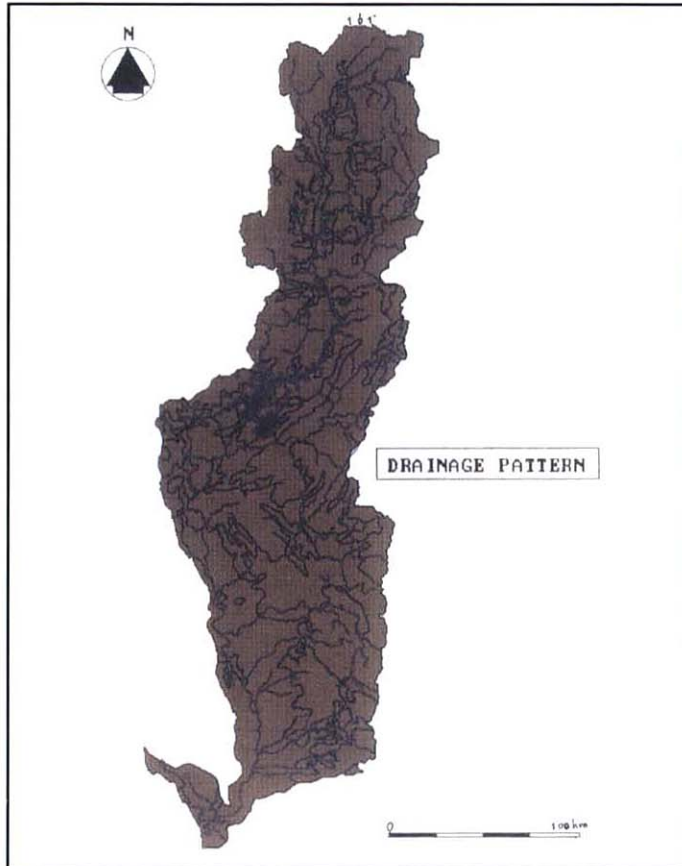


# Mae Nam Nan

## Map of River

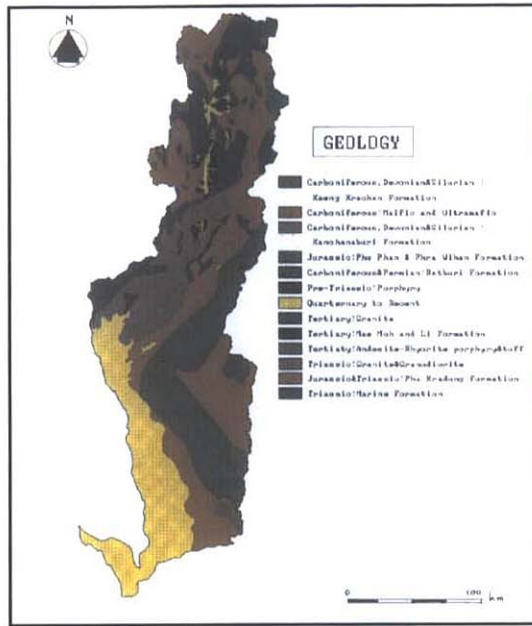


## Table of Basic Data

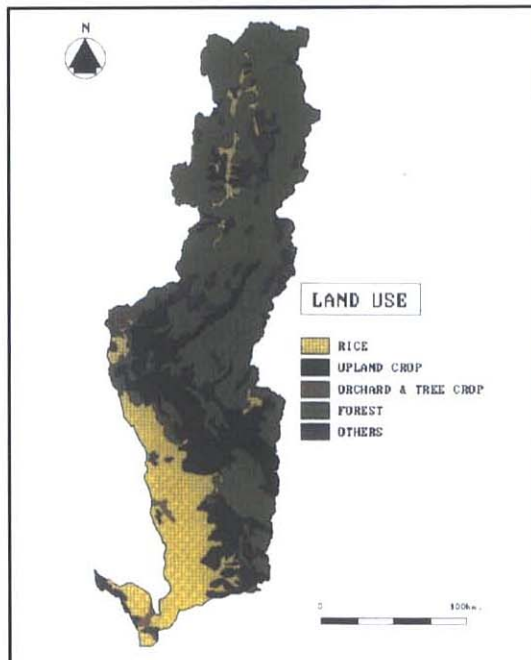
<b>Name:</b> Nan River		<b>Serail No:</b> Thailand : 3
<b>Location:</b> Northern part of Thailand	N 15° 42' 12"-19° 37' 48"	E 99° 51' 30"-101° 21' 48"
<b>Area:</b> 34,331 km <sup>2</sup>	<b>Length of main stream:</b> 650 km	
<b>Origin:</b> Phi Pannam Mt.	<b>Highest point:</b> Thung Chang District (2,079 m)	
<b>Outlet:</b> Chao Phraya River	<b>Lowest point:</b> River mouth ( 0 m)	
<b>Main geological features:</b> Pre-Cambrian to Paleozoic; Granite,Gneiss,Limestone		
<b>Main tributaries:</b> Kwae Noi River (4,676km <sup>2</sup> ), Wang Thong River (2,303km <sup>2</sup> ), Nam Wa River (2,176km <sup>2</sup> ), Nam Pard River (1,961km <sup>2</sup> )		
<b>Main lakes:</b> None		
<b>Main reservoir:</b> Sirikit Dam (9,510x10 <sup>6</sup> m <sup>3</sup> , 1971)		
<b>Mean annual precipitation:</b> 1,283 mm (1976 ~ 1995)		
<b>Mean annual runoff:</b> 42.6 m <sup>3</sup> /s at Muang District, Phichit Province		
<b>Population:</b> 2,555,595 (1992)	<b>Main cities:</b> Nan ,Uttaradit,Phitsanulok,Phichit	
<b>Land Use:</b> Forest 82.89% Agriculture & Urban area 15.16% Water Resources 1.95%		

