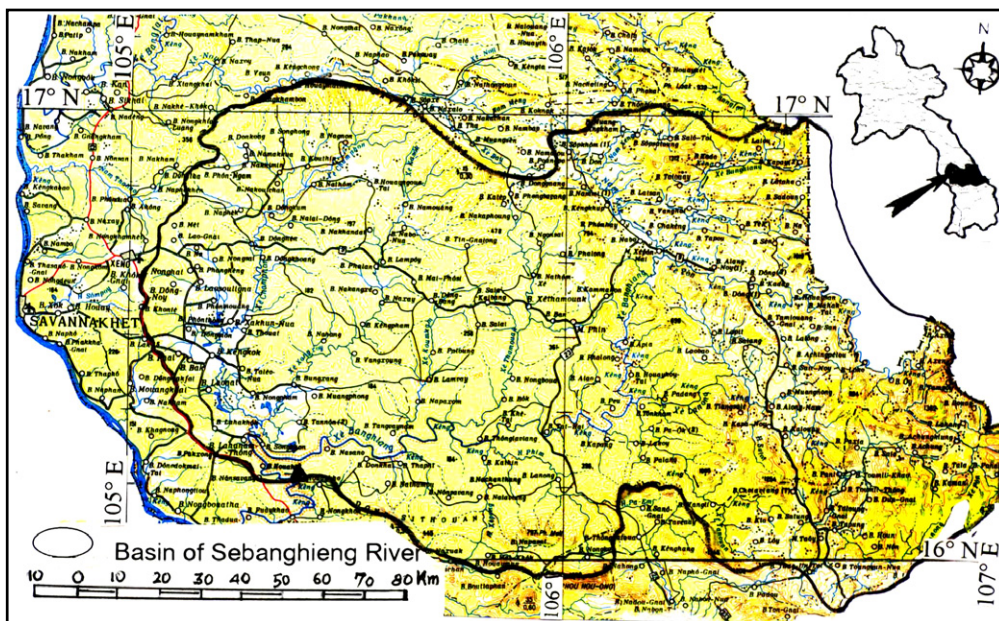


## Nam Sebanghieng

### Map of River



### Table of Basic Data

<b>Name:</b> Nam Sebanghieng		<b>Serial No.:</b> LAO - 6
<b>Location:</b> Savannakhet Plain	N 16°41'12"	E 106°13'06"
<b>Basin Area:</b> 19 400 km <sup>2</sup>	<b>Length of main stream:</b> 370 km	
<b>Origin:</b> Sayphouluang (2 300 m)	<b>Highest Pt.:</b> 1 613 m	
<b>Outlet :</b> Kengdone	<b>Lowest Pt.:</b> 143 m	
<b>Main geologic features:</b> Mesozoic, Palaeozoic, Precambrian		
<b>Main tributaries:</b> Sepone (3 990 km <sup>2</sup> ), Sethamouk (636 km <sup>2</sup> ), Sechamphone (2 640 km <sup>2</sup> )		
<b>Main lakes:</b> Nonglouang (Wetland )		
<b>Main reservoirs :</b> None		
<b>Mean annual precipitation:</b> 1 500 mm (1929~1995)		
<b>Mean annual runoff:</b> 497 m <sup>3</sup> /s at Ban Kengdone Station (19 400 km <sup>2</sup> ) (1960~1997)		
<b>Population:</b> 680 000 (1998 )	<b>Main cities :</b> Champhone, Savannakhet	
<b>Lands use:</b> Forest (55 %), Agriculture (30 %), Orchard (10 %), Urban (0.2 %), Others (4.8 %) (1998)		

