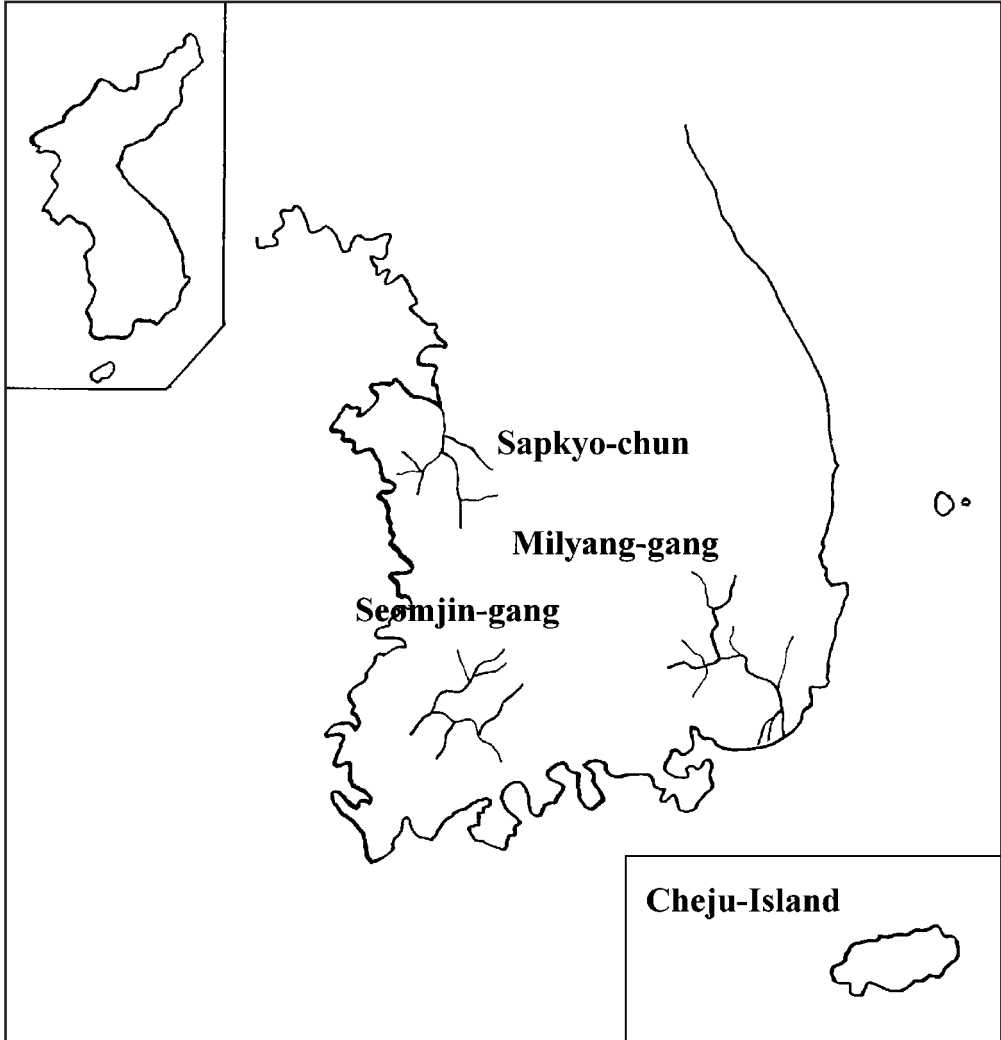


Republic of Korea

Korea-10: Seomjin-gang

Korea-11: Milyang-gang

Korea-12: Sapkyo-chun



Introduction

The Korean peninsula, which lies between the Yellow Sea and the East Sea, is about 1,300 km long and 300 km wide and is located at the eastern end of the Asian continent. The eastern coast line of the peninsula runs directly along the edge of steep mountain ranges, while the curved shapes of the western and southern coast lines indicate the occurrence of wide alluvial plains. In general, rivers running to the eastern coast are short and steep. Long rivers with gentle slopes, such as the Han River, the Geum River, the Nakdong River, and the Seomjin River, discharge to the southern or western coasts.

Korea is in the moderately humid zone of medium latitudes. It has a definite, seasonal climate that is greatly defined by dry, cold continental air masses during the winter, and humid warm air masses from the ocean during the summer. The average annual temperature is 14° C (57° F) along the southern coast, while it drops to as low as 11° C and 8° C (52° F and 46° F), respectively, over the mid and northern climatic zones. The yearly distribution of precipitation is determined by westerly and north-westerly dry winds from the Asian continent in the winter and moist south-easterly winds from the Pacific Ocean in the summer. Thus the rainfall is concentrated in the summer. Of the annual precipitation of 1,274 mm, approximately 66% occurs during the rainy season from June to September, 16% during the transition period from April to May, and the remaining 18% during the six months from October to March. As of 2000, the population of Korea was 46,136,000 with a population density of 462 person/km². Of a total land area of 99,450 km², farm lands account for 21,379 km² while forests cover about 63,762 km².

The three rivers catalogued in this volume are the Seomjin-gang, the Milyang-gang, and the Sapkyo-chun. They are representative of Korean rivers. The Seomjin-gang is the fourth largest river in Korea, and flows through the south-western part of the Korean peninsula. The Milyang-gang is one of the main tributaries of the Nakdong river which flows through the south-eastern part of the Korean peninsula. The Unmun and Milyang Dams play important roles by providing drinking water to the residents of nearby Taegu, Milyang and other areas. The Sapkyo-chun is located in the north-west of the Geum river basin and is a typical agricultural area. At the estuary of the Sapkyo-chun, the Sapkyo sea-dike was constructed for the irrigation in 1979.

