

Song Srepok

Map of River

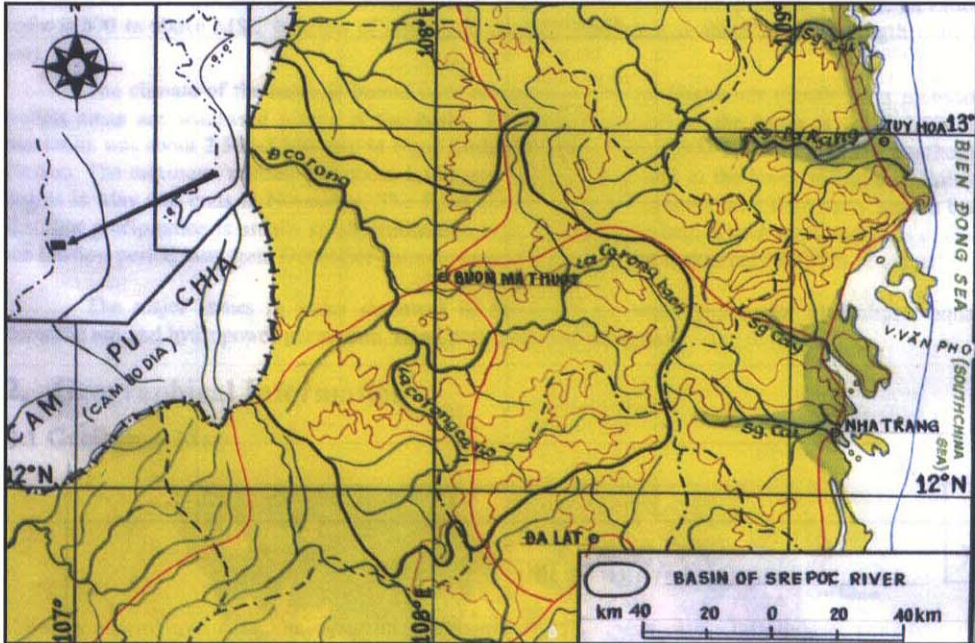
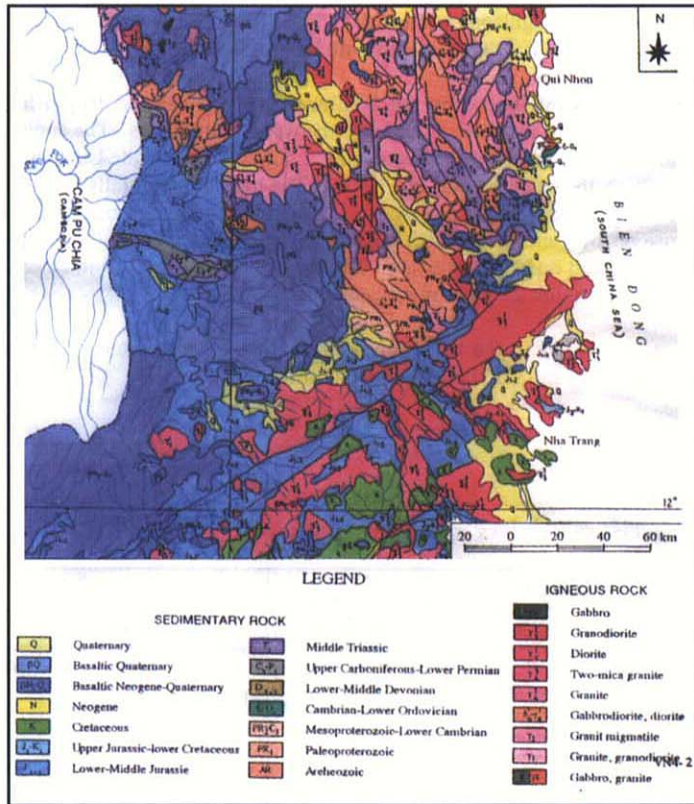