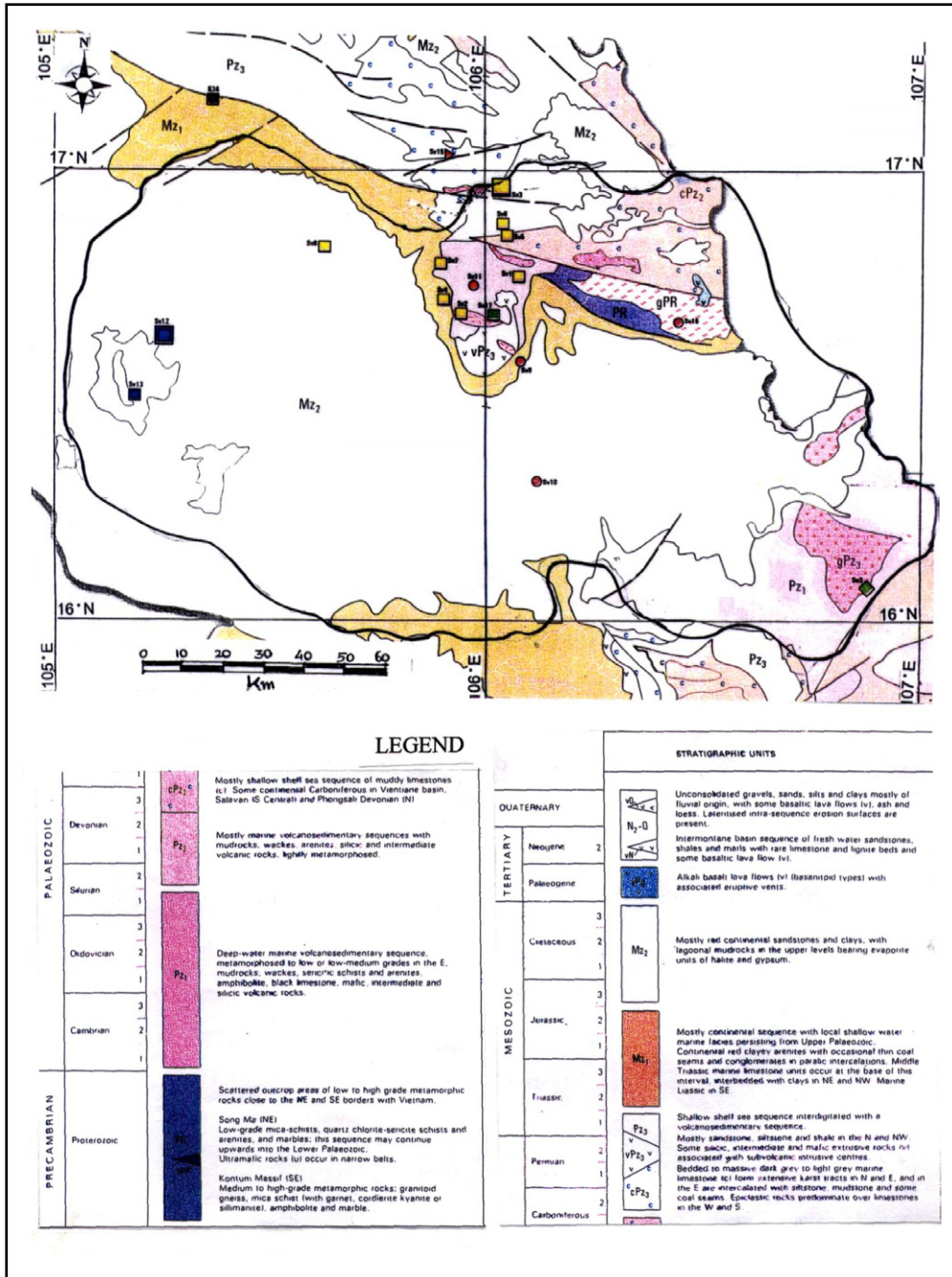
## 1. General Description

The Nam Sebanghieng is situated in the southern part of Lao PDR and adjoins the Sebangfay basin which extends immediately to the north. The two basins form the largest plain in the Country. The Sebanghieng originates in the Lao-Vietnam borders at elevations 1 000 ~ 2 000 m, flows westward with nine major tributaries and smaller sub-tributaries, and then flows into the Mekong River at a point about 90 km downstream of Savannakhet. It has a length of about 370 km although the total length including those of tributaries of different orders is about 3 442 km. The total catchment area at the confluence with the Mekong is 21 516 km<sup>2</sup> (19 400 km<sup>2</sup> at Ban Kengdone gauging station). The average annual precipitation is 1 500 mm and the mean annual discharge at Ban Kandone is 497.33 m<sup>3</sup>/s (1960~1977).

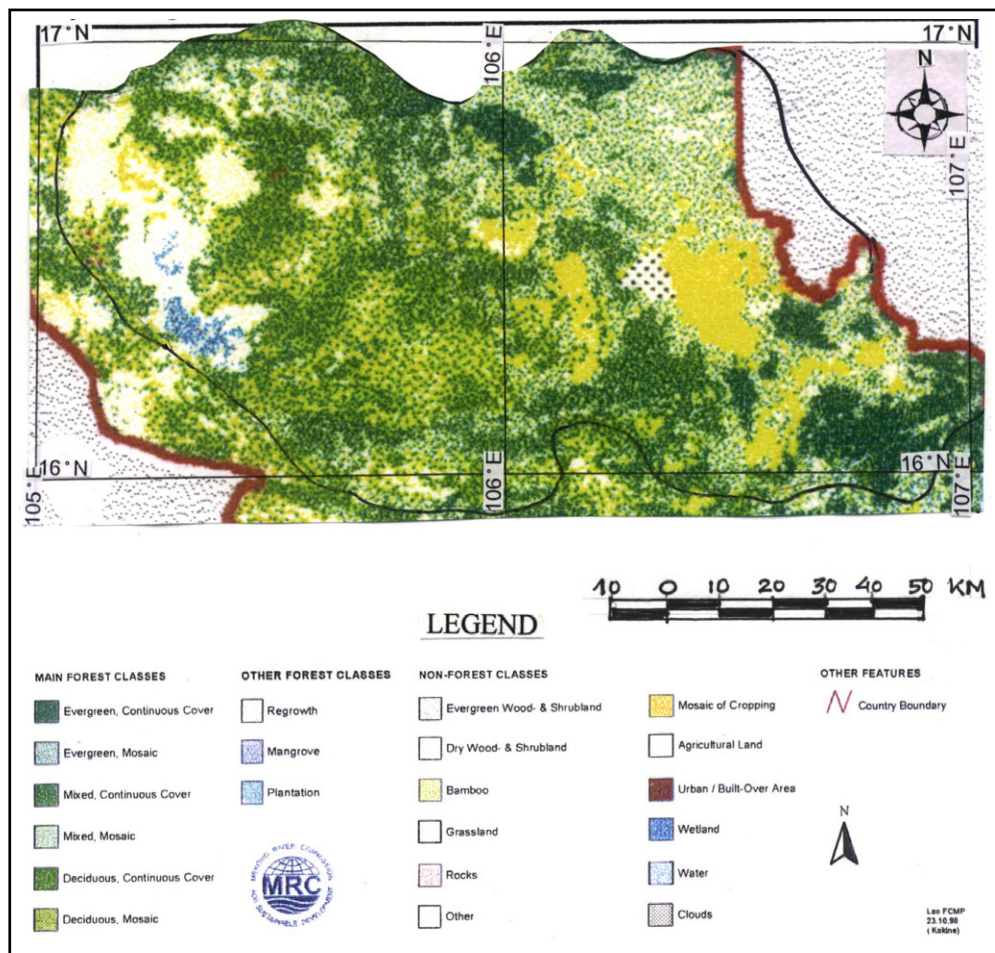
The total population in the basin, which is nearly the total population of the Savannakhet Province, is 680 000. The three administrative districts of Songkhone, Xonburi and Champhone alone have a population of 163 000. A great part of the basin is flat with some low lying hills ranging in elevation from 130 to 200 m. Mountains rising from 900~1 100 m stretch in the eastern part near the border. Red soil and sandstone prevail in almost the entire basin, although, in the north, east and the extreme eastern parts, Palaeozoic and Precambrian exist. The wetland area of Nong Louang is located between Sebanghieng, Sechamphone and Sesangsoy (Xexangxay). It is the Central Indochina (Tropical low land plain) biogeographical subunit with lakes, freshwater marshes, rainfed paddy, seasonally flooded grassland, flooded woodland, perennial and seasonal channels.