Acknowledgements

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Lee, Soontak (Chair), Yeungnam University,
Ahn, Sang-Jin, Choongbuk University, and
Chun, Byung-Ho, Korean Military Academy.

The organizations that have contributed include:

The River Planning Division, Water Resources Bureau, Ministry of Construction and Transportation,
The Han River Flood Control Office, Ministry of Construction and Transportation,
The Nakdong River Flood Control Office, Ministry of Construction and Transportation,
The Geum River Flood Control Office, Ministry of Construction and Transportation,
The Korean Water Resources Association, and
The Korean Water Resources Corporation.

Seomjin-gang

Map of River



Geographical Survey, MOCT, Korea

Table of Basic Data

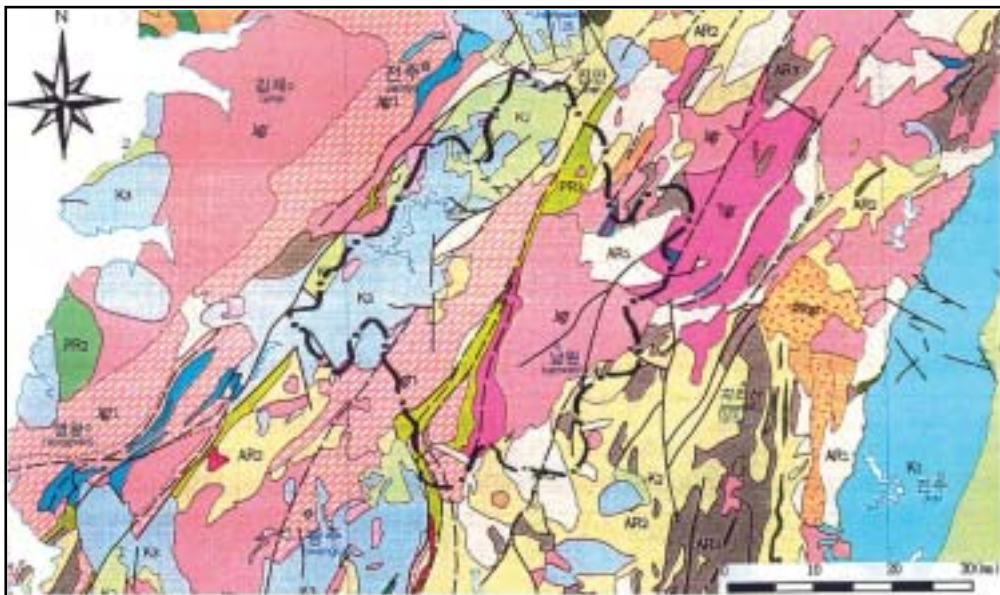
Name(s): Seomjin-gang		Serial No. : Korea (R. of) -10
Location: Junra Province, Korea	E 126° 51' 50" ~ 127° 53' 05"	N 35° 11' 44" ~ 35° 50' 00"
Area: 2,447.5 km ²	Length of the main stream: 156.3 km	
Origin: Mt. Palgong (1,151 m)	Highest Pt: Mt. Bakun (1,279m)	
Outlet: Seomjin-gang	Lowest Pt: Abrog (28.5 m)	
Main base rocks: Precambrian Gneiss, Cretaceous to Middle Granite, Sedimentary Rock		
Main tributaries: Yocheon (477.4 km ²), Osucheon (374.3 km ²)		
Main lakes: None		
Main reservoirs: Seomjin reservoir (466 × 10 ⁶ m ³ , 1996)		
Mean annual precipitation: 1,295 mm (1969 ~ 1996)		
Mean annual runoff: 75.7 m ³ /sec at Abrog (2,447.5 km ² (1984 - 1996)		
Population: 250,000 (1996)	Main cities: Namwon	
Land use: Forest (78.7%), Rice paddy (5.6%), Others (15.7%), (1995)		