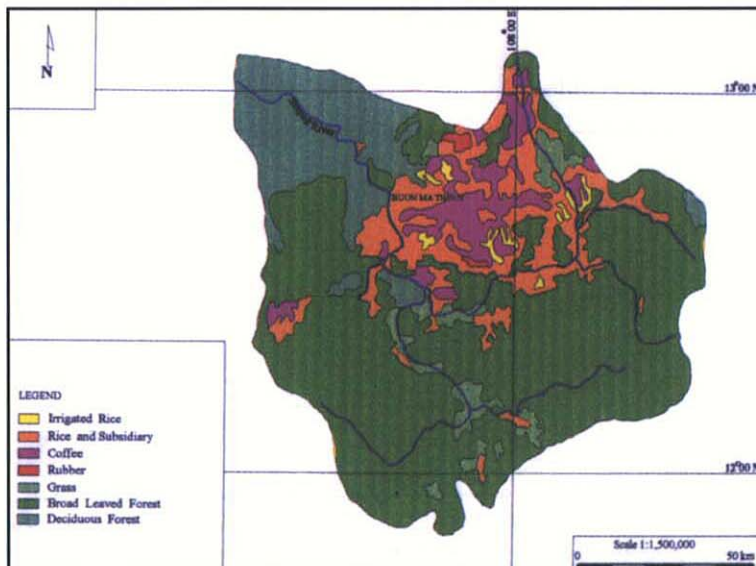
Table of Basic Data

| | | |
|---|--|------------------------------|
| Name: Srepok River | | Serial No.: Vietnam-4 |
| Location: Dac Lac Province, Vietnam | N 11° 50' ~ 13° 53' | E 107° 28' ~ 108° 43' |
| Area: 12 200 km ² (at the border) | Length of main stream: 315 km | |
| Origin: Mt. (1 400 m) | Highest point: Mt. Chu Yang Sin (2 000 m) | |
| Outlet: Mekong River in Cambodia | Lowest point: at the border with Cambodia | |
| Main geological features: Sandstone or weathering product from granite, basalt | | |
| Main tributaries: Krong Kno River (4 620 km ²), Krong Poco River (11 620 km ²), IaHleo River (4 760 km ²) | | |
| Main lakes: None | | |
| Main reservoirs: Lower Krong Buk Reservoir (14 x 10 ⁶ m ³), Buon Triet Reservoir (10 x 10 ⁶ m ³) | | |
| Mean annual precipitation: 1 833 mm | | |
| Mean annual runoff: 246 m ³ /s at Ban Don (10 700 km ²) (1977~1992) | | |
| Population: 660 000 | Main cities: Buon Ma Thuot | |
| Land use: Forest (74.5%), Rice paddy (14.7%), Other agriculture (6.6%), Grass (4.1%) | | |

2. Geographical Information
2.1 Geological Map



2.2 Land Use Map



1. General Description

The Srepok River is one of the tributaries of Mekong River. It is 315 km long, and its catchment area of 12 200 km² is in the central highlands within 12-13°N latitude. The average elevation of the basin is about 570 m. The basin has 22 rivers and creeks with lengths in excess of 10 km.

The climate in the basin is influenced by the Southwest monsoon in the central highlands, and is humid. The windward areas of the basin experience the wettest conditions. The annual rainfall of the basin is 1 833 mm. Highest rainfalls have been about 2 500~2 800 in Ngoc Linh and Chu Yang Son, and, 2 600~2 800 mm on the southern part of Pleikou. The minimum rainfalls have been about 1 400 mm in Krong Buk and in the lower mountains. The rainy season begins in May and ends in November. Because of low rainfall and high infiltration at the beginning, the flood season starts 2-3 months later, in August, and ends in December. The lowflow period lasts from December/January to June/July, and makes only about 25-35% of the annual runoff.

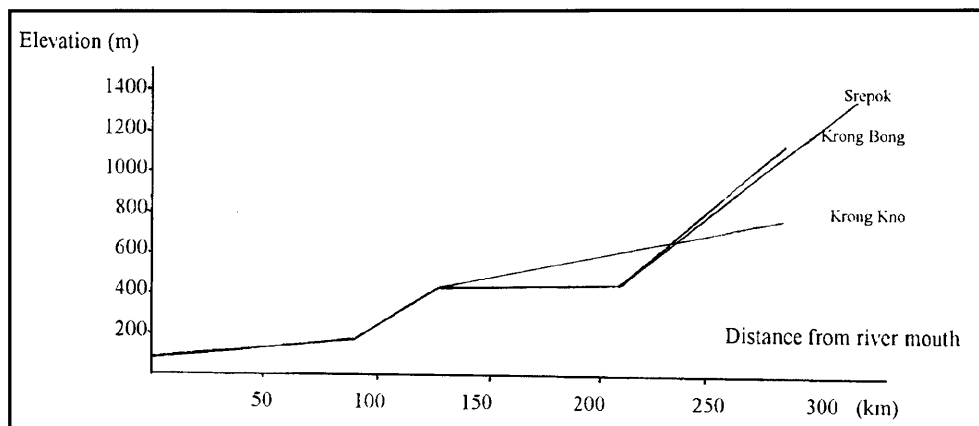
The major water related issues in the basin are water supply for agriculture, aquaculture, domestic use, hydropower generation, and flood protection and mitigation.