## 2. Geographical Information

### 2.1. Geological Map



## 2.2. Land Use Map

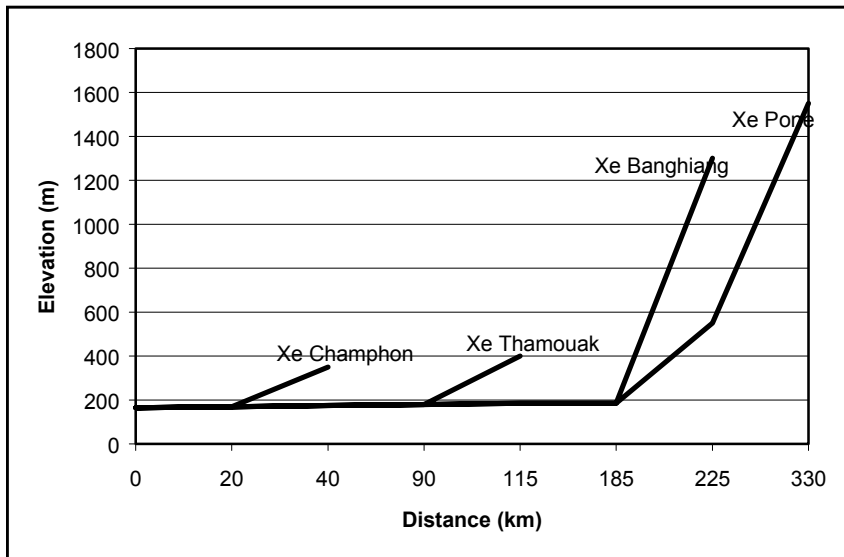


## 2.3. Characteristics of River and Main Tributaries

No.	Name of river	Length [km] Catchment area [km <sup>2</sup> ]	Highest peak [m] Lowest point [m]	Cities Population	Land use <sup>1)</sup> [%]	Representative vegetation and wildlife
1.	Sebanghieng	370 19 400	1 613 143	Muang Songkhone	F(55), P (40), L (5), OC	Dipterocarpus alatus, turbinatus  Panthera tigris
2	Sesangsoi	95 1 920	300 147	Muang phalane		
3	Sethamouak	35 636	200 170	Muang Phine		
4	Sechamphone	140 2 640	400 147	Muang champhone		
5	Sepone	130 1 460	1 000 185	Muang chanh		
6	Selanong	135 4 000	1 500 170	Bandong		

