Nam Sebangfay

Map of River

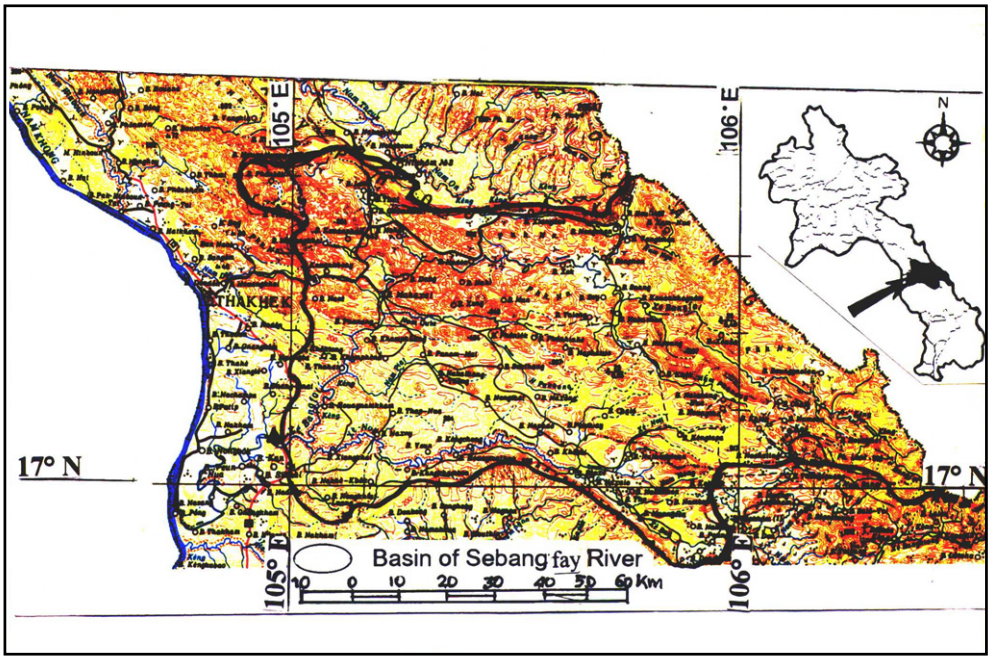


Table of Basic Data

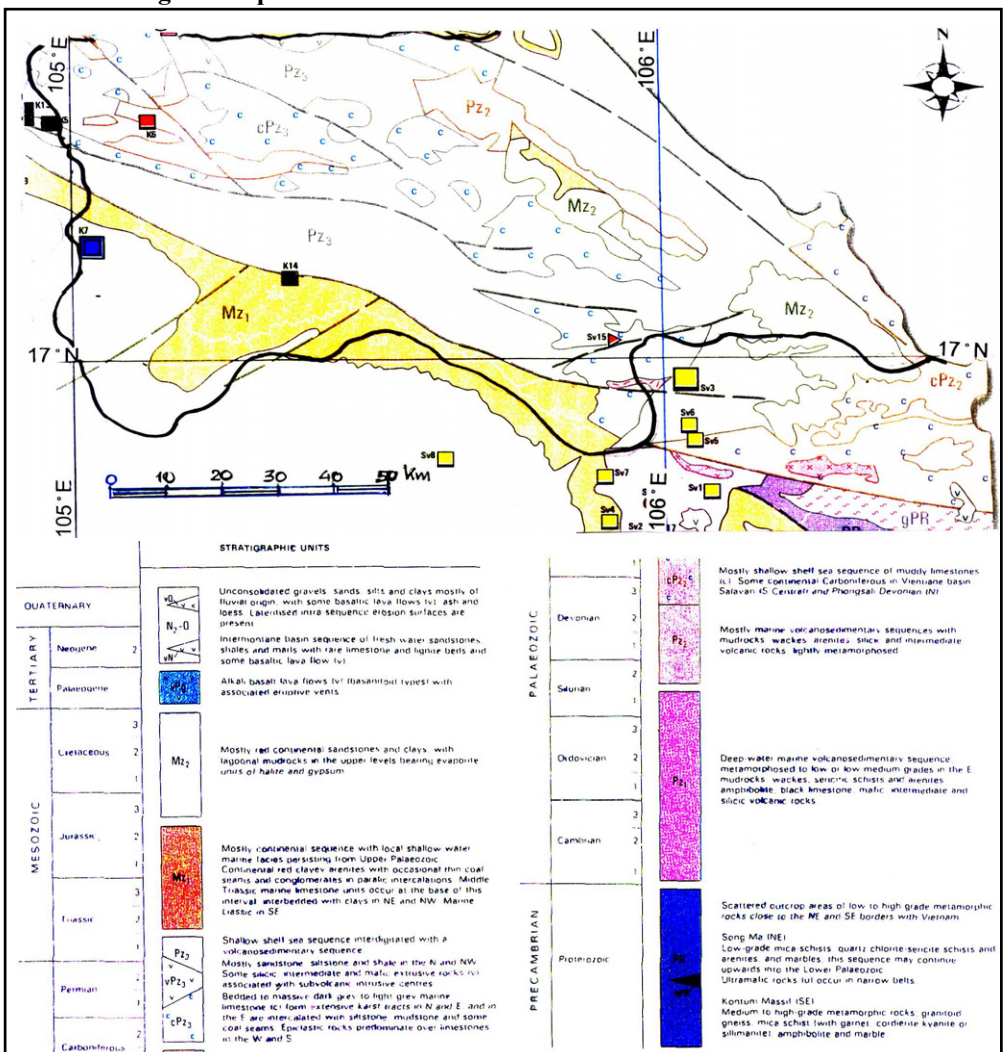
Name: Sebangfay		**Serial** No.**:** Lao – 5
Location: Khammouane Province	N 17 ^{o} 29’ 48”	E 105^{o} 25’ 42”
Basin Area: 8 560 km^2	**Length of the main stream:** 190 km	
Origin: Sayphouluang (2 200 m)	**Highest Point:** 1 397 m	
Outlet: Highway bridge	**Lowest Point:** 150 m	
Main base rocks: Mesozoic, Cretaceaus, Jurassic and Palaezoic		
Main tributaries: Nam Gnom (24 km^2); Nam Oula (320 km^2); Senoy (112 km^2)		
Main lakes: None		
Main reservoirs: None		
Mean annual precipitation: 2 300 mm (1985~1998)		
Mean annual runoff: 432 m^3/s at highway bridge (8 560 km^2) (1961~1997)		
Population: 192 189 (1998)	**Main Cities:** Mahazay, Thakhek	
Land use: Forest (59 %); Agriculture (10 %); Paddy field (20 %); Urban (1.5 %); Others (9.5 %)		