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 | Land use [%] |
|-----|---------------------------|---|--------------------------------------|------------------------|---------------------|
| 1 | Srepok (Main River) | 315 30 100 | 1 400 ----- | Buon Ma Thuot ----- | A (6.6) F (74.5) |
| 2 | Krong Kno (Tributary) | 156 4 620 | 775 ----- | | G (4.1) P (14.7) |
| 3 | Krong Bong (Tributary) | 73 809 | 1150 ----- | | |

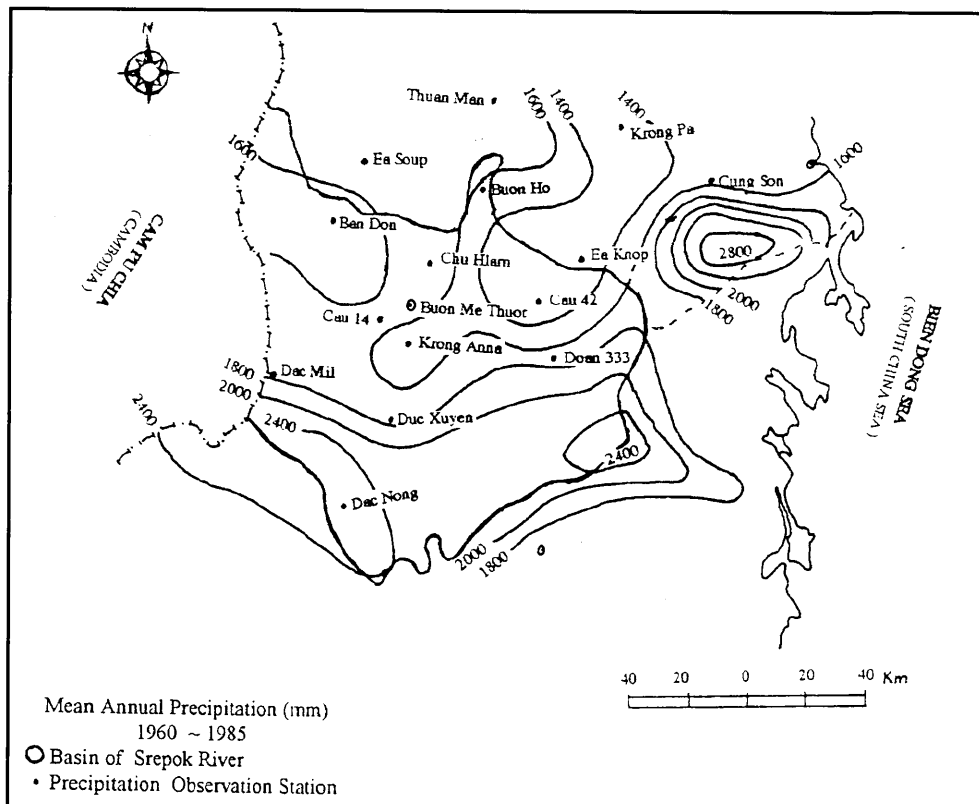
A: Other agricultural field F: Forest G: Grass P: Paddy field

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 [mm] | Mean annual evaporation [mm] | Observation items ¹⁾ |
|-----|---------------|---------------|-------------------------|-------------------------|--------------------------------|------------------------------|---------------------------------|
| 411 | Buon Ho | 700 | N 12° 55' E 108° 16' | (P) 1982~ (E) 1982~ | 1 470 | 1 206 | DS, E, P |
| 412 | Buon Ma Thuot | 490 | N 12° 41' E 108° 03' | (P) 1928~ (E) 1977~ | 1 787 | 1 550 | DS, E, P |
| 413 | Dac Nong | 660 | N 12° 00' E 107° 41' | (P) 1976 ~ (E) 1978~ | 2 391 | 915.9 | DS, E, P |