1. General Description

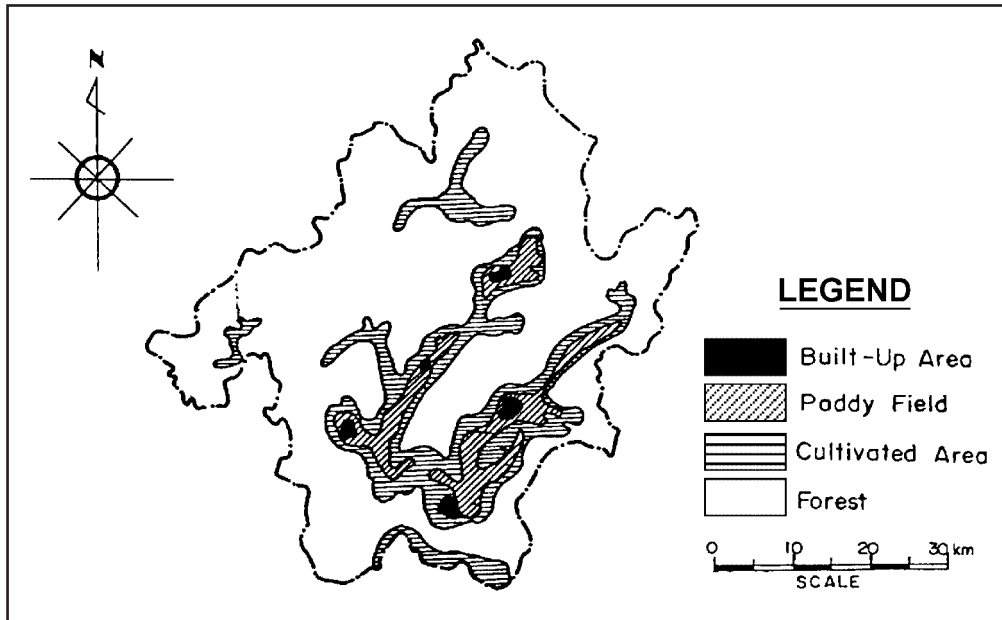
The Seomjin river is the fourth largest river in Korea with a total catchment area to the sea of 4,896.5 km² and a total river length of 212.3 km. It originates from Mt. Palgong (1,151 m), and flows through the south-western part of the Korean peninsula before discharging into the Korean Strait (South Sea). The northern part of the basin, (2,477.5 km²), has two main tributaries, the Yocheon and the Osucheon, which flow from the north-east. The average annual precipitation over the basin area is 1,295mm and the average annual discharge at Abrog, the basin outlet, was 75.7 m³/sec during 1984 ~ 1996. The population of this basin was 250,000 in 1996.

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map

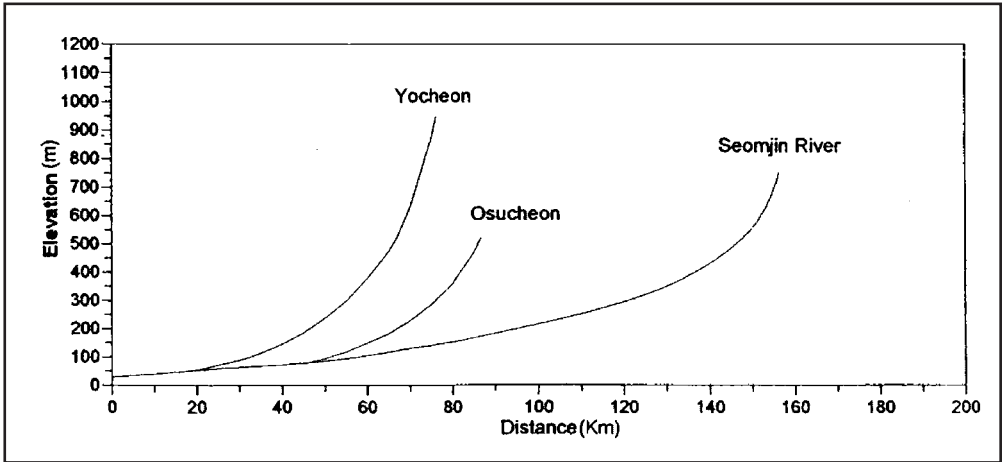


2.3 Characteristics of the River and the Main Tributaries

No.	Name of River	Length [km] Catchment area [km ²]	Highest peak [m]	Cities Population (1999)	Land use [%]
1	Seomjin-gang (Main River)	156.3 2,447.5	Mt. Palgong 1,151	Koksun Gun 138,727	F (78.7) P (5.6)
2	Yocheon (Tributary)	60.4 477.4	Mt. Bakun 1,279	Namwon City 112,961	U (2.1) A (11.3)
3	Osucheon (Tributary)	40.5 374.3	Mt. Cheonwhang 910	Imshil Gun 44,637	L (2.2) O (0.1)

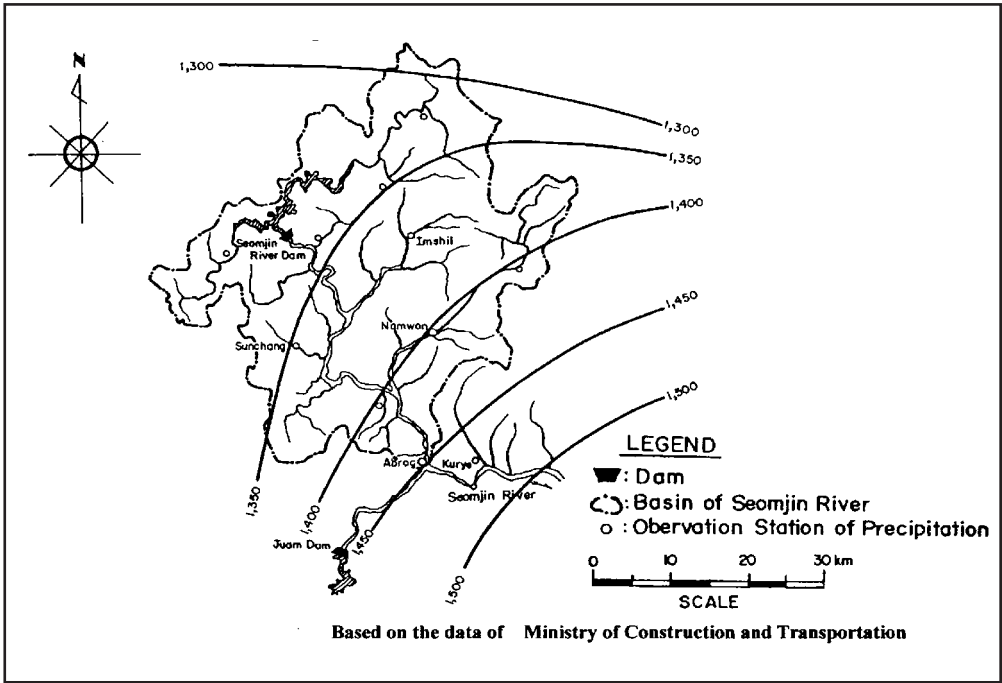
F: Forest L: Lake, river, marsh P: Paddy field U: Urban O: Orchard
A: Agricultural field (vegetable field, grass field)