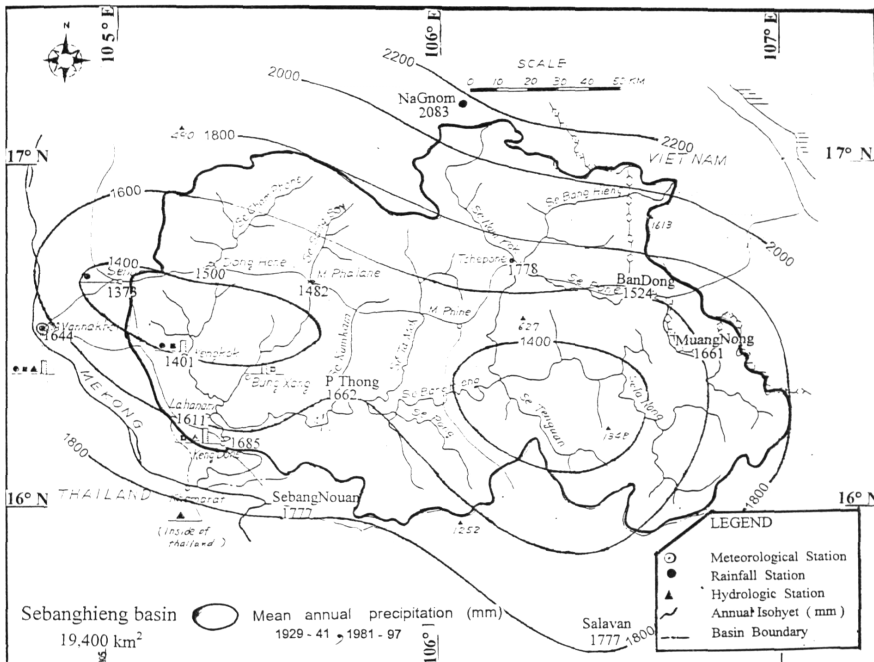
1) F: forest; P: paddy field; L: lake; OC: other crops

## 2.4. Longitudinal Profiles



## 3. Climatological Information

### 3.1. Mean Annual Precipitation 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 <sup>1)</sup>
1	Seno	180	N16°40.2' E 105°00'	1951~90	1 373	1 450	P, E, SR DS
2	KengKok	145	N 16°26' E 105°12'	1929~95	1 413	-	P
3	DongHene	188	N 16°16' E 150°12'	1966~90	1 500	-	P
4	Phalane	186	N 16°39' E 105°34'	1929~90	1 482	-	P
5	Sepone	185	N 16°42' E 106°14'	1929~95	1 778	-	P
6	Muane Nong	220	N 15°10' E 106°54'	1990~96	1 661	-	P
7	Ban Dong	200	N 16°40' E 106°27'	1990~96	1 524	-	P
8	Sebanghieng	145	N 16°41.8' E106°13.2'	1990~95	1 685	-	P

1) P: precipitation; E: evaporation; SR: solar radiation; DS: duration of sunshine

### 3.3. Mean Monthly Climate Data

Station: Seno

Observation item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual	Period for the mean
Temperature [°C]	21.2	23.5	26.7	28.1	27.4	26.5	26.2	25.9	25.7	24.7	22.8	20.8	25.0	1951~1998
Precipitation [mm]	3.0	15.9	27.7	70.5	185.0	250.6	244.6	343.0	251.4	84.9	5.2	1.8	1 483.6	1950~1998
Evaporation Pitch [mm]	140.5	144.8	167.4	148.6	113.5	87.8	81.4	71.9	74.7	106.2	130.9	134.9	1 402.6	1960~1998
Solar Radiation [MJ/m <sup>2</sup> /day]	17.6	19.6	20.5	21.4	20.6	18.0	19.0	16.4	17.1	17.4	18.0	17.1	18.5	1961~1980
Duration of Sunshine [hr]	275	249	251	243	226	163	178	130	157	202	257	269	2 600	1961~1980



#### 4.2. List of Hydrological Observation Stations

No.	Station	Location	Elevation [m]	Catchment area (A) [km <sup>2</sup> ]	Observation period	Observation items <sup>1)</sup> (frequency)
1	Sebanghieng	N 16°41'12" E 106°13'06"	145	19 400	1960~1997	H2(d), Q(d)
2	Sepone	N 16°42' E 106°14'	185	1 465	1994~1997	H2(d), Q(d)
3	Selanong	N 16°22'12" E 106°30'48"	200	2 011	1994~1997	H2(d), Q(d)
4	Sethamouak	16°34'36" E 105°54'48"	170	636	1994~1997	H2(d), Q(d)
5	Sechamphone	N 16°26'42" E 105°12'12"	147	2 610	1978~1997	H2(d), Q(d)

No.	$\bar{Q}^{2)}$ [m <sup>3</sup> /s]	Qmax <sup>3)</sup> [m <sup>3</sup> /s]	$\bar{Qmax}^{4)}$ [m <sup>3</sup> /s]	$\bar{Qmin}^{5)}$ [m <sup>3</sup> /s]	$\bar{Q/A}$ [m <sup>3</sup> /s/100km <sup>2</sup> ]	Qmax/A [m <sup>3</sup> /s/100km <sup>2</sup> ]	Period of statistics
1	497.33	8 500	4 689.25	17.0	2 056	43.81	1960~1997
2	56.31	934	739.10	5.55	5.05	6.38	1994~1997
3	88.10	5 528	2 807.70	12.03	13.96	27.49	1944~1997
4	16.93	1 719	813.40	0.00	12.79	27.03	1994~1997
5	51.47	815	433.58	0.38	1.66	3.12	1978~1997

