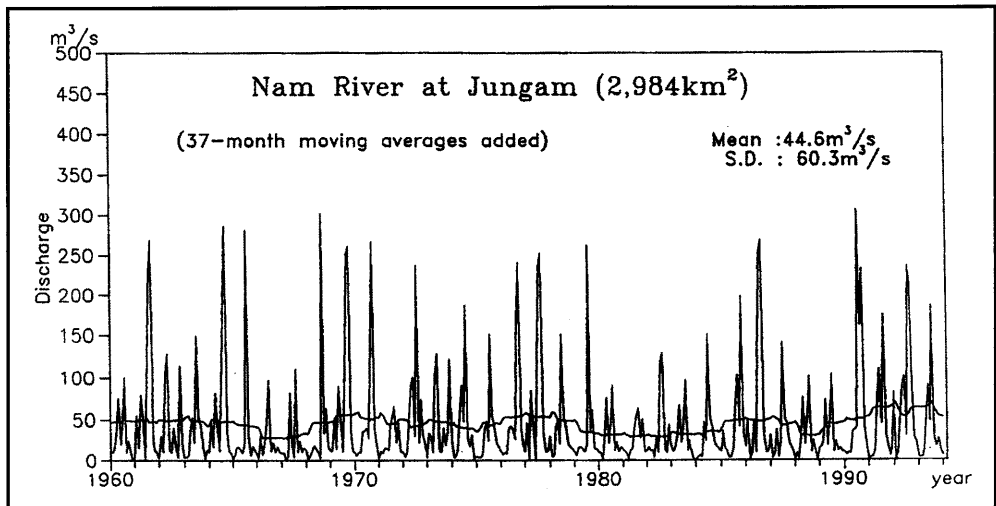
No.	Station	Location	Catchment area(A) [km ²]	Observation period	Observation items
021150	Jungam	N 35° 18' 39' E 128° 17' 48'	2,984	1967 ~ present	H1

No.	\bar{Q} ¹⁾ [m ³ /s]	Q max ²⁾ [m ³ /s]	\bar{Q} m/x ³⁾ [m ³ /s]	\bar{Q} min ⁴⁾ [m ³ /s]	\bar{Q} / A [m ³ /s/100km ²]	Qmax / A [m ³ /s/100km ²]	Period of statistics
021150	48.4	3,710	1,246.8	5.1	1.62	1.243	1960~present