## 2. Geographical Information

### 2.1 Geological Map



### 2.2 Land Use Map



## 1. General Description

The Nan River originates from the Phi Pannam Mountain Range in the Chiang Dao District which is located in the Chiang Mai Province in the northern part of Thailand. It flows southwards and joins the Ping River at Nakhon Sawan Province where the Chao Phraya River is formed. The Nan River is 650 km long and drains an area of 34,331 km<sup>2</sup>. The average annual precipitation in the basin is 1,283 mm, while the average discharge during the period 1976-1995 at Muang District, Phichit Province (station code : 01 09 17 02) has been 42.6 m<sup>3</sup>/s. Sirikit dam, built in 1971, is the only dam in this basin. The population in the basin in 1992 was 2,555,595.

### 2.3 Characteristics of River and Main Tributaries

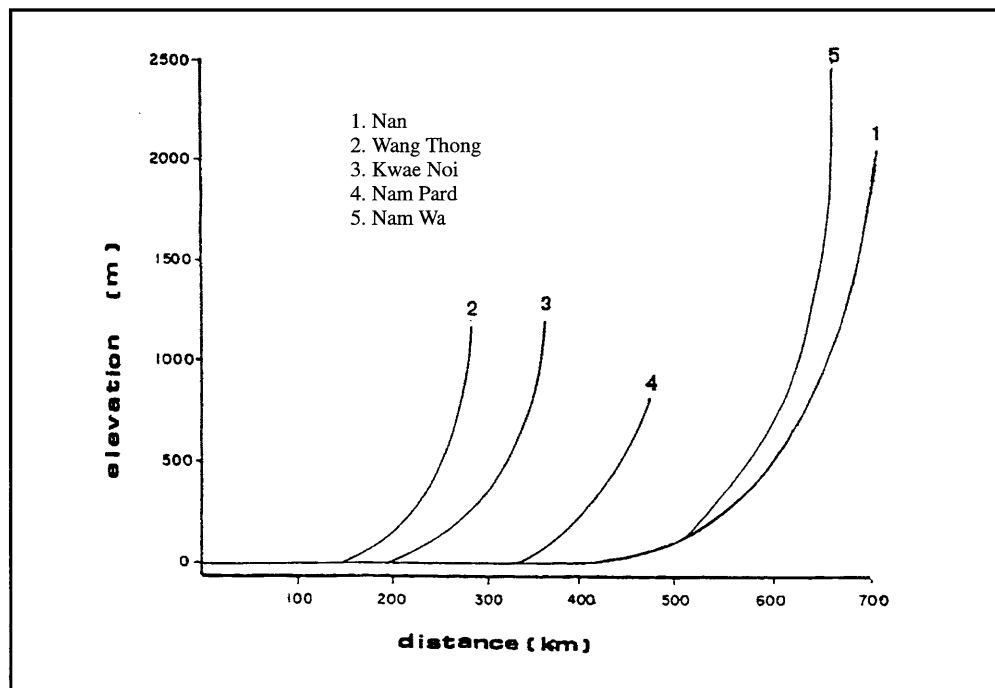
No.	Name of river	Length [km]	Highest peak [m]	Cities Population(1996)	Land use [%] (1994)
		Catchment area [km <sup>2</sup> ]	Lowest point [m]		
1	Nan (Main river)	650 34,331	2,079 -----	Nan (473,115), Phitsanulok (847,511), Phichit (580,694)	A & U (15.16%)  F (82.89%)  W (1.95)
2	Wang Thong (Tributary)	130 2,303	1,122 -----	Phitsanulok	
3	Kwae Noi (Tributary)	180 4,676	1,219 -----	Phitsanulok	
4	Nam Pard (Tributary)	130 1,961	883 -----	Uttaradit (479,460)	
5	Nam Wa (Tributary)	130 2,176	2,400 -----	Nan	