1) H2 (d): water level reading twice daily; Q(d): daily discharge

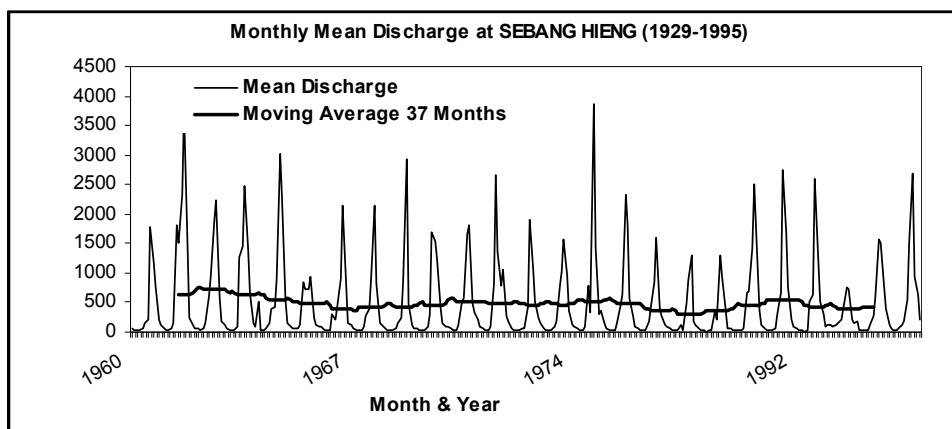
2) Mean annual discharge

3) Annual maximum discharge

4) Mean annual maximum discharge

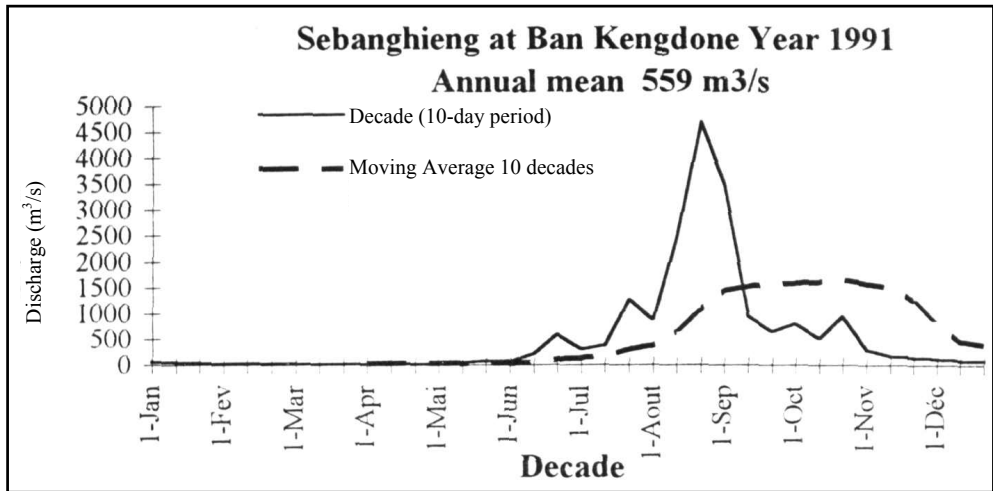
5) Mean annual minimum discharge

#### 4.3. Longterm Variation of Monthly Discharge

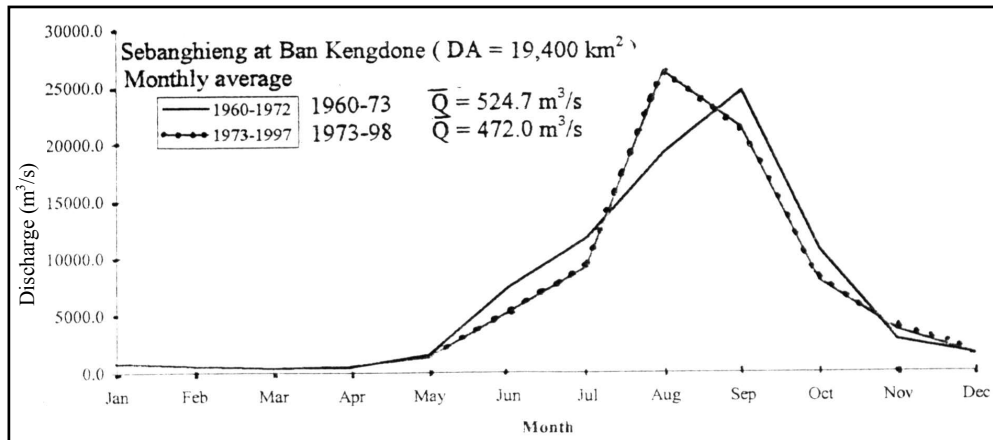




4.4. Annual Pattern of Discharge



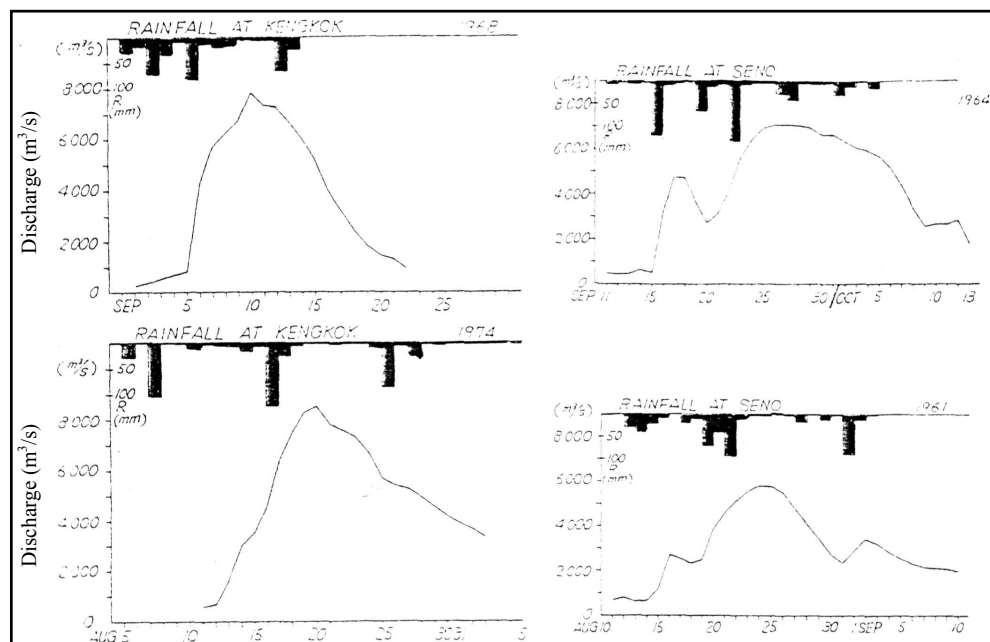
4.5. Unique Hydrological Features



## 4.6. Annual Maximum and Minimum Discharge

Year	Maximum		Minimum	
	Date	Discharge [m <sup>3</sup> /s]	Month	Discharge [m <sup>3</sup> /s]
1960	8.25	3 940	4	11.80
1961	9.28	6 400	4	15.40
1962	9.19	4 970	4	28.60
1963	8.13	5 550	4	20.90
1964	9.27	7 070	3	23.00
1965	9.4	2 250	4	30.20
1966	9.9	3 970	4	23.80
1967	9.25	4 110	4	21.60
1968	9.1	7 820	4	21.60
1969	9.5	5 040	3	18.10
1970	9.3	4 240	4	20.20
1971	7.17	5 830	3	3.40
1973	7.1	2 870	3	3.40
1974	8.2	8 500	4	28.60
1975	8.3	4 710	3	10.00
1976	8.6	4 020	4	11.20
1977	9.8	3 150	3	6.00
1979	9.27	5 960	12	29.40
1988	8.3	2 980	-	-
1989	9.9	1 720	3	12.70
1990	9.22	5 360	-	-
1991	8.21	5 340	4	15.90
1992	8.18	6 800	4	6.46
1993	8.19	1 500	-	-
1994	7.12	3 023	3	8.23
1995	8.31	3 788	3	11.01
1996	9.24	6 039	4	15.00
1997	8.2	4 349	4	27.40
Sum		131 299		423.9
Average		4 689.25		17.0

#### 4.7. Hyetographs and Hydrographs of Major Floods



Flood Discharge at Ban Keng Done

These figures indicate that in most floods, the discharge reaches its peak or increases close to the peak in two days after the main rainfall.