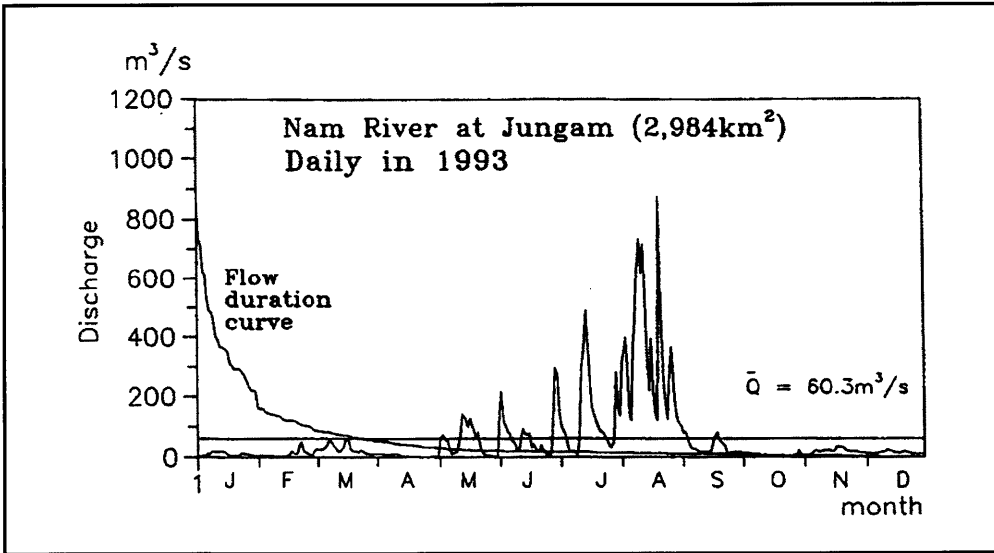
H1: water level in recording chart

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

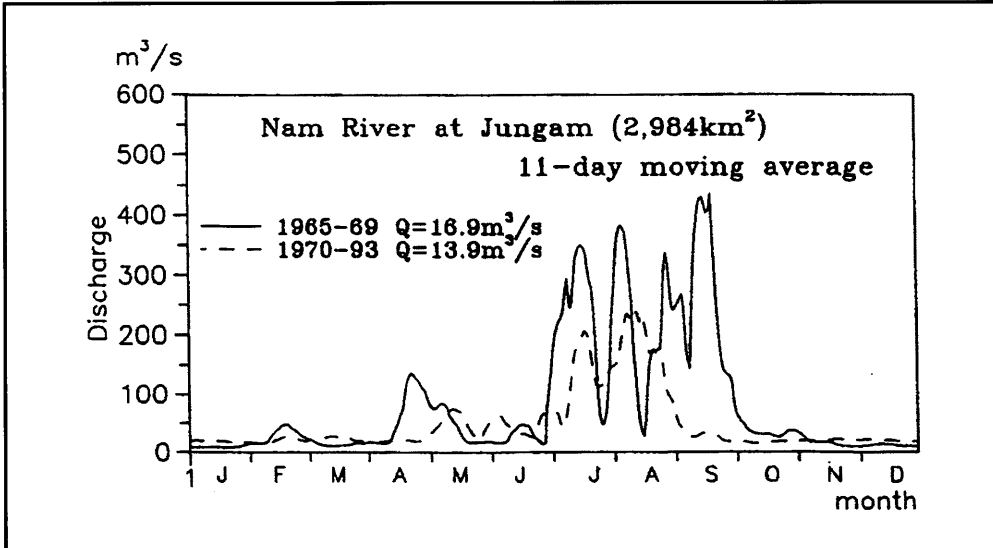
4.3 Long-term Variation of Monthly Discharge



4.4 Annual Pattern of Discharge



4.5 Unique Hydrological Features



Note that the Namgang Dam was constructed in 1969.

4.6 Annual Maximum and Minimum Discharges

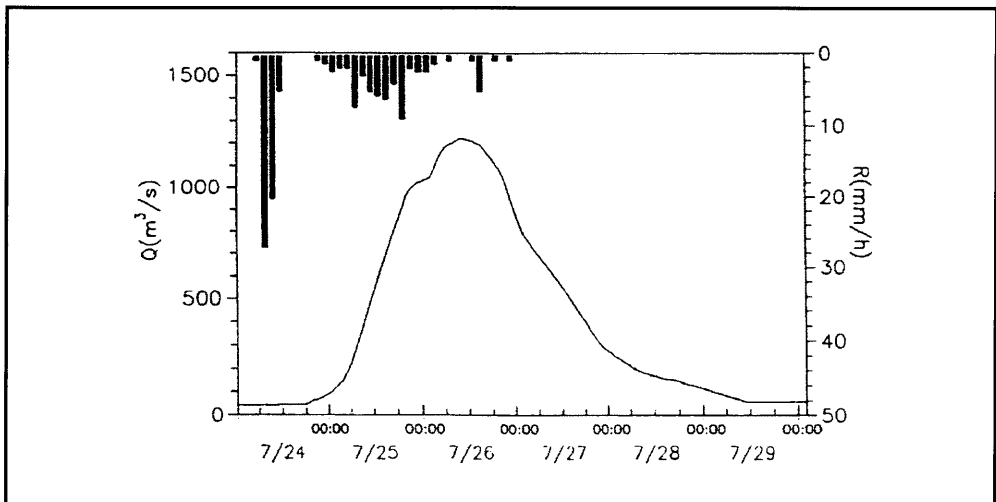
At Jungam (2,984km²)

Year	Maximum ¹⁾		Minimum ²⁾		Year	Maximum ¹⁾		Minimum ²⁾	
	Date	[m ³ /s]	Month	[m ³ /s]		Date	[m ³ /s]	Month	[m ³ /s]
1967	7.03	664.0	1	7.4	1984				
1968	8.17	3,710.0	2	5.4	1985				
1969	8.06	1,810.0	1	7.7	1986				
1970	7.05	1,290.0	1	4.8	1987				
1971	7.02	313.0	11	4.8	1988	7.16	522.1	6	1.6
1972	7.11	936.0	1	4.3	1989				
1973	4.24	1,000.0	2	11.9	1990				
1974	7.07	1,140.0	1	3.4	1991				
1975	7.13	584.0	1	2.8	1992				
1976	6.09	676.0	12	3.4	1993	8.21	1,116.4	4	3.5

