Nam Song

Map of River



Table of Basic Data

Name: Nam Song		Serial No.: Lao-12			
Location: Vangvieng District	N 18° 55' 24" - 19° 16' 00"	E 102° 15' - 103° 38'			
Area: 864 km ²	Length of the main stream:	36 km			
Origin: Phou keo (1,012 m)	Highest Pt: Phou Namsang (1,992 m)			
Outlet: Near Hineheup (Nam Lik)	Lowest Pt: 296 m (Vangvien	g)			
Main base rocks: Permian and Carboniferous predominance					
Main tributaries: Nam Ssnen (35 km ²), Nam Pa	$mom (24 \text{ km}^2)$				
Main lakes: None					
Main reservoirs: Nam Song Diversion weir (div	ert from Nam Song to Nam Ng	um reservoir up to 210 m ³ /s)			
Mean annual precipitation: 2,481 mm (Basin a	verage)				
Mean annual runoff: 47.96 m ³ /s at Vangving (1987 - 2000)					
Population: 40,000 persons (2002)	Main cities: Vangvieng, Phat	tang			
Land use: Forest (40.0), Urban (8.0), Paddy (25	.0), Lake, river, marsh (1.0), U ₁	pland (20.0), Other (6.0)			

1. General Description

The Nam Song originates from Phoukeo at an elevation 1,012 m and flows to the west to Phatang for a distance of about 17km and then flows straight to south of Vangvieng. From the south of Vangvieng to the confluence with Nam Lik at Hineheup, the river meanders along a narrow valley. The length of Nam Song to Vangvieng is about 36 km of the total length of 80 km. The catchment area at Vangvieng is 864 km² of the total area of 1,770 km². The basin is located between 18°55'24"N - 19°16'N and 102°15'E - 103°38'E. The highest point is Phou Namsang at 1,992 m on the eastern border with the Nam Ngum basin about 6 km from Phou Miang at an elevation of 2,455 m. Due to the topographic effect, Vangvieng (296 m) receives an average of 3,330 mm of rainfall annually. The basin annual average is about 2,481 mm/year. The annual run-off at Vangvieng is 47.96 m³/s (1987-2002).

The Nam Song basin is the most populated basin compared with the surroundings due to rapid development, urbanization and tourism attraction by Vangvieng Resort extension industrial area from cement factory, the first and big one in Laos. The water law was set up to anticipate population and economic development pressures against limited water supply and to promote conjunctive water management. With rapid growth of population, the problem of water availability becomes crucial during the dry season coupled with high sediment transport during the rainy season. At present there are no serious problems concerning water utilization between upstream and downstream areas.

2. Geographical Information

2.1 Geological Map



2.2 Land Use Map



2.3 Characteristics of the River and Main Tributaries

No	Name of River	Length [km] Catchment area [km ²]	Highest peak [m] Lowest point [m]	Cities Population (year)	Land use [%]
1	Nam Song (Main river)	36 864	1,992 296	Vangvieng	F (40) U (8.0)
2	Nam Sanen (Tributary)	16 35	1,992 450	-	
3	Nam Pamom (Tributary)	14 24	1,500 380	Phatang	
4	Nam Song (Lower branch)	44 904	504 200	Vangkhy, Hineheup	

F: Forest; U: Urban

2.4 Longitudinal Profiles



3. Climatological Information



3.1 Annual Isohyetal Map and Observation Stations

3.2	List of Meteor	ological	Observation	Stations
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No.	Station	Elevation [m]	Location	Observation period	Mean annual precipitation [mm]	Mean annual evaporation [mm]	Observation items ¹⁾
1	Phatang	340	N 19° 08' 00" E 102° 34' 00"	1995 - 1998	2,448.3	-	Р
2	Vangvieng	296	N 18° 56' 00" E 102° 27' 00"	1969 - 1998	3,330.1	1,472.0	Р
3	Hineheup	200	N 18° 48' 00" E 102° 20' 00"	1991 - 1998	1,665.3	-	Р