1. General Description

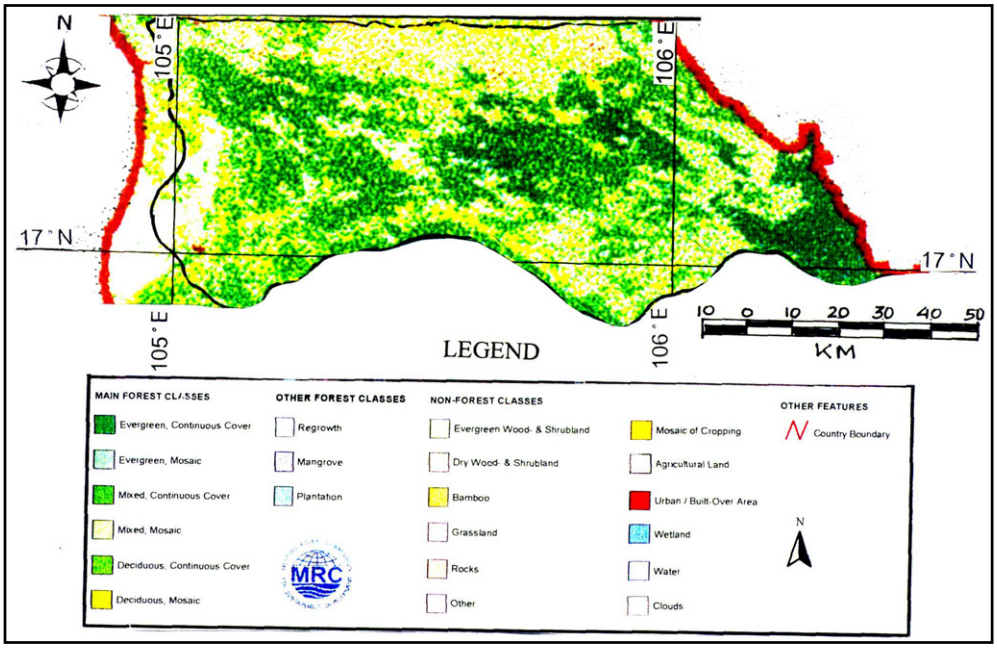
The Nam Sebangfay is 190 km long and has a drainage area of 8 560 km^2 at the Highway Bridge gauging station. The original meaning of the river Bangfay is bamboo rocket in Lao. On the 5th month of the lunar year, the rocket festival is celebrated every year. At the source, the river flows from the Vietnam border in the southeast-northwest direction to Boualapha District and changes direction to the west to Mahaxay District and then turns from the northeast-southwest into the Mekong. The river course looks like a rocket trajectory. The average annual precipitation is 2 300 mm and the annual discharge at highway bridge (8 560 km^2) is 431.7 m^3/s (1961~1997). With an annual increase of 2.6% since 1990, the total population in the basin is estimated to reach 192 200 in 1998. Geologically, the whole basin is composed of Mesozoic cretaceous, Jurassic, Triassic to Davonian Palaezoic.