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 ¹⁾ [mm]	Mean annual Evaporation ²⁾ [mm]	Observation items
31**	Imshil	244.0	N 35° 37' E 127° 17'	1973 ~ present	1,279.5	1,106.4	P (TB) E, DS
32*	Namwon	89.6	N 35° 24' E 127° 20'	1973 ~ present	1,261.8	1,052.9	P (TB) E, DS
265*	Dunnam	320.0	N 35° 32' 28" E 127° 20' 22"	1990 ~ present	1,070.6	---	P (TB)
269*	Ogog	30.0	N 35° 15' 02" E 127° 22' 10"	1990 ~ present	1,170.4	---	P (TB)
272***	Gangjin	360.0	N 35° 31' 37" E 127° 09' 55"	1961 ~ present	1,345.0	---	P (TB)
106***	Seongsu	420.0	N 35° 42' 30" E 127° 20' 48"	1991 ~ present	---	---	P (TB)
107***	Saangchi	350.0	N 35° 29' 06" E 127° 12' 26"	1991 ~ present	---	---	P (TB)

* Serial number used by the Ministry of Construction and Transportation

** Serial number used by Weather Office, Korean Meteorological Agency

*** Serial number used by Korean Water Resources Corporation

P: Precipitation E: Evaporation DS: Duration of sunshine TB: Tipping bucket with recording chart

1) Period for the mean is from the beginning of the observation period to 1992

2) Measured by 20 cm pan

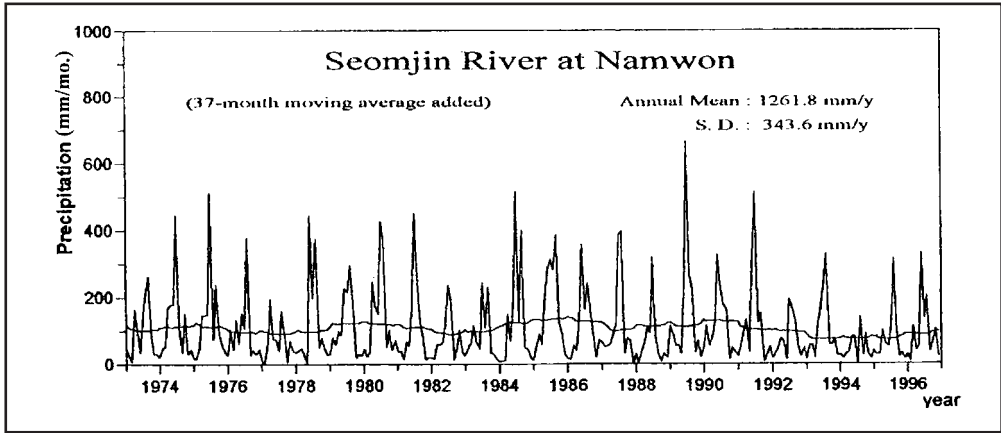
3.3 Monthly Climate Data

Station: Namwon

Observation item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C]	-1.8	0.4	5.4	11.8	17.2	21.1	25.0	25.5	19.4	13.8	6.3	0.4	12.0	1973~1996
Precipitation [mm]	31.3	39.9	54.1	96.3	89.3	178.3	282.6	223.7	131.6	58.9	47.5	31.4	1,261.8	1973~1996
Evaporation [mm]*	39.3	48.1	82.9	107.6	135.4	124.2	121.5	133.9	94.7	81.4	46.4	37.0	1,052.9	1973~1996
Duration of sunshine [hr]	149	147	198	210	243	193	180	211	180	197	137	134	2,179	1973~1996