A &amp; U: Agriculture and Urban

F: Forest

W: Water Resources

### 2.4 Longitudinal Profiles





### 3.2 List of Meteorological Observation Stations

Station No.	Station Name	Elevation	Location	Observation period	Mean annual precipitation [mm]	Observation item
0309115	Phromphiram		N17° 01' 57" E100° 12' 17"	1976 ~1995	1,207.7	P(S)
0309161	Wang Thong		N16° 49' 25" E100° 25' 59"	1976~ 1995	1,277.6	P(S)
0309171	Phitsanulok		N16° 47' 00" E100° 01' 26"	1951~1995	1,330.5	P(S)
0309172	Nakhon Sawan		N15° 48' 00" E100° 10' 00"	1951~1995	1,118.8	P(S)
0309173	Phichit		N16° 26' 10" E100° 21' 10"	1976~1995	1,177.2	P(S)

P(S) : Precipitation from standard rain guage

### 3.3 Monthly Climate Data

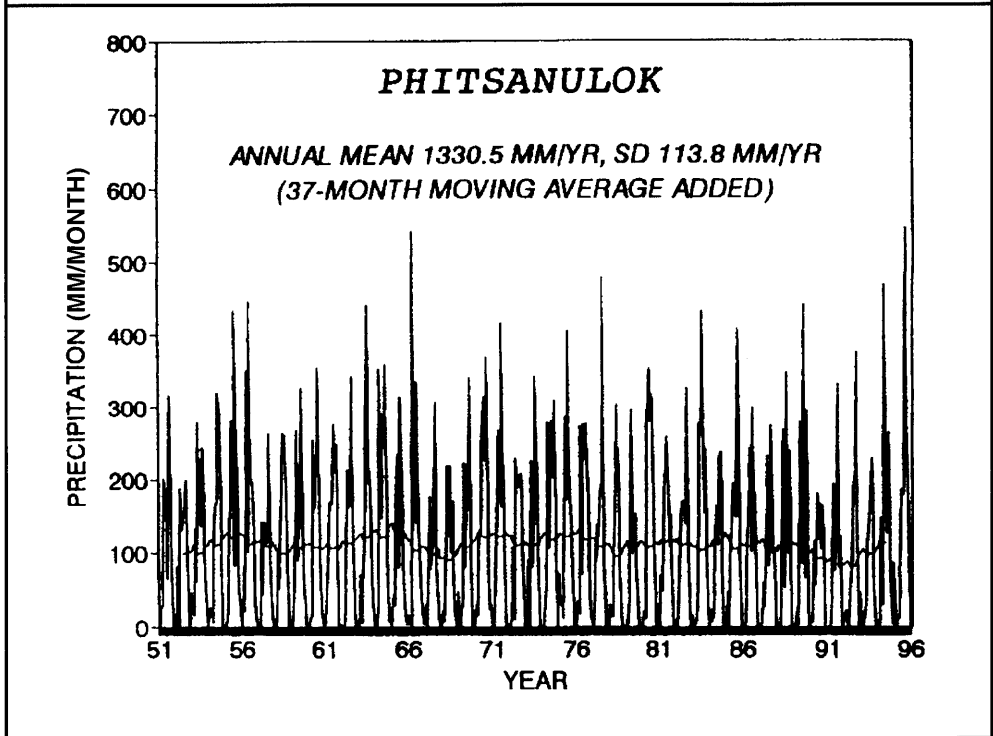
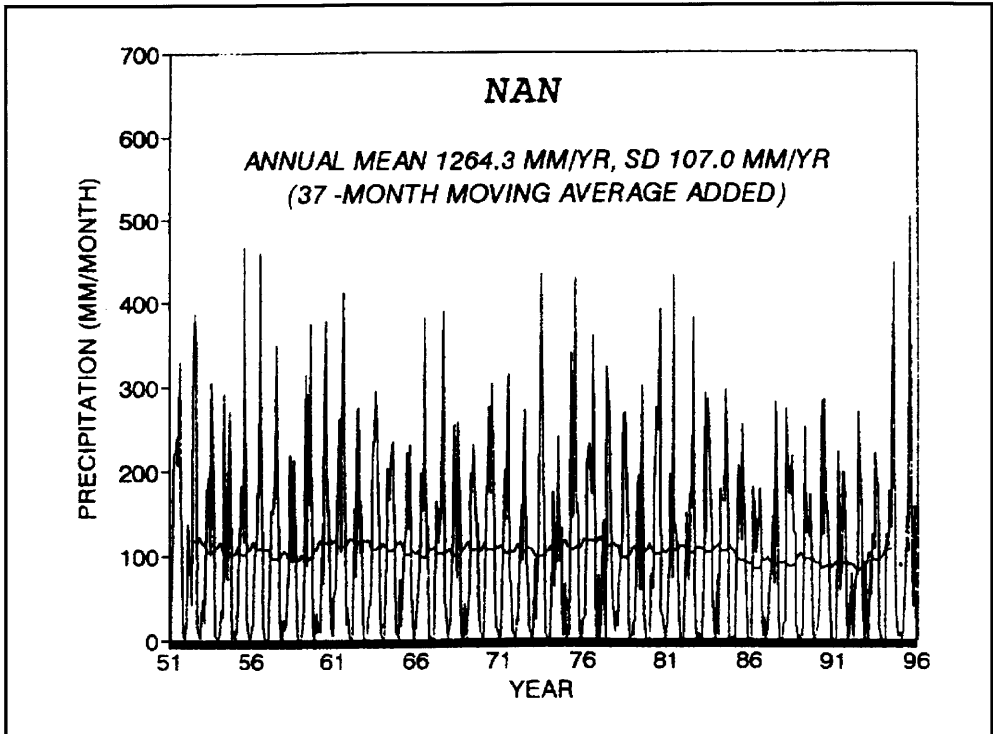
Station : Nan ( 03090401 )

Observation item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C ]	21.1	23.4	26.7	29.2	28.9	28.3	27.6	27.6	27.2	26.3	24.0	20.8	25.9	1951~1995
Precipitation [mm]	9.4	14.2	33.0	97.2	172.1	146.0	207.8	267.0	210.7	81.6	18.5	6.8	1,264.3	1951~1995
Evaporation [mm]	81.1	91.0	118.9	142.9	138.4	109.7	100.3	96.4	99.5	101.2	86.0	77.0	1,242.4	1963~1995

Station : Phitsanulok ( 03091701 )