2. Geographical Information

2.1. Geological Map



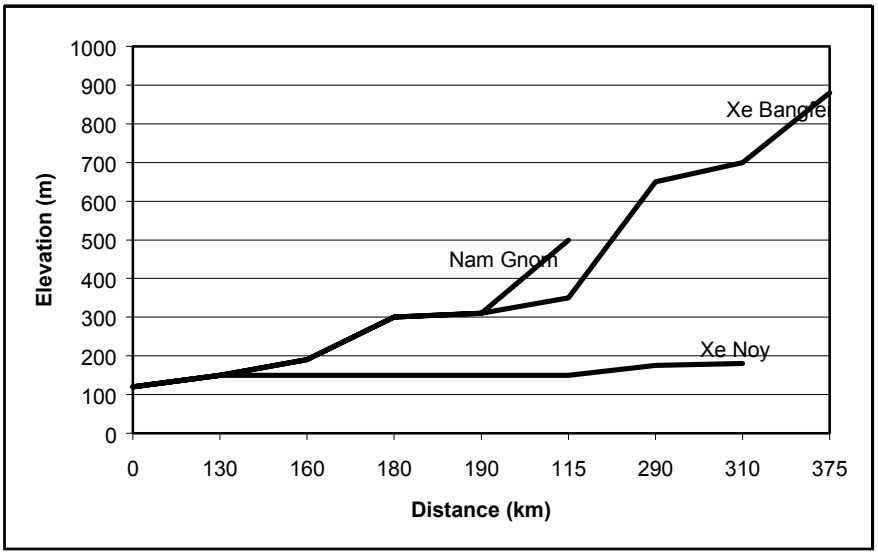
2.2. Land Use Map



2.3. Characteristics of River and Main Tributaries

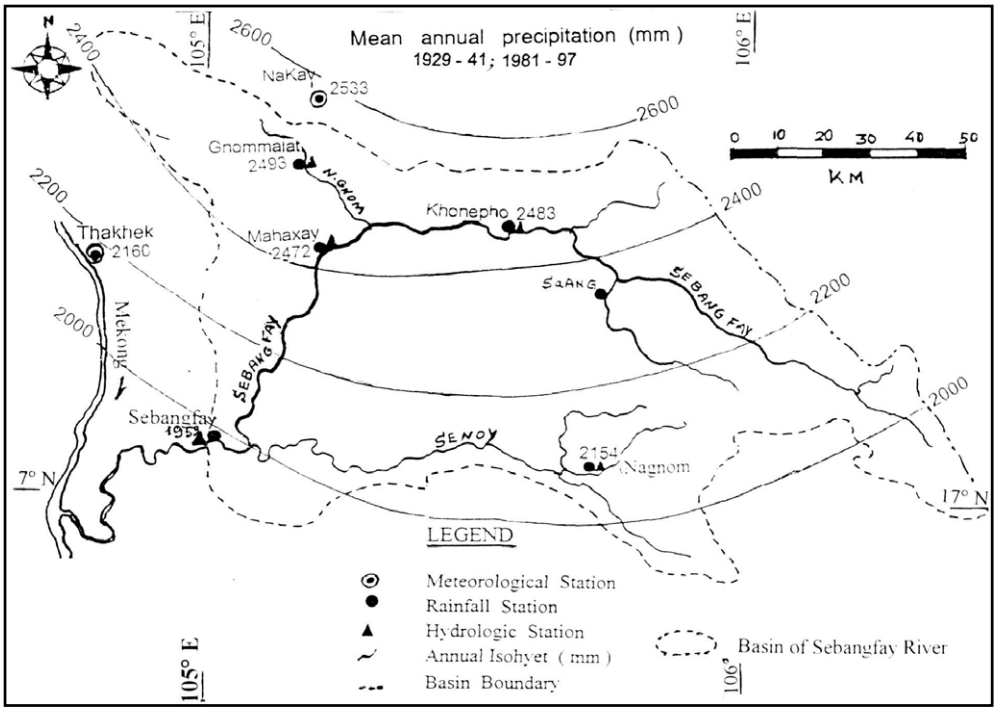
No.	Name of river	Length [km] Catchment area [km^2]	Highest peak [m] Lowest point [m]	Cities Population (Year)
1.	**Sebangfay**	190 8 560	1 397 150	Thakhek
2.	**Nam Gnom/ Kathang**	38.5 224	400 157	Gnommalath
3.	**Nam Oula**	36 320	599 150	Mahaxay
4.	**Senoy**	22 112	730 149	Khouaxe