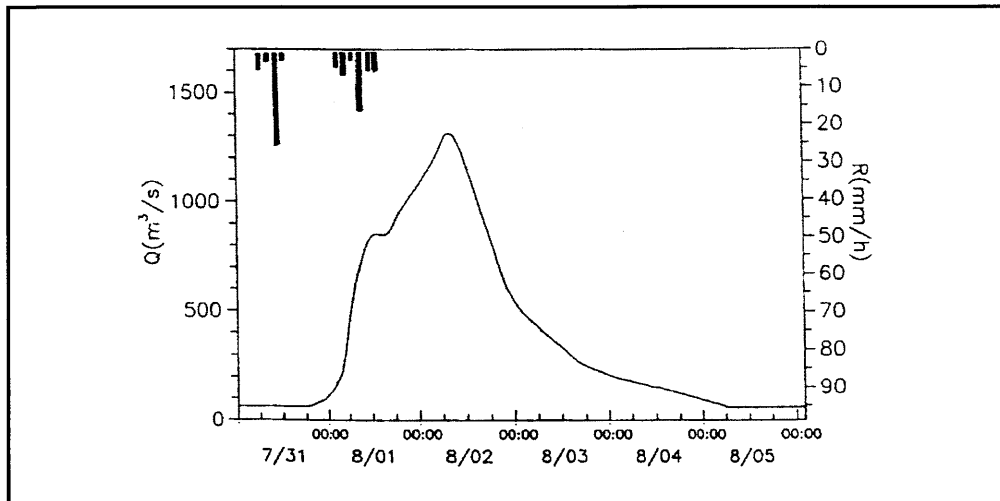
1), 2) Instantaneous observation by recording chart

4.7 Hyetographs and Hydrographs of Major Floods

At Jungam (2,984 km²) July 1989



At Jungam (2,984 km²) July 1991



Based on the data of Ministry of Construction and Transportation
Hyetographs of basin average rainfall

5. Water Resources

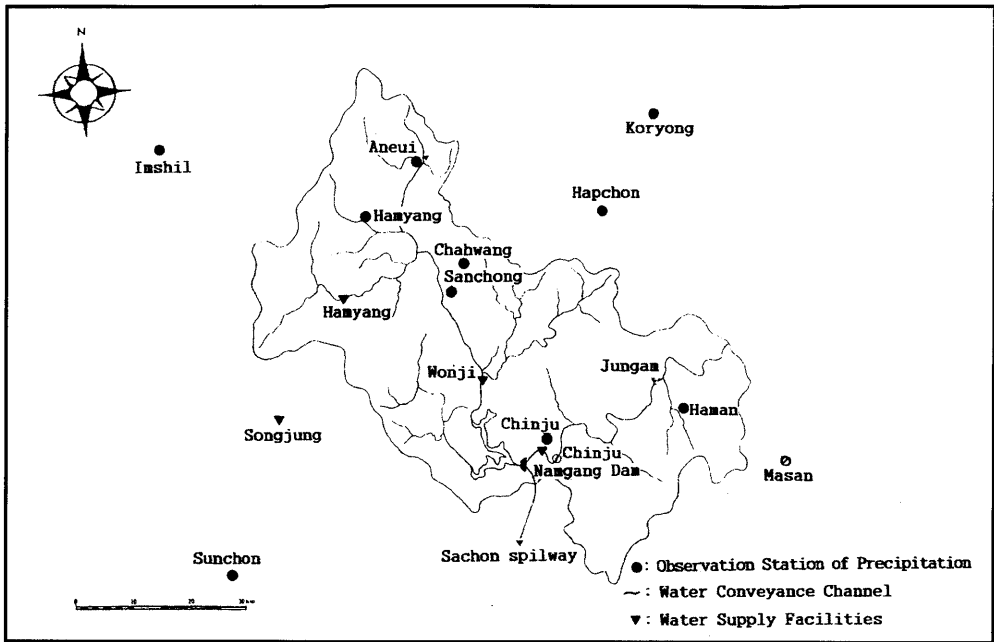
5.1 General Description

The Nam occupies about 14.5% of the Nakdong river basin. The development of water supply and sewage treatment facilities in the basin cannot cope up with the rapid increase of water demand in municipal and industrial sectors including heavy industries. As a result, the Nam river basin experiences critical conditions in water quantity and quality within the basin and in neighbouring basins.

Since the average annual precipitation in the basin is far greater than the average value for the whole nation and mostly concentrated in summer seasons between June and September, the basin is likely to have floods or droughts every year.