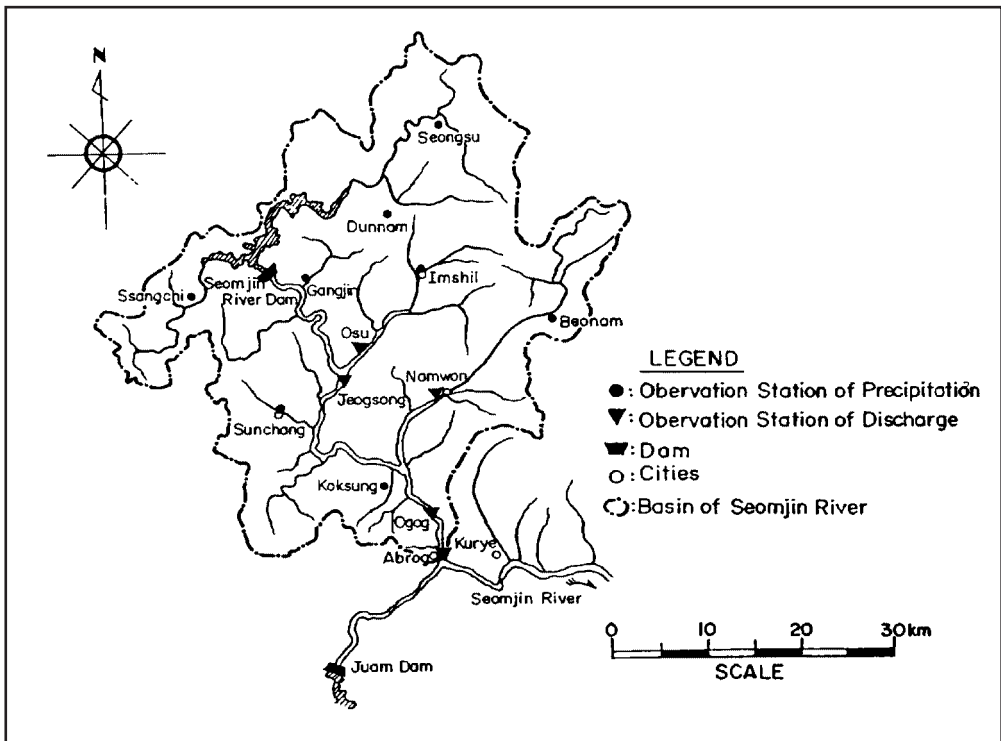
* measured by 20 cm pan

3.4 Long-term Variation of Monthly Precipitation Series



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 ¹⁾
168	Ogog	N 35° 14' 02" E 127° 22' 10"	2,380.6	1990 ~ present	H1
171	Jeongsong	N 35° 23' 54" E 127° 13' 09"	1,384.5	1990 ~ present	H1
173	Namwon	N 35° 24' 21" E 127° 23' 26"	219.2	1990 ~ present	H1
177	Abrog	N 35° 11' 44" E 127° 22' 24"	2,447.5	1917 ~ present	H1
181	Osu	N 35° 26' 11" E 127° 14' 38"	352.3	1970 ~ present	H1

No.*	\bar{Q} ²⁾ [m ³ /s]	Qmax ³⁾ [m ³ /s]	\bar{Q} max ⁴⁾ [m ³ /s]	\bar{Q} min ⁵⁾ [m ³ /s]	\bar{Q}/A [m ³ /s/100km ²]	Qmax/A [m ³ /s/100km ²]	Period of statistics
177	75.7	4,689.0	2,296.0	4.4	3.1	191.6	1984 ~ 1996