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[1)]
1.	Tha khek	153	N 17º23'6" E 104 º 49'4"	1929~1997	2 308.6	937.6	P, T, E, SR
2.	Mahaxay	-	N 17o25'00" E 105 º 11'30"	1929~1998	2 741.0	-	P
3.	Gnommalath	-	N 17 º 36'15" E 105 º 10'20"	1990~1994	2 493.0	-	P
4.	Khouaxe	-	N 17 º 04'18" E 104 º 54'06"	1994~1995	1 953.0	-	P

1) P: precipitation; T: temperature; E: evaporation; SR: solar radiation

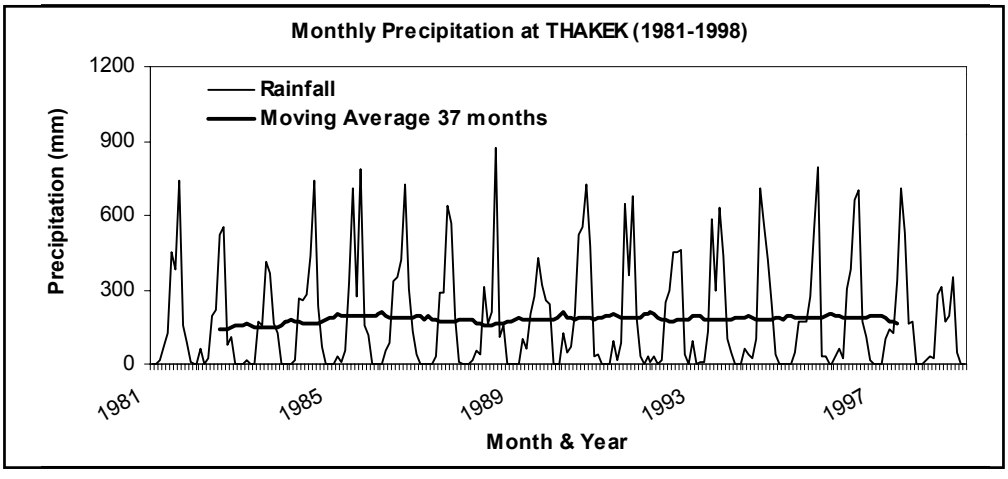
3.3. Monthly Climate Data

Observation Station: Thakhek

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Temperature [ºC]	21.6	23.9	26.1	28.3	28.4	27.8	26.7	27.0	26.7	25.3	24.0	21.4	25.6	1929~90
Precipitation [mm]	.8	22.9	37.7	69.2	238.8	363.5	449.5	575.5	254.8	88.5	7.5	7.2	2 122.7	1981~98
Evaporation [mm]	97.4	95.9	119.8	109.2	83.6	46.2	48.5	42.7	50.9	74.0	91.3	99.4	985.7	1987~98
Solar radiation* [cal/cm^2/day]	409.4	433.5	479.0	499.5	467.0	365.8	388.5	381.3	399.3	428.2	417.9	406.8	423.0	1991~98
Duration of sunshine [hr]	243.6	212.9	240.1	239.5	213.7	108.4	131.4	127.9	156.7	219.7	247.9	265.2	240.7	1991~98