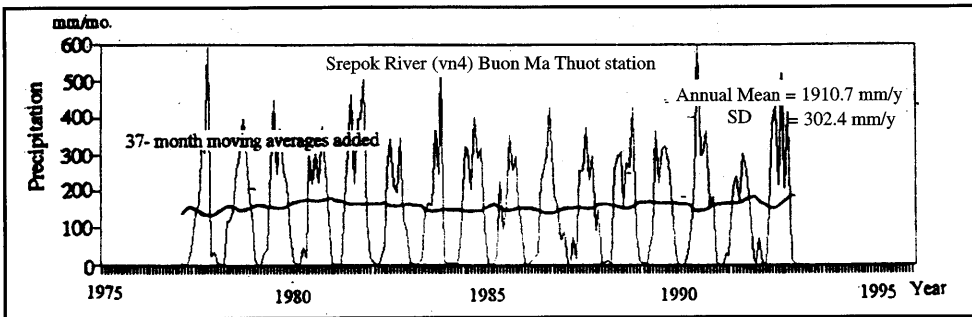
DS: Duration of sunshine observed by Helioscope
E: Evaporation observed by Piche tube

P: Precipitation observed by Pluviometer

3.3 Monthly Climate Data

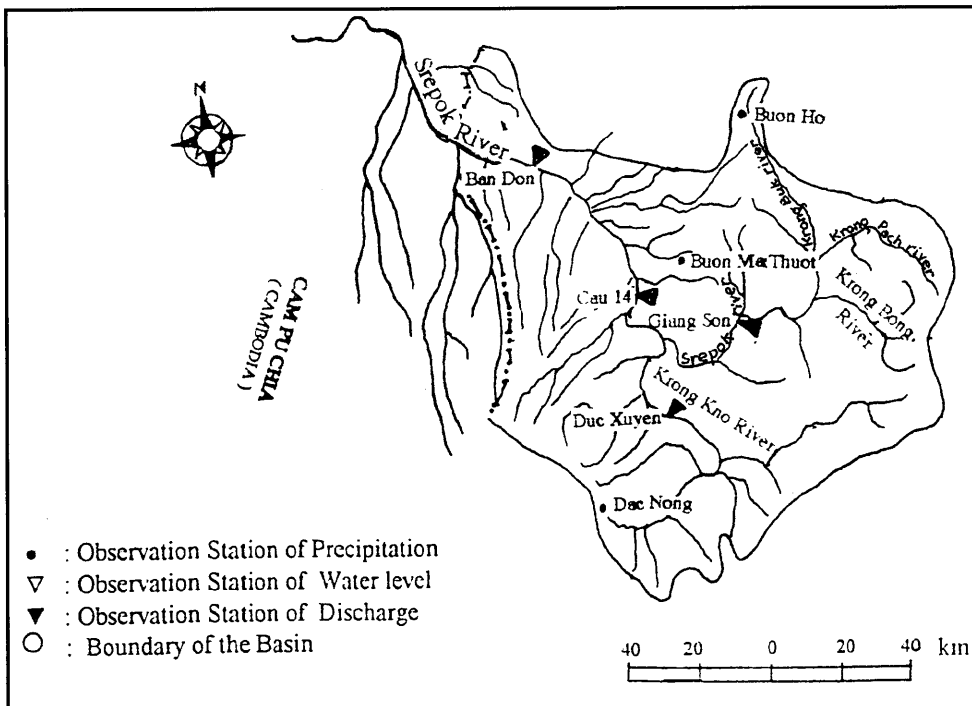
| Observation item | Observation station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Period for the mean |
|---------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------------------|
| Temperature [°C] | Buon Ma Thuot | 21.1 | 22.7 | 24.7 | 26.1 | 25.8 | 24.8 | 24.3 | 24.2 | 23.9 | 23.5 | 22.5 | 21.2 | 23.7 | 1928~1990 |
| Precipitation [mm] | Buon Ma Thuot | 3.7 | 6.0 | 23.1 | 97.0 | 230.0 | 248.6 | 267.5 | 294.5 | 296.6 | 204.1 | 93.8 | 21.9 | 1 787 | 1928~1990 |
| Evaporation [mm] | Buon Ma Thuot | 185.8 | 201.6 | 236.5 | 204.1 | 131.6 | 77.9 | 70.9 | 64.8 | 55.3 | 78.5 | 102.1 | 140.8 | 1 550 | 1977~1990 |
| Duration of sunshine [hr] | Buon Ma Thuot | 251.6 | 250.3 | 277.4 | 257.0 | 227.5 | 182.3 | 183.8 | 163.0 | 162.5 | 175.7 | 175.9 | 208.9 | 2 516 | 1958~1990 |