* Serial number used by Ministry of Construction and Transportation

1) H1: water level in recording chart

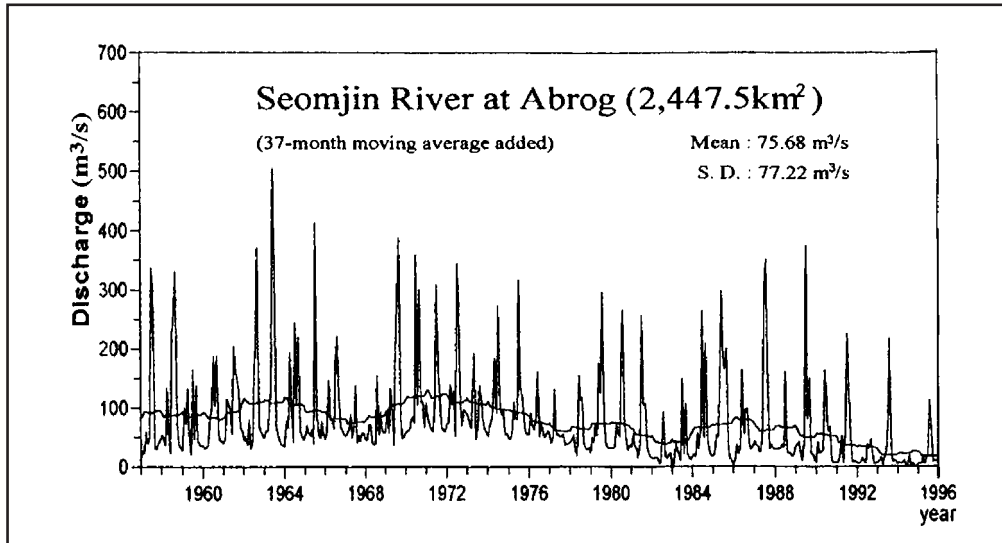
2) Mean annual discharge

3) Maximum discharge

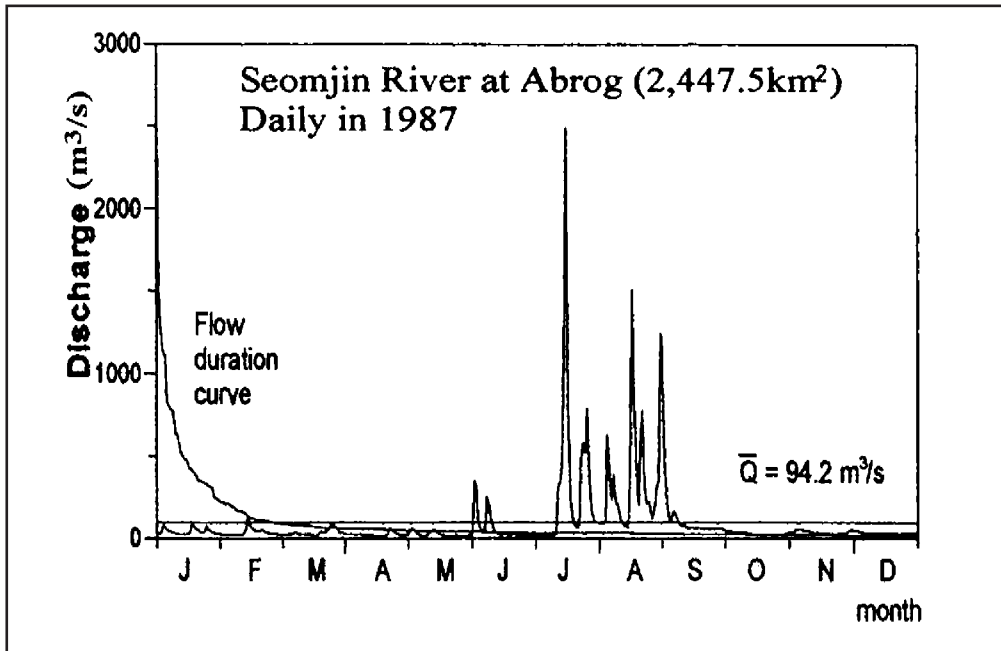
4) Mean annual maximum discharge

5) Mean annual minimum discharge

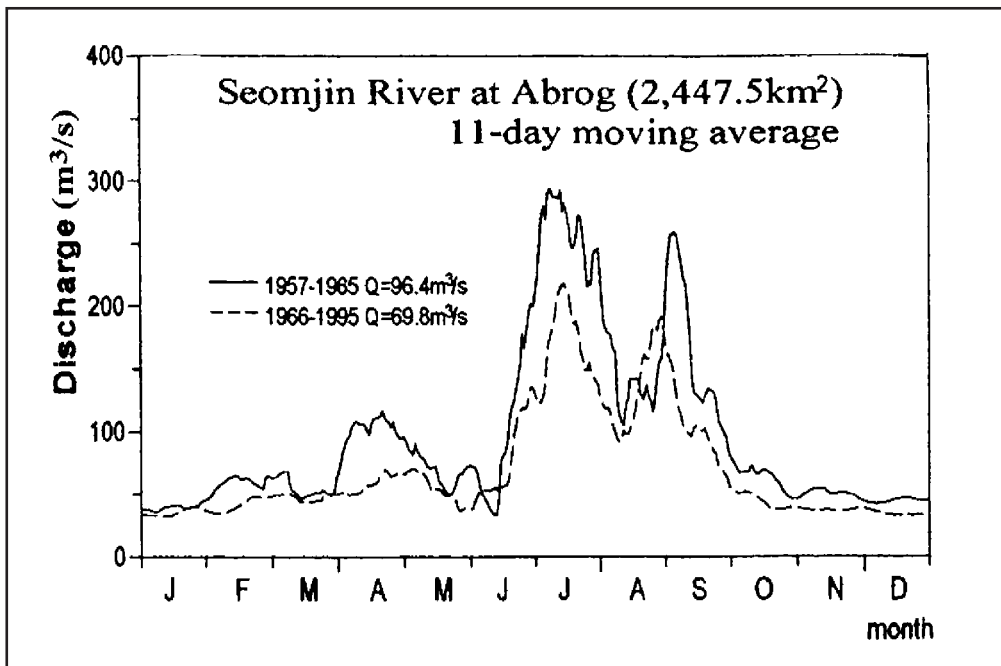
4.3 Long-term Variation of Monthly Discharge Series



4.4 Annual Pattern of Discharge Series



4.5 Unique Hydrological Features



Note that the Seomjin Dam was constructed in 1966

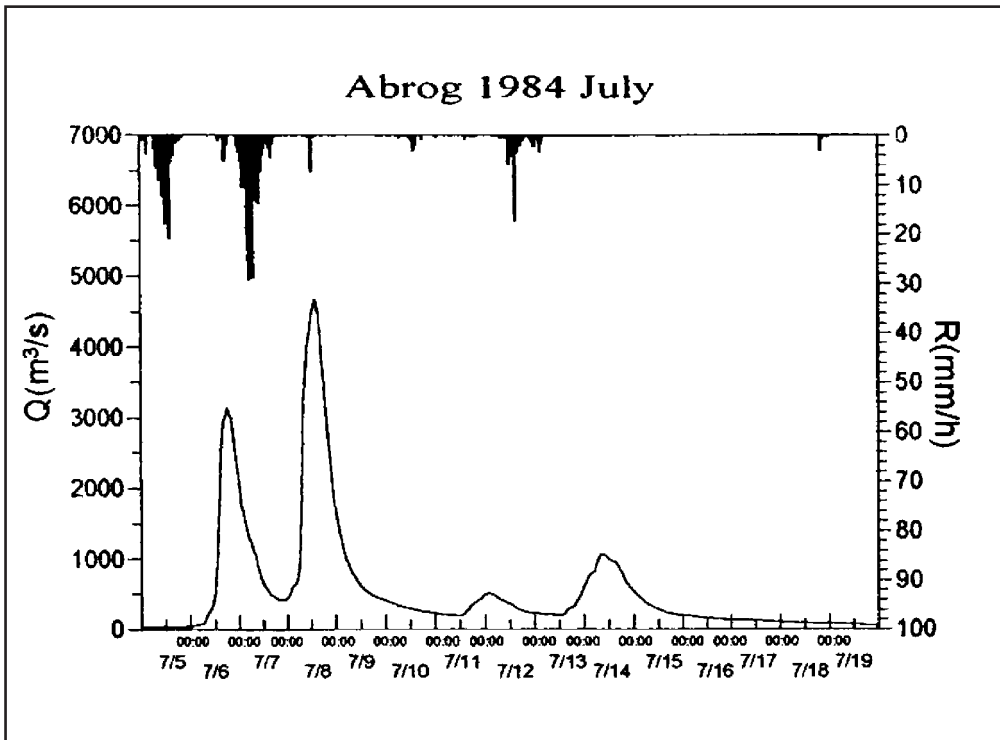
4.6 Annual Maximum and Minimum Discharges