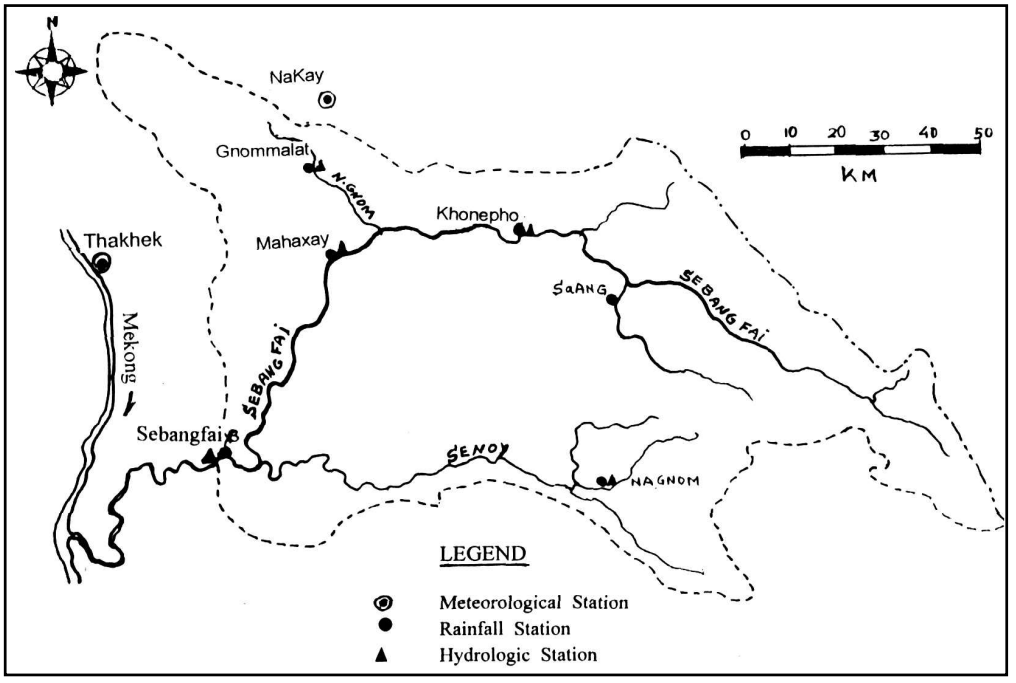
* Computed from Angstrom unit

3.4. Long-term Variation of Monthly Precipitation Series



4. Hydrological Information

4.1. Map of Streamflow Observation Stations



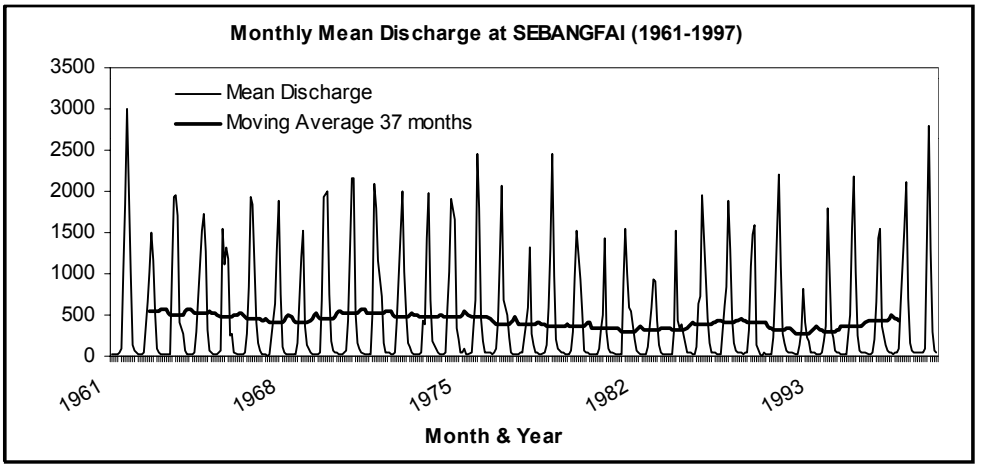
4.2. List of Hydrological Observation Stations

No.	Station	Location	Elevation [m]	Catchment Area [km^2]	Observation period	Observation items [1] [Frequency]
1.	**Sebangfay**	Mahaxay	150	4 520	1988~93	H2, Q(d)
2.	**Sebangfay**	High way	147	8 560	1960~97	H2, Q(d), P, WQ
3.	**Nam Gnom**	Gnommalat	156	24	1994~98	H2, Q(d), S

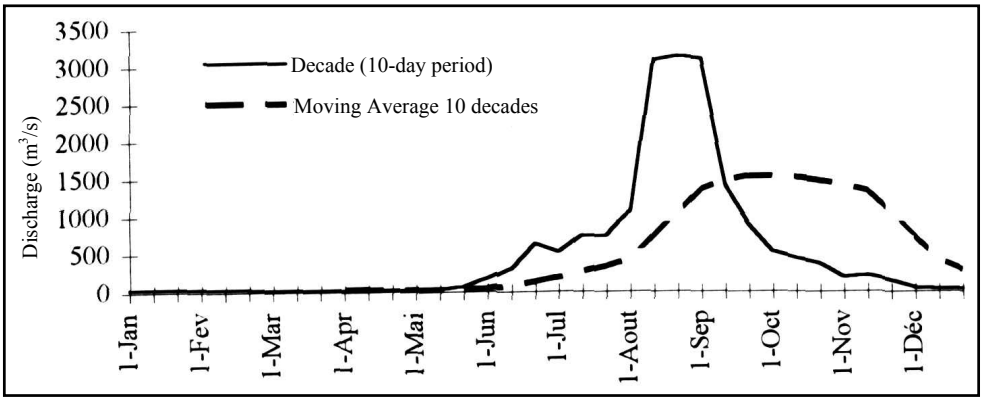
No.	$\overline{Q}$ [2] [m^3/s]	Qmax [3] [m^3/s]	$\overline{Qmax}$ [4] [m^3/s]	$\overline{Qmin}$ [5] [m^3/s]	$\overline{Q/A}$ [m^3/s/100km^2]	Qmax/A [m^3/s/100 km^2]	Period of statistics
1.	209	2 200	1 651	7.09	0.46	4.60	1989~98
2.	432	4 169	2 973	19.92	0.50	2.57	1960~97
3.	20	100	40	1.0	0.80	4.17	1994~97