3.4 Long-term Variation of Monthly Precipitation



4. Hydrological Information

4.1 Map of Streamflow Observation Stations



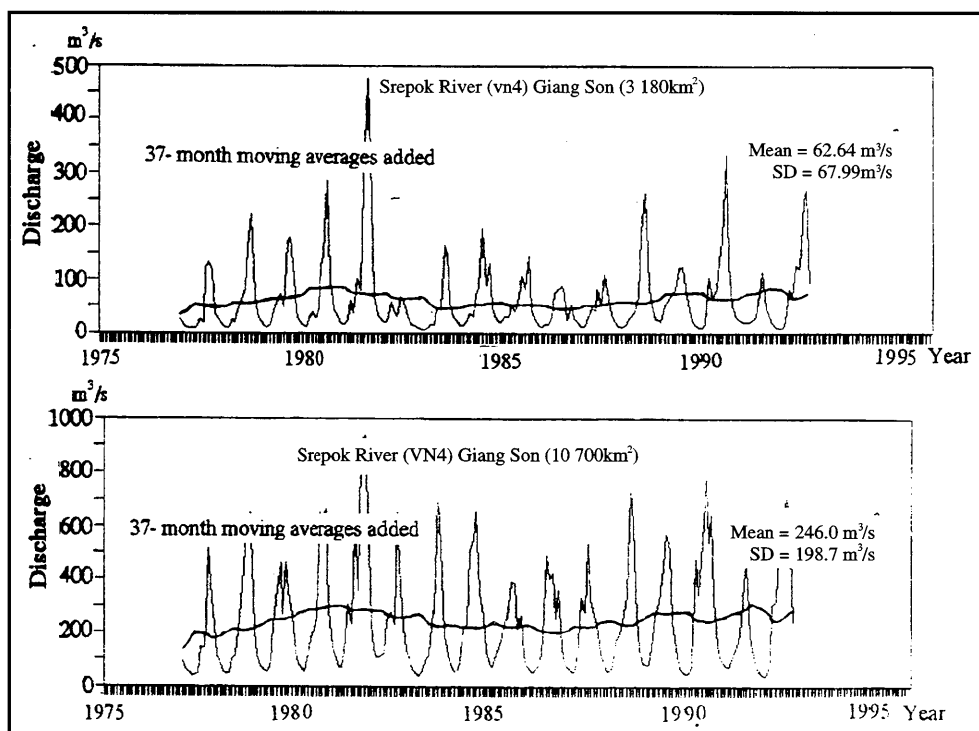
4.2 List of Hydrological Observation Stations

| No. | Station | Location | Catchment area (A) [km ²] | Observation period | Observation items ¹⁾ (frequency) |
|-----|-----------|-------------------------|---------------------------------------|--------------------|---|
| 421 | Giang Son | N 12° 30' E 108° 12' | 3 180 | 1977~ | H, Q, P, S |
| 422 | Cau 14 | N 12° 36' E 107° 56' | 8 670 | 1977~ | H, Q, P, S |
| 423 | Ban Don | N 12° 54' E 107° 46' | 10 700 | 1977~ | H, Q, P, S |
| 424 | Duc Xuyen | N 12° 17' E 107° 59' | 3 080 | 1978~ | H, Q, P, S |