1) P: Precipitation

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]	Vangvieng	20.7	22.7	25.8	27.6	27.5	27.6	26.8	26.6	27.0	26.4	24.2	21.5	25.3	1,972 - 83
Precipitation [mm]	Vangvieng	11.1	21.0	54.5	150.0	321.0	621.9	875.2	659.5	422.5	125.3	53.4	14.6	3,330.1	1,969 - 98
Evaporation [mm]	Vangvieng	60.0	76.0	127	151	163	158	157	149	141	132	92.0	66.0	1,472.0	1,972 - 83
Solar radiation [MJ/m ² /d]	Vangvieng	14.5	19.4	22.4	20.8	19.4	18.4	17.7	16.9	16.8	16.4	14.4	14.4	15.97	1,972 - 83
Duration of sunshine [hr]	Vangvieng	222	249	302	240	201	172	161	153	158	197	175	211	2441	1,972 - 83

Observation station: Vangvieng

3.4 Long-term Variation of Monthly Precipitation



4. Hydrological Information



4.1 Map of Stream flow Observation Stations

4.2 List of Hydrological Observation Stations

No.	Station	Location	Catchment area (A) [km ²]	Observation period	Observation items (frequency) ¹⁾
1	Vangvieng	N 18° 54' 24" E 102° 26' 54"	864	1987 - 2002	H, Q 3 times/day
1	Vangvieng	N 18° 54' 24" E 102° 26' 54"	864	1979 - 1981 1983 - 1985	H. two - five Reading/day
2	Vangkhi	N 18° 46' 00" E 102° 24' 00"	1,050	1994 - 1996	H, Q (daily)

No.	Q ²⁾ [m ³ /s]	Qmax ³⁾ [m ³ /s]	Qmax ³⁾ [m ³ /s]	Qmin ⁴⁾ [m ³ /s]	Q/A [m ³ /s/100km ²]	Qmax/A [m ³ /s/100km ²]	Period of statistics
1	47.96	799	374.07	6.996	43.295	92.477	1987 - 2002

1) Daily water level and discharge

2) Mean annual discharge

3) Maximum discharge4) Mean maximum discharge

4) Mean maximum discharge5) Mean minimum discharge

5) Mean minimum discharge

4.3 Long-term Variation of Monthly Discharge



4.4 Annual Pattern of Discharge





4.5 Unique Hydrological Features

4.6 Annual Maximum and Minimum Discharges

At Vangvieng [864 km²]

	Ma	ximum	Mir	ıimum		Ma	ximum	Mir	imum
Year	Date	Discharge [m ³ /s]	Month	Discharge [m ³ /s]	Year	Date	Discharge [m ³ /s]	Month	Discharge [m ³ /s]
1987	2-Sep	258.00	April	4.80	1997	2-Sep	799.00	March	10.0
1988	31-Aug	350.00	March	6.64	1998	14-Aug	285.00	May	4.95
1989	14-Jun	314.00	April	6.64	1999	13-Aug	238.428	Feb	8.60
1990	11-Sep	357.00	April	6.50	2000	27-Jun	184.167	April	11.1
1991	15-July	312.00	March	8.00	2001	4-Jul	473.682	Feb	9.1
1992	26-July	370.00	May	2.67	2002	6-Aug	470.203	Feb	10.1
1993	30-Jun	364.00	March	5.86					
1994	30-Aug	366.00	May	3.09	Sum =		5,611.0		104.94
1995	14-Aug	526.00	April	6.89	Mean =		374.07		6.996
1996		No Data							



4.7 Hyetographs and Hydrographs of Major Floods

5. Water Resources

5.1 General Description

The Nam Mon river diversion weir was constructed to supply irrigation water to lowland paddy fields. An estimation of volume (l/sec) to be diverted for irrigation, the extent of irrigated area (ha) and peak discharge were made. Also, aspects in terms of predominant soils, their weathering status, soil formation, as well as parent material, rock types and geological formations were described.