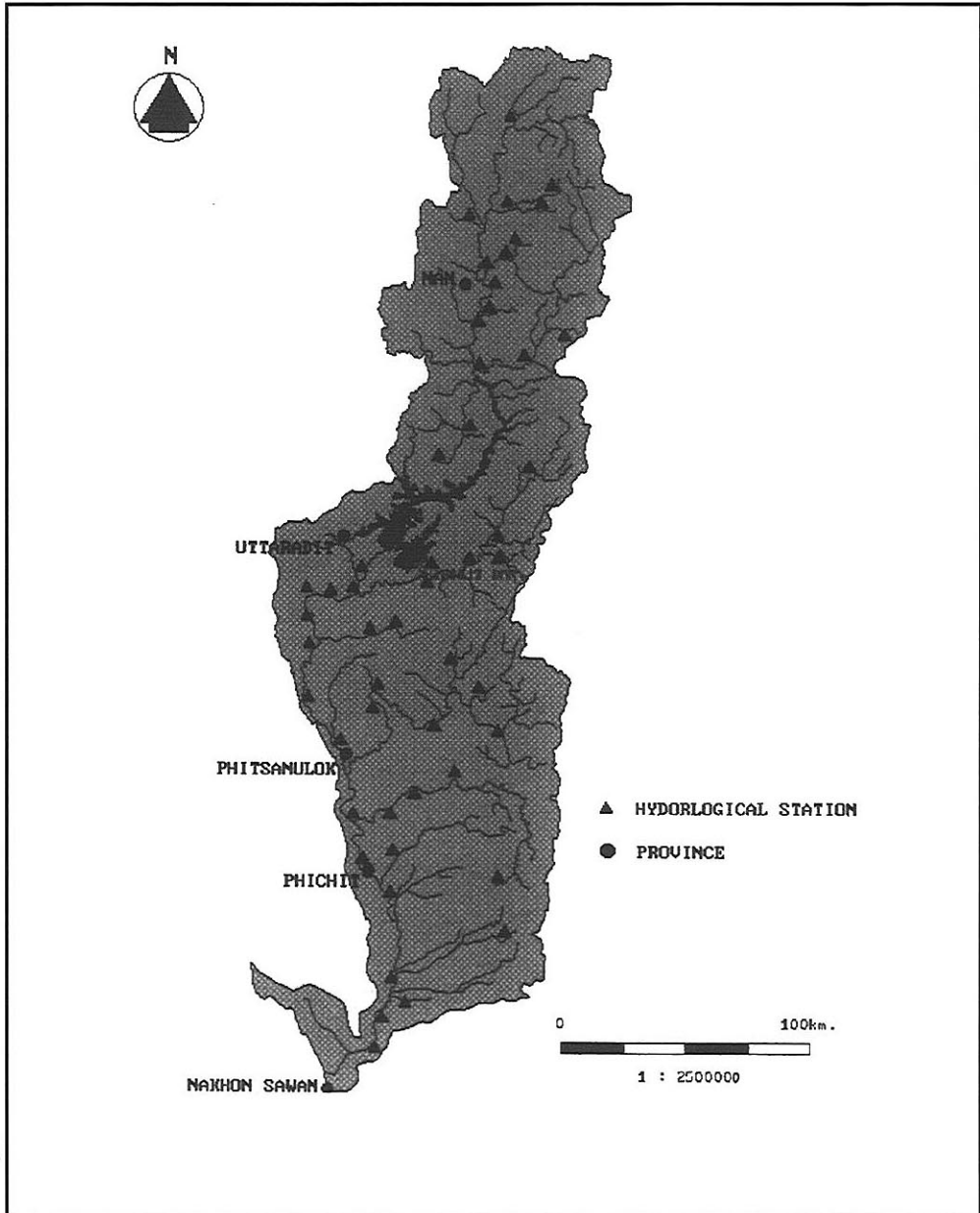
Observation item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C ]	24.1	26.4	28.9	30.6	29.6	28.6	28.1	27.7	27.8	27.5	26.0	23.9	27.4	1951~1995
Precipitation [mm]	5.7	11.8	35.3	49.9	191.8	175.7	186.5	251.9	243.6	143.3	27.2	6.8	1,330.5	1951~1995
Evaporation [mm]	107.4	117.4	159.1	185.9	177.0	145.2	137.6	126.3	117.0	122.5	113.3	109.0	1,617.7	1962~1995
Duration of Sunshine [hr]	266.3	249.5	263.6	272.8	250.8	181.8	169.7	159.4	162.8	220.8	262.3	262.3	2,700.0	1957~1995