1) H2: water level reading twice daily; Q(d): daily discharge; WQ: water quality; S: Sedimentation
2) Mean annual discharge
3) Annual maximum discharge
4) Mean annual maximum discharge
5) Mean annual minimum discharge

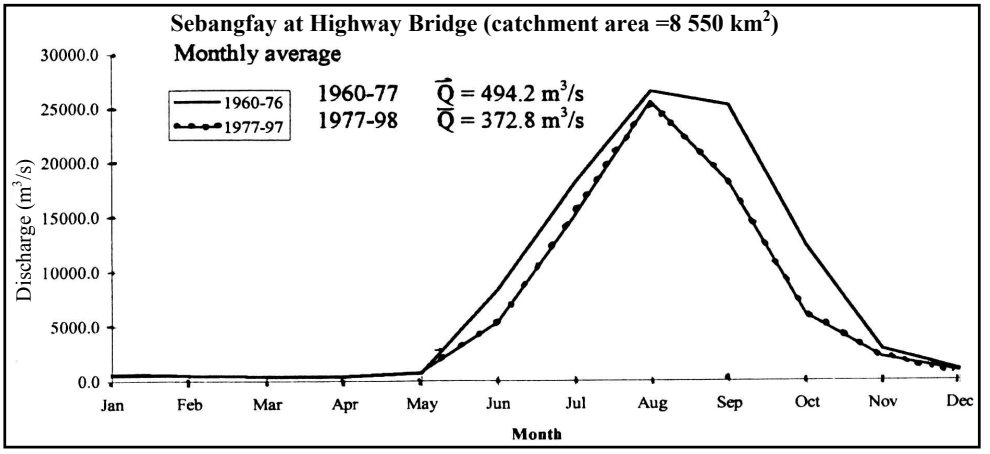
4.3. Long-term Variation of monthly Discharge Series