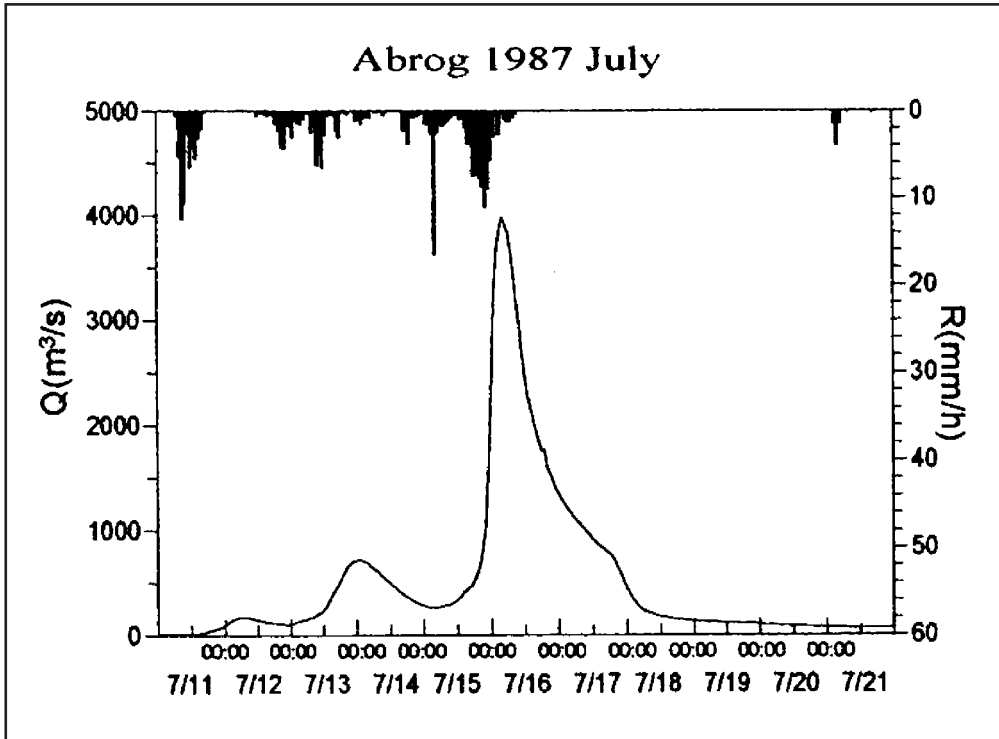
Station: Abrog

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]
1984	7.8	4,689	1	10.8	1991	7.10	1,797	10	0.7
1985	9.19	3,066	12	4.0	1992	7.19	1,261	12	2.8
1986	6.25	3,911	1	3.1	1993	7.12	1,419	4	0.4
1987	7.16	3,980	7	12.9	1994	8.12	145	7	0.2
1988	7.16	734	7	10.3	1995	8.26	836	1	0.3
1989	7.25	4,689	6	3.7	1996	6.25	1,299	1	2.4
1990	6.20	2,017	1	5.3					