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

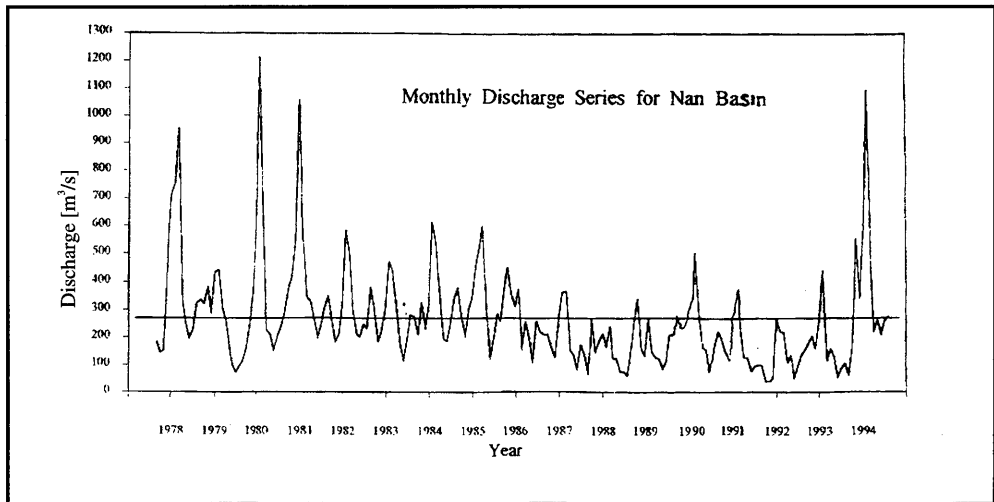
No.	Station	Location	Catchment area [km <sup>2</sup> ]	Observation period	Observation items <sup>1)</sup> (frequency)
01090101	Muang District Nan Province	N 18° 46' 23" E 100° 46' 51"	4,609	1922-present	Q(H1)
01091601	Wang Thong District Phitsanulok Province	N 16° 50' 35" E 100° 31' 20"	1,861	1965-present	Q(H1) WQ(H6m)
04090201	Pau District Nan Province	N 19° 12' 59" E 100° 57' 36"	148	1977-1994	Q(H1) WQ(H6m)
01091701	Muang District Phitsanulok Province	N 16° 48' 35" E 100° 15' 37"	25,294	1966-present	Q(H1)
01091702	Muang District Phichit Province	N 16° 26' 31" E 100° 2' 11"	29,153	1944-1994	Q(5d)

No.	$\bar{Q}$ [m <sup>3</sup> /s]	$Q_{max}^*$ [m <sup>3</sup> /s]	$\bar{Q}_{max}^{**}$ [m <sup>3</sup> /s]	$\bar{Q}_{min}$ [m <sup>3</sup> /s]	$\bar{Q}/A$ [m <sup>3</sup> /s/100 km <sup>2</sup> ]	$Q_{max}/A$ [m <sup>3</sup> /s/100 km <sup>2</sup> ]	Period of statistics
01090101	38.1	2,287	1,255	5.90	0.83	49.62	1922-1995
01091601	22.9	886	327	0.38	1.23	47.61	1965-1995
04090201	47.9	953	430	2.60	1.10	21.96	1977-1995
01091701	43.4	1,896	1,023	45.7	0.17	7.50	1966-1995
01091702	42.6	1,563	1,146	40.3	0.15	5.36	1944-1995

1) H1: Waterlevel in recording chart  
5d: 5-day, 6m: Six monthly

$\bar{Q}$  : Mean annual discharge  
 $Q_{max}^*$  : Maximum discharge  
 $\bar{Q}_{max}^{**}$  : Mean annual maximum discharge  
 $\bar{Q}_{min}$  : Mean annual minimum discharge  
WQ : Water qualities