4.4. Annual Pattern of Discharge Series



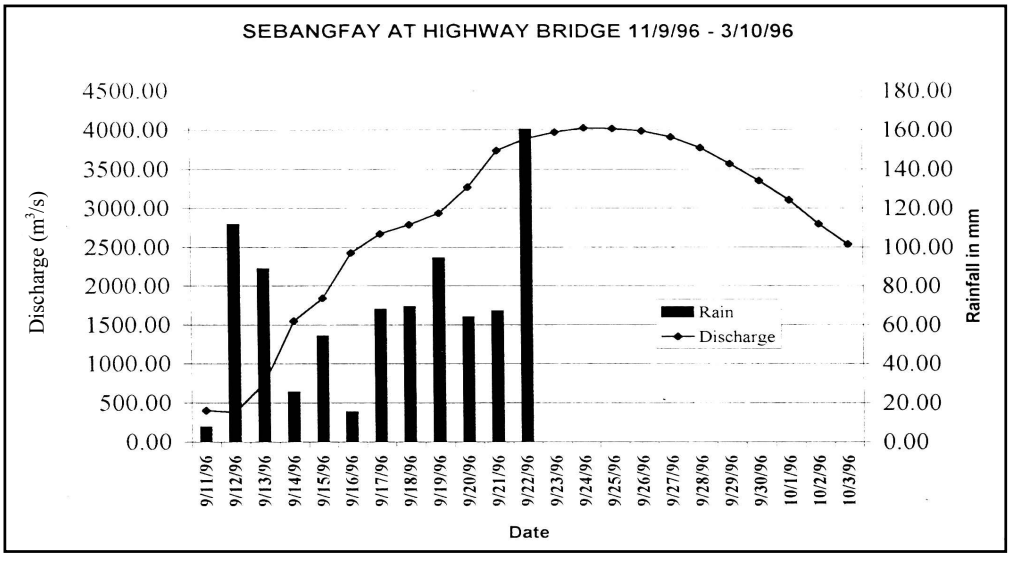
4.5. Unique Hydrological Features



4.6. Annual Maximum and Minimum Discharges

Year	Maximum		Minimum		Year	Maximum		Minimum	
	Date	Discharge [m^3/s]	Month	Discharge [m^3/s]		Date	Discharge [m^3/s]	Month	Discharge [m^3/s]
1960	10.1	3 000	4	8.2	**1990**	9.4	2 800	4	26.00
1961	8.25	3 300	4	15.0	**1991**	8.23	3 900	6	15.00
1962	8.13	2 550	5	22.3	**1992**	7.27	1 550	5	16.00
1963	8.14	3 130	5	14.2	**1993**	7.16	3 000	5	16.00
1964	8.28	3 000	4	19.6	**1994**	8.7	3 345	5	26.30
1965	6.25	2 900	4	20.6	**1995**	9.5~6	3 234	4	27.50
1966	8.26	2 900	3	17.4	**1996**	9.24	4 026	3	30.24
1967	9.28	2 880	5	13.4	**1997**	8.21	4 169	3,4	35.80
1968	9.11	2 950	4	19.0					
1969	8.14	2 870	3	18.5	**Sum**		104 054.0		677.4
1970	8.27	3 350	4	16.6	**Mean**		2 973.0		19.92
1971	7.21	3 240	4	19.0					
1972	8.26	3 210	5	21.8					
1973	9.6	3 000	4	22.8					
1974	8.31	3 220	4	25.7					
1975	9.3	3 340	4	25.4					
1976	8.8	3 200	5	29.2					
1977	9.9	2 930	3	12.2					
1978	8.17	3 400	3	17.0					
1979	9.28	2 810	4	18.2					
1980	9.1	2 770	6	17.9					
1981	7.7	3 000	3	16.7					
1982	8.23	1 790	4	19.5					
1983	8.8	1 200	6	17.2					
1984	8.18	3 140	4	16.7					
1985	8.21	2 450	5	20.5					
1988	8.3	2 500	x	x					

4.7. Hyetographs and Hydrographs of Major Floods



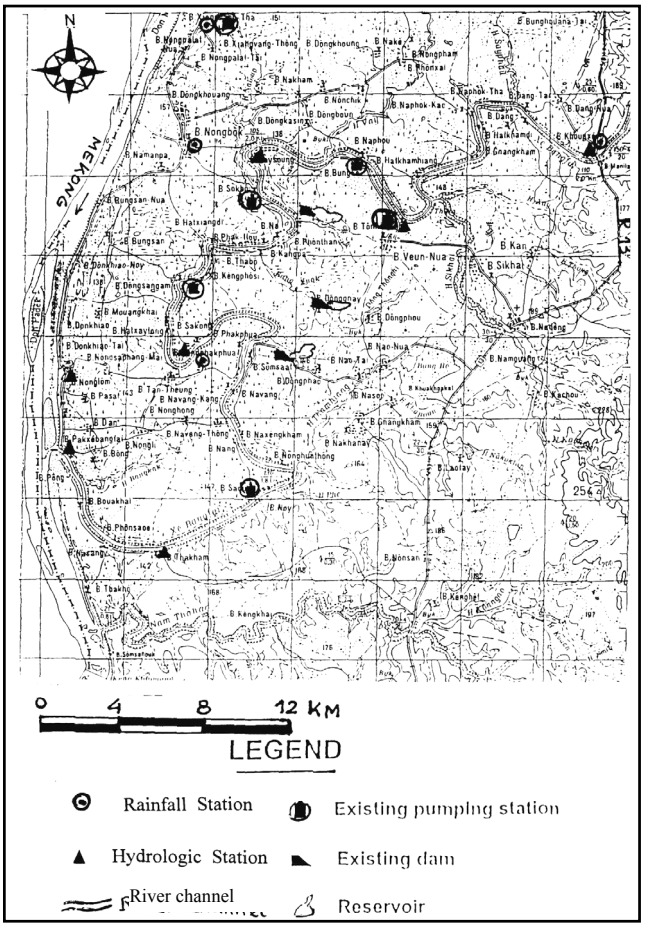
5. Water Resources

5.1. General Description

The upper part of the Sebangfay basin is mountainous with some peaks higher than 1 500 m. Flat land appears around Mahaxay District where an important tributary Nam Gong/Kathang, 38.5 km long, drains to Gnommalath District. In this area, accurate hydrological data are available from 1994 to 1998. The elevation difference between Mahaxay and the Highway Bridge is about 150 m. There are 9 small tributaries in this basin. They are Houey Xiangxet (50 km^2), Houey Bangbet (320 km^2), Houey Xiengxon (96 km^2), Houey Sapha (64 km^2), Nam Oula (320 km^2), Houey Saoton (40 km^2), Houey kaison (48 km^2), Nam Piat (368 km^2), and Senoy (112 km^2) with water level data. Downstream of the Sebangfay bridge, an area of up to 70 000 ha of potential agricultural land exists with wetlands, consisting of freshwater lakes, river, ponds, rice paddy and some freshwater marshes, of around 125 km^2. In this area there are several pumping stations along the Sebangfay.

In the complex river system, the peak flood in the downstream occurs two or three days before that upstream, as in the case of the event in August and September 1995 when the maximum water level at Highway Bridge rose 3 days prior to that at Mahaxay. It is believed that the constant year round discharge of 200 m^3/s released from Nam Theun powerhouse will change the river morphology of the Sebangfay from Mahaxay to the confluence with the Mekong.