In the 28 year period from 1965 to 1993, there have been 10 occurrences of floods of magnitude greater than $1,500 m^3/s$ or $0.50 m^3/s/km^2$ at Jungam (2,984 km^2), which amounts to approximately once in 3 years. The maximum flood experienced at this station was $3,710 m^3/s$ in 1968. The drought minimum flow of $2.8 m^3/s$ also occurred in the same year.

5.2 Map of Water Resource Systems



* Nam River joins to the Nakdong River at Jijung-mun in Uiryung.

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]	Purposes ¹⁾	Year of completion
Nam	Namgang	2,285	136.3	108.78	I, W	1969

Major Inter-basin Transfer

Name of transfer line	Names of rivers and places connected		Length [km]	Maximum capacity [m ³ /s]	Purpose ¹⁾	Year of completion
	From	To				
Sachunspillway	Namgang Dam	Sachun Bay	11.0	5,460	M	1969

1) I: Industrial use, M: Maintenance of flood flows, W: Municipal water supply

5.4 Major Floods and Droughts

Major Floods at Dongchon (Catchment area 1,529km²)

Date	Peak discharge [m ³ /s]	Rainfall [mm] Duration	Meteorological cause	Dead and missing	Major damages (Districts affected)
1979.8.25	N.A.	538 8.24~8.26	Typhoon		Sanchung County Chinju City
1989.7.26	N.A.	280 7.25~7.27	Typhoon	7	Sanchung County
1990.6.25	N.A.	280 6.19~6.29	Typhoon		Chinju City
1991.8.24	N.A.	154 8.22~8.264	Typhoon		Chinju City
1992.9.24	N.A.	104 9.22~9.26	Typhoon		Chinju City
1993.8.10	N.A.	113 8.8~8.12	Typhoon		Chinju City

Major Droughts

Period	Affected areas	Major damages and counteractions
1967. 10 ~ 11	Chinju city, Hamyang County	Supply cut ratio at the first stage : 20%
1968. 1 ~ 9	Chinju city, Hamyang County	Supply cut ratio at the first stage : 20%
1975. 6 ~ 9	Chinju city, Hamyang County	Supply cut ratio at the first stage : 25%
1976. 6 ~ 9	Chinju city, Hamyang County	Supply cut ratio at the first stage : 30%
1979. 9 ~ 11	Chinju city, Hamyang County	Supply cut ratio at the first stage : 25%
1982. 8 ~ 11	Chinju city, Hamyang County	Supply cut ratio at the first stage : 20%
1994. 7 ~ 11	Chinju city, Hamyang County	Supply cut ratio at the first stage : 20%

5.5 Groundwater and River Water Quality

River Water Quality¹⁾ at Dongchon²⁾, 1993

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pH	6.3	7.8	7.1	7.8	7.0	6.8	7.2	7.1	8.2	7.8	7.7	7.8
BOD [mg/l]	2.6	2.6	2.6	3.0	2.3	2.3	3.2	2.3	4.2	3.0	1.6	2.2
COD _{Mn} [mg/l]	3.9	3.7	3.0	3.8	4.6	7.2	6.5	4.3	4.9	6.4	2.7	5.9
SS [mg/l]	3.2	12.4	2.0	7.2	17.5	58.8	19.2	20.8	5.5	7.5	2.5	6.0
Coliform Group [MPN/100ml] ³⁾	1.7×10 ³	1.8×10 ³	9.4×10 ²	7.9×10 ²	2.4×10 ³	2.4×10 ³	1.4×10 ³	5.0×10 ³	1.1×10 ³	2.4×10 ³	2.4×10 ⁴	2.2×10 ³
Discharge [m ³ /s] ⁴⁾	16.9	11.0	32.6	10.0	46.8	63.1	104.7	289.5	33.1	11.9	24.1	17.4

1) Observed once a month on a dry day normally several days after rainfall.

2) Located near Yungwol City 14km from the river mouth.

3) Measurement method: BGLB (brilliant green lactose bile) method.

4) Discharge on the observation date.

6. Socio-cultural Characteristics

The Nam is located in the southern part of the main traffic highway and railroad between Seoul and the coastal city, Pusan. The capital city of Kyoungnam province, Chinju is in this basin. It is the centre of political, economic, social and cultural activities in the south-eastern part of Korea known as "Yeungnam". This basin is also in the neighbourhood of the old capital city, Pusan, which is the most important trade port and economic area in Korea.

7. References, Databooks and Bibliography

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