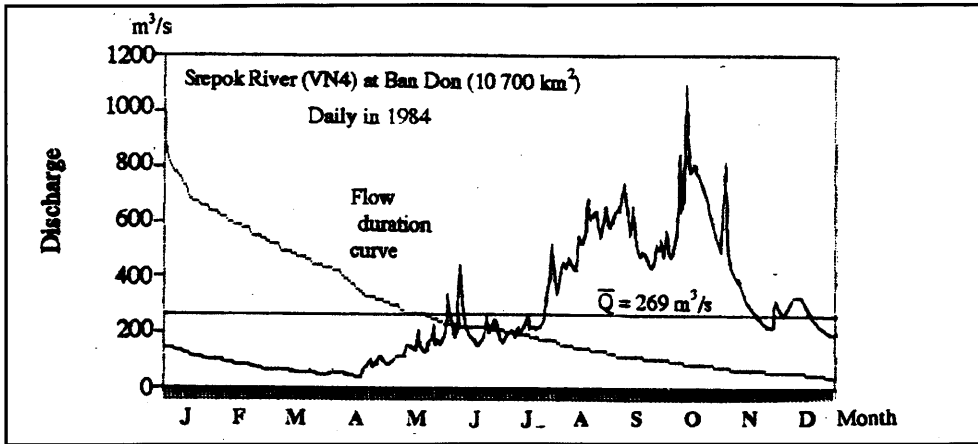
| No. | \bar{Q} ²⁾ [m ³ /s] | Q max ³⁾ [m ³ /s] | \bar{Q} max ⁴⁾ [m ³ /s] | \bar{Q} min ⁵⁾ [m ³ /s] | \bar{Q} / A [m ³ /s/100km ²] | Q max / A [m ³ /s/100km ²] | Period of statistics |
|-----|---|---|---|---|---|---|----------------------|
| 421 | 62.64 | 990 | 247.3 | 8.65 | 1.90 | 31 | 1977~1992 |
| 422 | 209.6 | 1 520 | 805.8 | 40.5 | 2.42 | 18 | 1977~1992 |
| 423 | 246.0 | 2 400 | 1 352 | 45.0 | 2.30 | 22 | 1977~1992 |
| 424 | 101.4 | 1 920 | 966 | 17.1 | 3.30 | 62 | 1978~1992 |

- 1) H: Water level (twice daily, in flood season more frequent)
 P: Precipitation (daily)
 Q: Discharge (30 - 40 measurements/year)
 S: Sediment concentration (daily index sample; 20 measurements/year)
- 2) Mean annual discharge
 3) Maximum discharge
 4) Mean maximum discharge
 5) Mean minimum discharge

4.3 Long-term Variation of Monthly Discharge

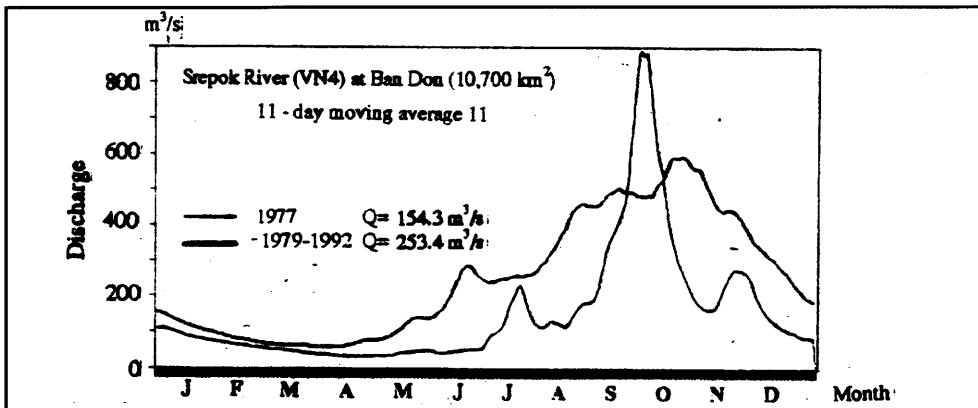


4.4 Annual Pattern of Discharge



4.5 Unique Hydrological Features

The annual discharge patterns before and after the construction of the Buon Tria, Buon Triet Dams in 1978.