The Nam Mon is the only main perennial stream which flows through the area and has a watershed of about 80 km². The average discharge is 5.0 m^3 /sec with a maximum discharge of 10 m³/sec. The capacity of this flow rate is sufficient for some 200 ha of irrigated area.

A private company constructed the weir in 1997. It is about 50 m long and 4.5 m high from the bed of the stream giving a flooding storage level of about 5.0 m. The concrete canal was designed directly at the meander of the stream and is approximately 20 m long, 2 m wide and some 1.2 m high. The water distribution system is immediately behind the weir. Parts of the surrounding area (about 1 ha) are designed with gabions to protect this system from erosion and also to avoid damage to the weir during high floods. The weir has a very simple operation: wood pieces are placed in the gate during the dry season to keep the water level at the required height. During the rainy season they are removed to increase discharge capacity. The weir cost was about 30 million Kips of which 30% came from contributions by the 4 neighboring villages while the rest was a government subsidy. The paddy yields have doubled since the irrigation system was implemented.

5.2 Map of Water Resource Systems



5.3 List of Major Water Resources Facilities

Major Reservoir

Name of river	Name of dam (reservoir)	Catchment area [km ²]	Gross capacity [10 ⁶ m ³]	Effective capacity [10 ⁶ m ³]	Purpose ¹⁾	Year of completion
Nam Song downstream of Vangvieng	Nam Song (Vangkhi)	1,050	16	5 - 10	Р	1996

1) P: Hydro-power

Major Interbasin Transfer

Name of	Name of river and places connected		Lenth	Maximum capacity	Purpose ¹⁾	Year of
transfer fine	From	То	[KIII]	[m /s]	_	completion
Vangkhi	Nam song	Nam Ngum reservoir	2	210	Р	1996

1) P: Hydro-power

5.4 Major Floods and Droughts

Major Floods at Vangvieng

Date	Peak Discharge [m ³ /s]	Rainfall [mm] Duration	Meteorological cause	Dead and missing	Major damages (Districts affected)
5-6 Jul 1981	1,000	300 mm (4-5 Jul)	Typhoon (Kelly)	-	Nam Lik bridge completely destroyed (designed for 100 year flood)

Major Droughts

None

5.5 Suspended Sediment Loads and Sediment Yields at the Confluence Point Nam Song with Nam Lik Hineheup

- Water sampling period	= 1987-1989
- Number of samples	= 89
- Calculation period	= 1987-1989
- Ratio measured to calculated loads	= 0.774
- Mean annual load [tonnes/year]	$= 505.2 \times 10^{3}$
- Sediment yield [tonnes/year/km ²]	$= 127.2 \text{ x } 10^3$

6. Socio-cultural Characteristics

From ancient mythology, around Ban Phatang (Phadaeng) and Vangvieng, there was a duel between two giant "Nhuak" (dragons) to dispute a pretty girl named Nang Ay. The winner from villagers has constructed a magnificent fish catching as known Tham Chang. Vang in Lao means deep water like a retarding pond. So, Vangvieng and Vangkhi have natural landscape as Tham Chang or cave Chang in Vangvieng resort officially recognized in 1996 as a tourism site with beautiful stalactites and stalagmites with Nam Lae flows throughout rock, fresh and cool inviting to bath.Vangvieng resort is located about 150 km from Vientiane on the national road N° 13 north in a quiet atmosphere and natural attraction with an emerging cement factory on the skyline east of Vangvieng. The origin of the people living in this area is from Hoaphan Province. Their traditional cultivation in the uplands is the slash and burn practice. Nam Song provides natural growing vegetation of cresol where the name of Nam Song comes from.

7. References, Data books and Bibliography

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- GTZ Methods and instrumentations on integrated watershed management in Lao PDR and Vietnam, Vientiane November 1998.
- DMH Hydro-climatic data updated until 2002.