## 5. Water Resources

### 5.1. General Description

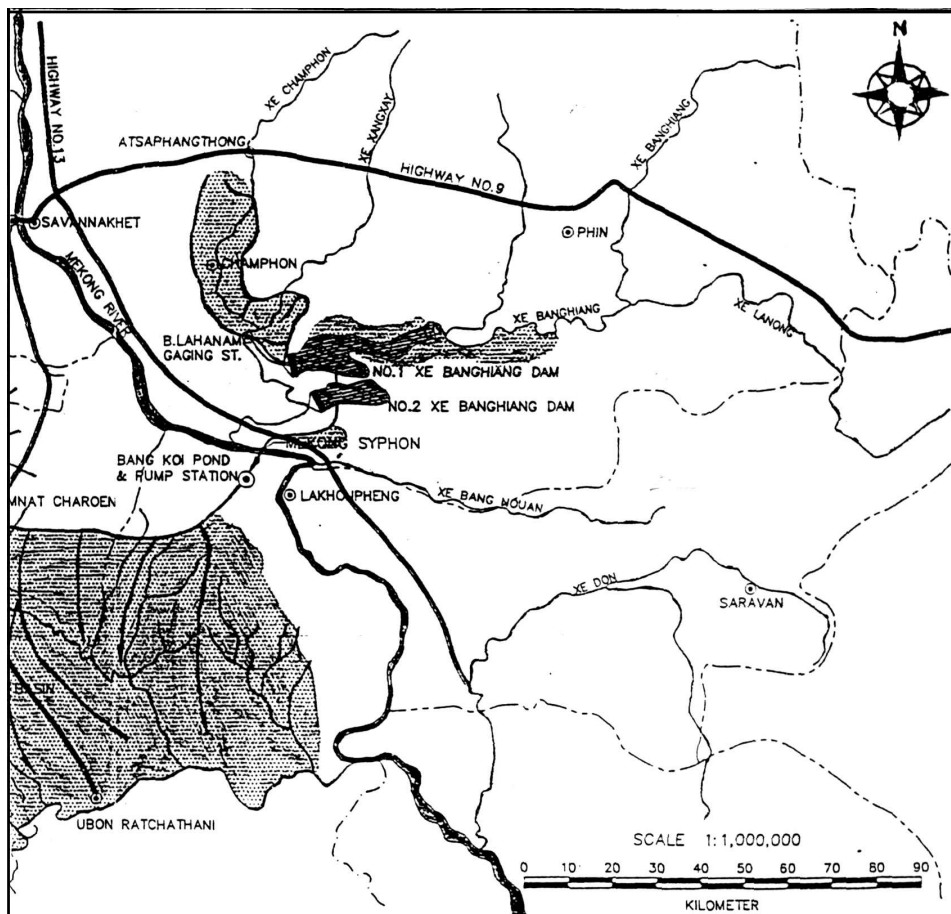
The Sebanghieng, one of the largest tributaries of the Mekong, lies in Savannakhet Province. Its enormous potential of water supply with hydropower possibilities in the upper stream and in some nine sub-tributaries is yet to be exploited. At present, the agricultural area in the Sebanghieng basin is about 110 000 ha, and the population is about 680 000. In the lower Sebanghieng (comprising three districts), the agricultural area is 40 000 ha which is about 40 % of the total area. Irrigation facilities along the Sechamphone and the Sebanghieng include 17 reservoirs, 12 pumping stations, 16 small-scale ponds and 8 weirs. Most of the hydraulic structures are subject to frequent seasonal flooding. Peak discharges exceeding 5 000 m<sup>3</sup>/s occurred 8 times during the 28 year period from 1960–1997, the highest being the 1974 flood with a discharge of 8 500 m<sup>3</sup>/s. The lowland area has always suffered from inundation during the wet season and rice cultivation is facing water shortages due to dry spells and scattered rainfall. In order to obtain stable and sustainable agriculture in the lowland area, it is necessary to construct dams for regulation of flood discharges as well as for irrigation of the downstream reaches (see location map in 5.2). The Lao – Thai Friendship Water Development of the Sebanghieng River has the following objectives:

- To control the flooding of the Sebanghieng that has brought about large scale inundation problems every year in the 50 000 ha of lowland along the tributaries of Xexangxay and Sechamphone in

the Savannakhet Province and to supply irrigation water from the reservoir to the same area as well as the surrounding upland area totaling about 80 000 ha,

- To supply excess water from the Sebanghieng Reservoir for irrigation in northeast Thailand on a commercial basis via a feeder canal and crossing structure across the Mekong (Mekong Siphon). This important project is under study.

## 5.2. Map of Water Resources Systems



## 5.3. List of Major Water Resources Facilities

Name of river	Name of dam	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>	Expected year of completion
Sebanghieng	Dam No. 1	19 400	3 300	2 500	Irrigation	2005
	Dam No. 2	19 400	3 300	2 500	Irrigation	2005

## 5.4. Major Flood and Drought Experiences

### Major Floods

Date	Station Catchment area [km <sup>2</sup> ]	Peak discharge [m <sup>3</sup> /s]	Rainfall [mm] Duration	Meteorological cause	Dead and missing	Major damages [Districts affected]
1974	Kengdone 19 400	8 500	150 15~16/8	Typhoon Monsoon	Yes	Champhone
1978	-ditto-	7 000	214 11~12/8	Typhoon	9	Champhone Songkhone
1996	-ditto-	6 039	217.3 11~13/9	Monsoon Typhoon	Yes	Champhone Songkhone