5.2. Map of Water Resources Systems



5.3. Major Floods and Droughts

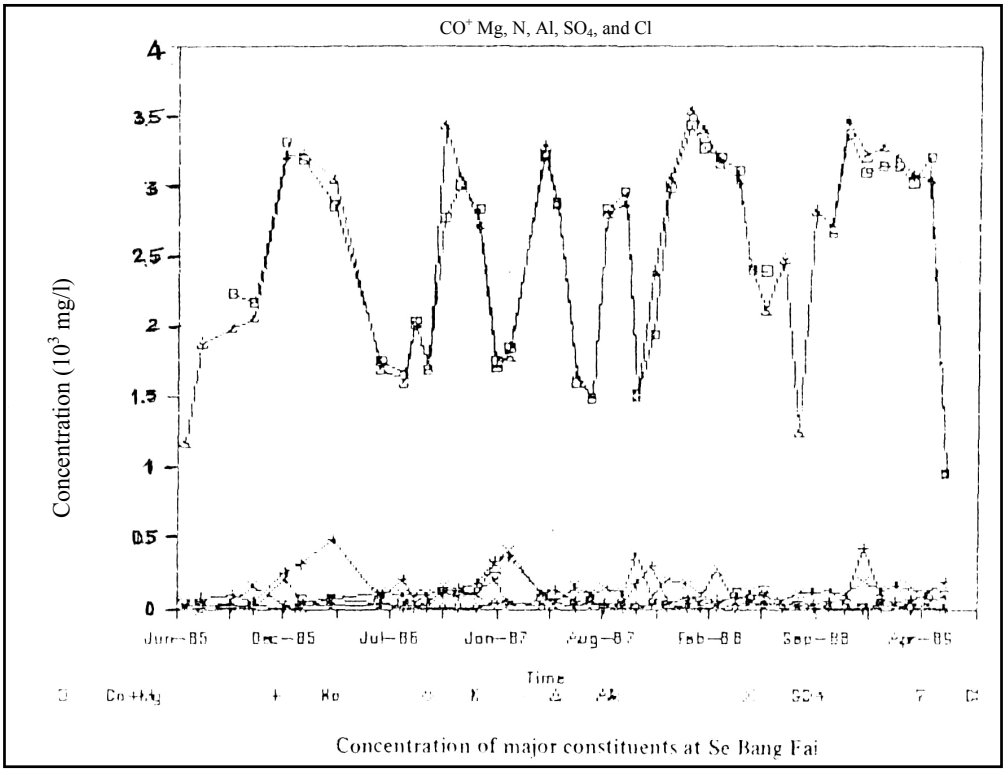
Major Flood

Date	Station Catchment Area [km^2]	Peak Discharge [m^3/s]	Rainfall [mm] Duration	Meteorological Cause	Major damages [District affected]
1996	**Sebangfay 8 560**	2 200	160.0 22/Sep/1996	Typhoon	Sebangfay districts
1996	**Mahaxay 4 520**	4 169	523.0 17~12/Sep/1996	Typhoon Monsoon	Mahaxay Districts

Major Droughts

Period	Areas Affected	Major Damages and Counteractions
July 1998	Mahaxay Gnommalath	4 400 ha affected. Confronting such a situation, the district administration has mobilised local labour to repair irrigation facilities for water supply to the second rice transplantation and cultivation for subsidiary crops.

5.4. Groundwater and Water Quality



Concentration of major constituents at Se Bang Fai

5.5. Other Notable Features of Water Resources

The Sebangfay plain is a focal area for rice production which is one of the five major National Programmes which include food production, stabilization/reduction of shifting cultivation, promotion of agricultural goods, promotion of integrated rural development and human resources development. The lower Sebangfay from Thakhek City to the Sebangfay Bridge with an agricultural area of 50 000 ha has many irrigation schemes including 15 small sized hydraulic structures (7 pumping stations, 5 gates, 2 reservoirs and some traditional ponds). These together can provide irrigation facilities for 2 000 ha during the wet season and for about 700 ha during the dry season. However, major constrains of alternate high and low flows still exist.

6. Socio-economic Characteristics

As the Sebangfay has a Lao name which means “rocket river”, it is very popular from Lam Mahaxay, a folkloric song of Mahaxay district. Mahaxay in Lao means great victory against aggressor. Halfway between Thakhek and Mahaxay, at a site located in the border of the Sebangfay river basin, there are some grottos and caves. This beautiful landscape in Khammouane Province is a place of tourist attraction. It is hoped that the impressive limestone karst of the “Hin Nam No” of the National Biodiversity Conservation Area in the eastern part of this basin will receive the world heritage nomination for natural site in the near future.

7. References, Databooks and Bibliography

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