## 4.3 Long-term Variation of Monthly Discharge



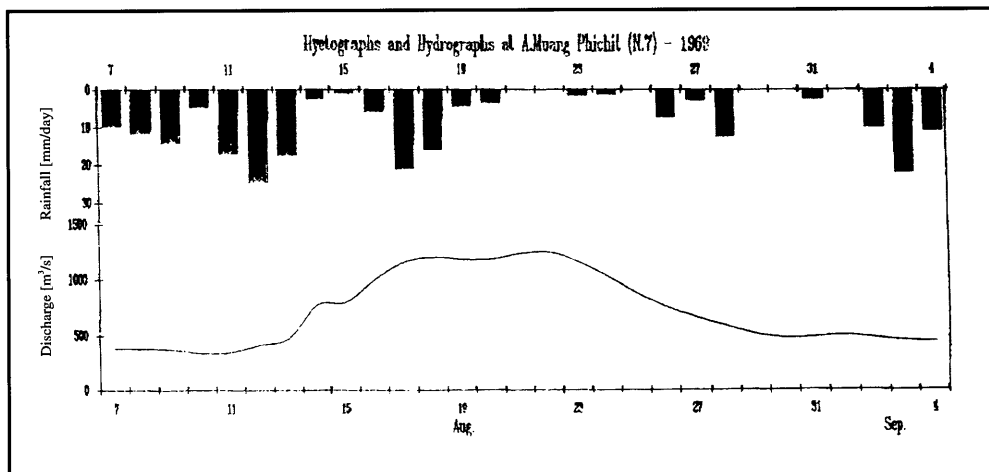


### 4.6 Annual Maximum and Minimum Discharges

Station : Muang district , Nan province ( 01090101 )

Year	Maximum		Minimum		Year	Maximum		Minimum	
	Date	[m <sup>3</sup> /s]	Date	[m <sup>3</sup> /s]		Date	[m <sup>3</sup> /s]	Date	[m <sup>3</sup> /s]
1960	9.16	1,367	3.24	22.00	1977	9.09	1,007	2.23	82.00
1961	10.02	1,563	3.27	18.00	1978	10.08	1,352	5.26	78.00
1962	10.03	1,291	4.08	22.00	1979	8.13	760	2.21	45.00
1963	9.18	1,392	5.21	13.00	1980	9.10	1,419	4.17	61.00
1964	10.07	1,441	4.13	12.00	1981	8.10	1,305	1.13	126.00
1965	9.12	1,091	4.05	17.00	1982	9.12	1,064	7.01	89.00
1966	9.07	1,489	4.21	11.00	1983	9.10	702	1.12	87.00
1967	9.30	1,403	4.17	18.00	1984	9.11	837	12.27	104.00
1968	8.19	1,072	3.11	7.00	1985	10.20	1,074	1.13	88.00
1969	8.22	1,249	4.01	7.00	1986	8.30	655	1.14	49.00
1970	8.30	1,534	4.03	7.00	1987	8.24	884	3.31	23.00
1971	10.06	1,061	4.26	22.00	1988	7.21	610	4.07	31.00
1972	8.12	445	2.03	16.00	1989	6.01	511	1.07	38.00
1973	9.24	878	5.02	25.00	1990	6.02	840	1.05	25.00
1974	8.20	940	1.09	105.00	1991	8.25	678	3026	45.00
1975	9.01	1,399	2.04	144.00	1992	9.27	572	6.01	7.00
1976	10.02	1,142	2.23	133.00	1993	9.25	577	1.13	31.00
					1994	9.18	1,211	4.18	32.00