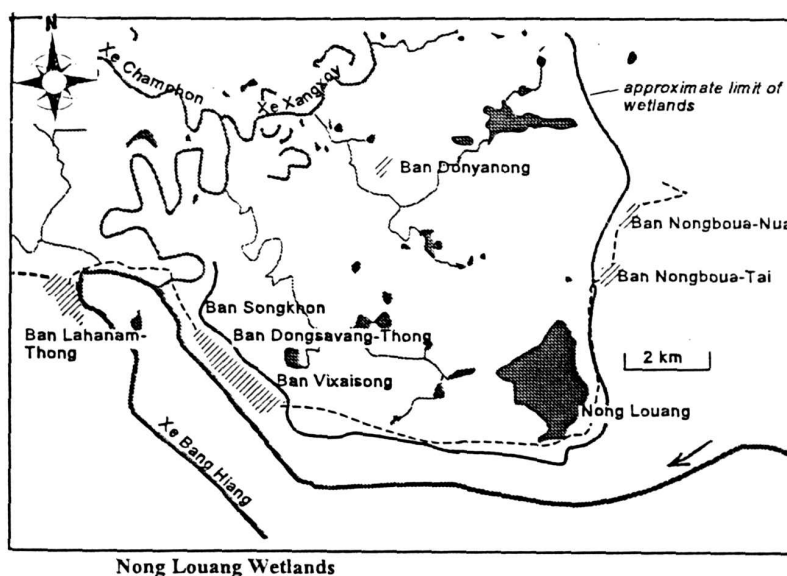
### Major Droughts

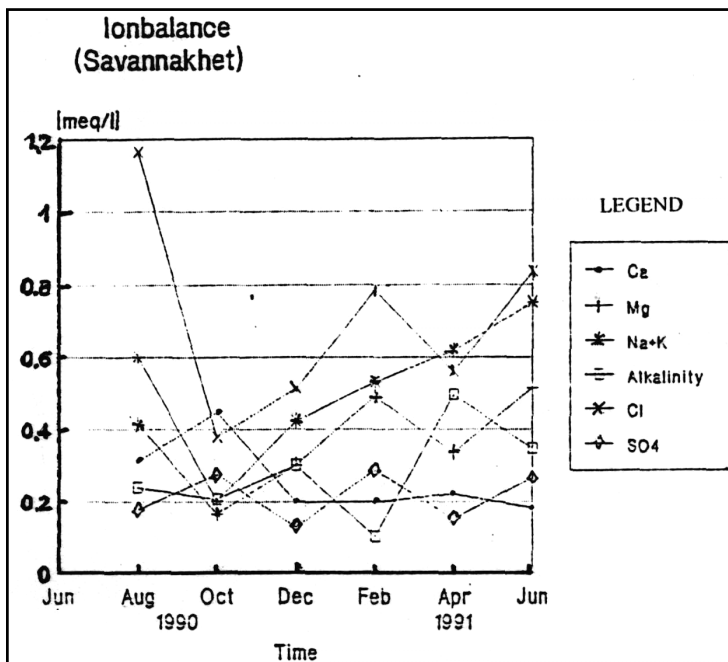
Period	Areas Affected	Major Damages and Counteractions
July~Aug 1988	Champhone Songkhone	Agriculture, rice crops
June~Aug 1998	Champhone Xonburi	Agriculture, rice crops

## 5.5. Groundwater and Water Quality

From 1990 to 1993 there were 4 monitoring wells in Savannakhet province mostly located within or near the Sebanghieng plain. The water tables varied from 2.50 m to 2.66 m in February 1990 and February 1991 respectively. Nong-Louang recharges aquifers which are tapped in villages and fields adjacent to the wetland area ( see map below). Results of water quality observations were also available at Ban Nongsavath in Savannakhet plain from June 1990 to June 1991. (see graphs of the 6 constituents below). The water quality analysis from Sebanghieng itself is not available. However results obtained from scattered samples have shown that the concentration rate is nearly the same of that observed in the Sebangfay (basin of Lao - 5).

Nong Louang itself has an area of around 4 km<sup>2</sup>. The area is occupied by the wetland group is around 90 km<sup>2</sup>.





River Quality: <sup>1)</sup> Monthly; Station: B. Nong Savath; <sup>2)</sup> Year: 1990~1991

## 5.6. Other Notable Features of Water Resources

As stated in 5.1, the water resources development project in the lower Sebanghieng basin is vital agricultural sector for solving problems related to food production. The Sebanghieng plain in general, and the area enclosing the three districts of Songkhone, Champhone and Xonbouri in particular, are located in the flood prone areas. According to the River Improvement Plan for inundation protection from large floods of 5 000 to 8 000 m<sup>3</sup>/s, improvements will be needed to pass 8 000 m<sup>3</sup>/s in the 30 km river reach from Lahanam to Keng Khai. This measure is not recommendable because of the large volume of earth and rock excavation (some 60 x 10<sup>6</sup> m<sup>3</sup>) involved. In the 70's, a flood forecasting and warning system including a channel cutoff between Songkhone and Lahanam was also envisaged as a hydrologic activity of the Typhoon Committee.

For the time being, a flood control plan by dam is under study. It involves the construction of two dams, No. 1 and No. 2, with lengths of 4 000 m and 3 700 m respectively (see location map in 5.2). On the basis of an effective reservoir capacity of 2 500 x 10<sup>6</sup> m<sup>3</sup> for flood regulation and the need to minimize the resettlement villages (This will increase considerably if the full supply level exceeds 160 m), the full supply level of both reservoirs is set at 155 m. On the basis of a dead storage of 800 x 10<sup>6</sup> m<sup>3</sup> for sedimentation and the need for a sufficient hydraulic head for diversion canal to divert water to the lower Chi area in Thailand, the low water level is proposed to be set at 143 m.

The reservoir shall be operated mainly for flood control purposes during two months, August and September, and for irrigation water supply during the rest of the year.

## 6. Socio-cultural Characteristics

Sebanghieng in Lao means Banghieng River. In this basin which has an area of 21 000 km<sup>2</sup>, people from different ethnics, still preserve their cultural traditions. The Lam Phouthai, the folkloric song of Sepone District and Lamtangvay in Xonbouri of the lower Sebanghieng are still popular. Local people still believe that if they fish in certain part of Nong Louang they will suffer from misfortune and may die. They avoid these areas and if they have to pass through them by canoes, they talk only in a quiet and polite manner. It is said that there is a village submerged under part of the lake and that stones and cooking pots can sometimes be seen at the bottom although they cannot be removed. In this area, the sediment at the bottom is believed to contain human bones. It is reported that gill nets and other fishing equipment set in these sacred areas will be moved or damaged by unknown forces. The Nong Louang wetland complex is also a scientific research site for the study of biology of Siamese crocodiles at Kout Bakkok. In recent years, some features of dinosaur bones were discovered at Ban Tangvay. These are displayed in the dinosaur museum in Savannakhet. In another site at Ban Nakapong, dinosaur bones are still in sedimentary rocks. Tracks and traces of dinosaurs can be seen in Mouang Phalane on Route No. 9 on the bank of the Sesongsy near the waterfall.

## 7. References, Databooks and Bibliography

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