1), 2) Instantaneous observation by recording chart

4.7 Hyetographs and Hydrographs of Major Floods





Based on the data of Ministry of Construction and Transportation

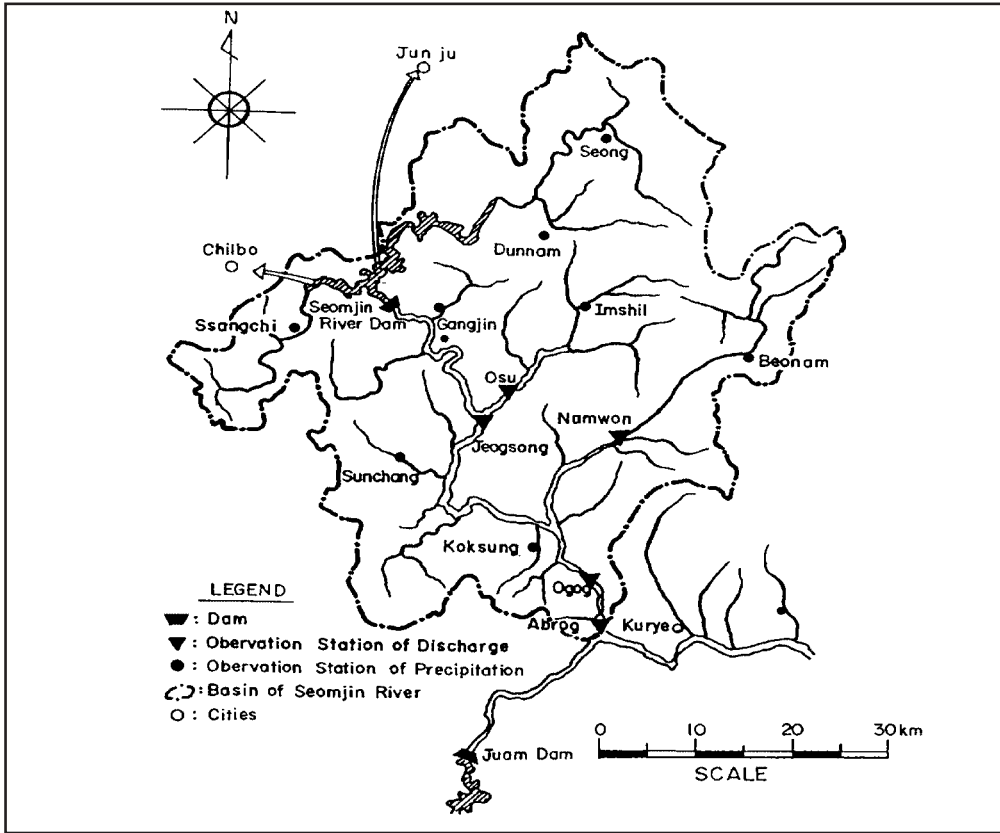
5. Water Resources

5.1 General Description

The basin is composed of complex geological formations, and throughout the basin area mountainous forests are dominant. Except for some narrow flat areas in the valleys, most of the basin is mountainous. The area is covered by shallow well-drained soils. In the dry season there is very little runoff in the rivers, with about 70% of the annual runoff occurring between June and September.

The site of the concrete gravity Seomjin Dam is in the north-eastern part of the basin. The dam is 64 m high with a crest length of 344.2 m, a gross storage capacity of $466 \times 10^6 m^3$, an active storage capacity of $370 \times 10^6 m^3$, a flood control space of $32 \times 10^5 m^3$, and an annual energy output of 6×10^5 kwh/yr. This reservoir contributes to: the reduction of flood damages in downstream areas; and the supply of water for municipal and irrigation purposes, and for electric power generation. Some $1,890 m^3/day$ are supplied to the Chilbo power plant (160×10^6 kwh/yr) which is located about 6.2 km west of the Seomjin dam, and a further $130 m^3/day$ of water goes to Junju city, located near about 22.5 km north of the dam, as drinking water.

5.2 Map of Water Resource Systems



5.3 List of Major Water Resources Facilities

Major Reservoir

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
Seomjin-gang	Seomjin Dam	763	466	370	W, F, I, M, P	1966

1) W: Municipal water supply F: Flood control I: Industrial use M: Maintenance of normal flows P: Hydro-power

Major Interbasin Transfer

Name of transfer line	Name of rivers connected		Length [km]	Maximum capacity [m ³ /s]	Purpose ¹⁾	Year of completion
	From	To				
Chilbo Conveyance Channel	Seomjin Dam	Chilbo	6.2	21.9	A	1995
Junju Conveyance Channel	Seomjin Dam	Junju	22.5	1.5	W	1996

1) W: Municipal water supply A: Agricultural use.

5.4 Major Floods and Droughts

Major Floods

Date	Peak discharge [m ³ /s]	Rainfall [mm] Duration	Meteorological Cause	Dead and Missing	Major damages (Districts affected)
1984.7.8	4,689	584.0 7.4 ~ 4	Heavy Storm	3	Namwon
1987.7.16	3,980	251.2 7.11 ~ 16	Typhoon	3	Namwon, Imshil, Sunchang
1989.7.25	4,189	334.7 7.23 ~ 25	Heavy Storm	1	Namwon, Sunchang

Major Droughts

Period	Areas affected	Major damages and counteractions
1988.8 ~ 12	Namwon, Koksung, Sunchang	Supply cut ratio at the first stage: 10%
1981.1 ~ 12	Namwon, Koksung, Sunchang	Supply cut ratio at the first stage: 40%
1995.1 ~ 6	Namwon, Koksung, Sunchang	Supply cut ratio at the first stage: 15%

5.5 Groundwater and Water Quality

River Water Quality¹⁾ at Seomjin Dam Site²⁾ in 1996

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
pH	6.6	6.9	7.1	7.3	6.9	6.9	6.9	7.3	6.6	6.9	7.0	6.9
BOD [mg/l]	1.7	1.7	1.7	1.6	1.4	2.1	1.8	2.3	2.0	1.7	1.7	1.8
COD _{Mn} [mg/l]	2.4	2.1	2.2	2.0	2.4	2.5	2.6	3.1	2.7	2.8	2.6	2.8
SS [mg/l]	1.9	2.6	1.4	2.7	3.7	3.9	3.8	3.0	4.2	2.4	3.5	2.9
Coliform group [MPN/100ml] ³⁾	500	340	340	330	210	200	100	260	310	300	270	430
Discharge [m ³ /s] ⁴⁾	1.5	1.0	26.36	5.7	6.4	65.9	46.4	3.7	3.0	1.6	4.7	8.1

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

2) Located near Chongju City 12 km from the river mouth.

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

4) Discharge on the observation date.

6. Socio-cultural Characteristics

The main city of the basin, Namwon, is well known for hosting the Korean drama, 'Chunhyangjun'. The Palpal highway, an important component of national transportation system that links Taegu to Kwangju, passes through the basin. In the eastern part of this basin is the famous Jirisan national park. Other tourist attractions such as the Naejangsan national park, the Dugyusan national park and the Kurye springs are also near the basin.

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