### 4.7 Hyetographs and Hydrographs of Major Floods



## 5. Water Resources

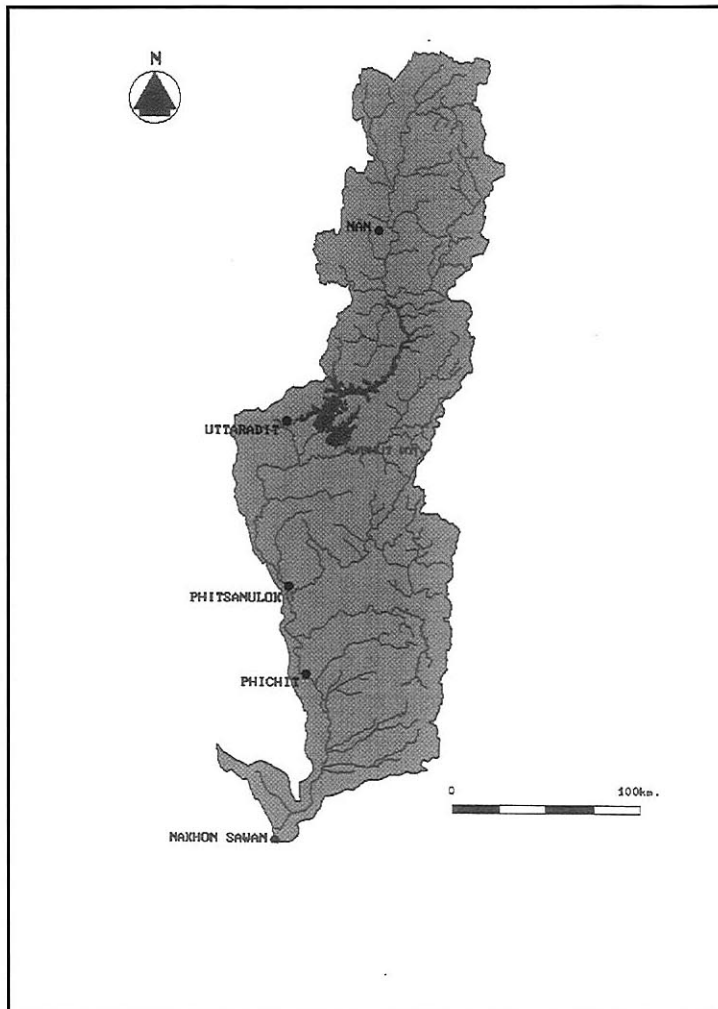
### 5.1 General Description

The Nan River Basin is divided into 17 sub-basins. Most areas in the upper part of the basin are mountainous and are the headwaters of its sub-basins. The lower part consists of mostly agricultural areas and cities. The water resources are utilized mainly for paddy irrigation. At present there are 311 irrigation projects in the basin covering an irrigated area of  $1.73 \times 10^6 \text{ km}^2$ .

The only existing large impounding reservoir in the basin is created by the Sirikit Multipurpose Dam. It has gross and effective capacities of  $9,510 \times 10^6 \text{ m}^3$  and  $8,660 \times 10^6 \text{ m}^3$  respectively.

Flooding in the basin usually occurs in the lower part during the period from July to September which corresponds to the typhoon season. The month of September has the highest frequency of flood occurrence with the provinces of Phitsanulok and Nakhon Sawan affected most.

### 5.2 Map of Water Resources System



### 5.3 List of Major Water Resources Facilities

#### Major Reservoirs

Name of river	Name of reservoir	Catchment area [km <sup>2</sup> ]	Gross capacity [10 <sup>6</sup> m <sup>3</sup> ]	Effective capacity [10 <sup>6</sup> m <sup>3</sup> ]	Purpose <sup>1)</sup>	Year of completion
Nan	Sirikit	13,130	9,510	8,660	A,F,I,P,W	1971

1) A : Agricultural use, F: Flood control, I : Industrial use, P: Hydro-power, W : Municipal water supply

### 5.5 Groundwater and Water Quality

#### Groundwater

Province	Quantities (No. of wells)	Qualities
1. Nan	615	Most of wells in the area of upper part of the basin are safe for drinking, only some wells have high level of Fe and hard water. In the area of the lower part of the basin, wells have high levels of Fe and Mn, but most wells are safe for drinking.
2. Uttaradit	685	
3. Phitsanulok	1,176	
4. Phichit	445	
5. Nakhon Sawan	1,134	
Total	4,055	

#### River Water Quality

Place and year	pH	BOD (mg/l)	Coliform (MPN/100ml)
Nan Province (1991)	7.2 - 8.5	low	0 - 54,000
Sirikit Dam (1991)	6.9 - 8.5	5 - 7.5	no data
Phitsanulok (1993)	8.0	1.1 - 1.8	4,600 - 24,000

## 6. Socio-cultural Characteristics

Nan River Basin is bordered to the east by the Democratic People's Republic of Lao with high mountain ridge in between. There are many hilltribes living in the headwater areas of the basin in the mountains at high altitude. Most of them use sloping lands for field crop cultivation resulting in soil erosion during the rainy season. They have their own culture, dialects, traditions and beliefs but most of them can understand the Thai language quite well. In general, ethnic Thais live in the plains of the basin on both sides of the Nan River and tributaries. They do agricultural practices and speak northern Thai dialect. The famous primitive tradition concerned with water is the Water Festival, the so called Thesakarn Songkran or Thai new year celebration. According to the lunar calendar the new year is on the 13th of April which is the beginning of the growing season. The people in the area are conservative and religious, and generally lead a peaceful life.

## 7. References, Databooks and Bibliography

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 Electricity Generating Authority of Thailand (1992): *Surface runoff and specific yield of river basin in Thailand*, Survey and Ecology Department, Meteorology and Hydrology Division, (February 1992).  
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 Royal Irrigation Department, Hydrology Division : *Thailand hydrological yearbook*, 1922-1995.