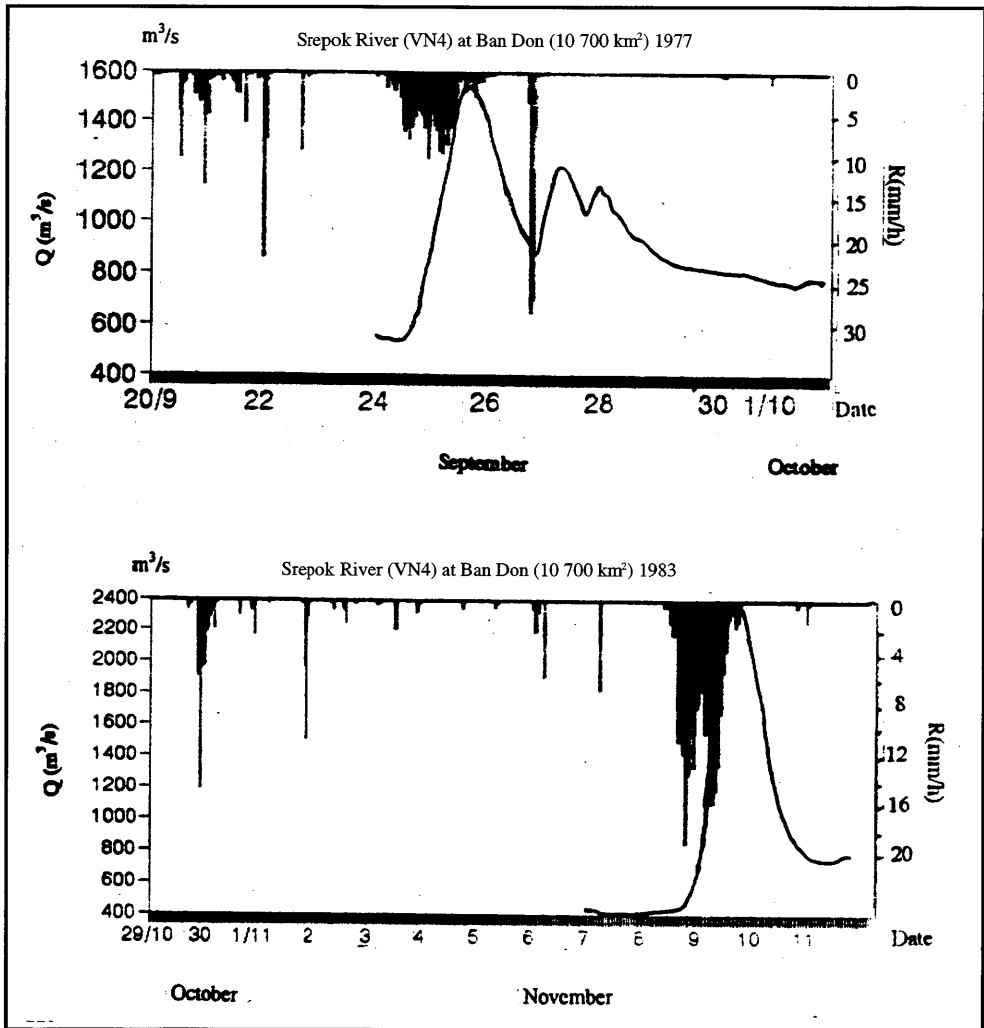
4.6 Annual Maximum and Minimum Discharges

At Ban Don [10 700 km²]

| Year | Maximum ¹⁾ | | Minimum ²⁾ | | Year | Maximum ¹⁾ | | Minimum ²⁾ | |
|------|-----------------------|---------------------|-----------------------|---------------------|------|-----------------------|---------------------|-----------------------|---------------------|
| | Date | [m ³ /s] | Month | [m ³ /s] | | Date | [m ³ /s] | Month | [m ³ /s] |
| 1977 | 9.25 | 1 540 | 5 | 29.2 | 1985 | 9.10 | 931 | 4 | 53.1 |
| 1978 | 7.01 | 1 140 | 4 | 30.2 | 1986 | 8.16 | 949 | 5 | 79.6 |
| 1979 | 8.08 | 910 | 4 | 46.2 | 1987 | 9.23 | 1 160 | 5 | 37.1 |
| 1980 | 11.02 | 1 510 | 4 | 43.6 | 1988 | 10.10 | 1 260 | 4 | 38.8 |
| 1981 | 10.15 | 1 810 | 4 | 51.9 | 1989 | 10.05 | 1 350 | 3 | 56.4 |
| 1982 | 9.11 | 1 070 | 5 | 92.4 | 1990 | 9.04 | 1 650 | 5 | 33.6 |
| 1983 | 10.09 | 2 400 | 4 | 23.3 | 1991 | 10.13 | 712 | 4 | 40.5 |
| 1984 | 11.02 | 1 320 | 4 | 36.6 | 1992 | 10.24 | 1 920 | 2 | 27.3 |

1), 2) Discharge rated according to manual observation of water level

4.7 Hyetographs and Hydrographs of Major Floods

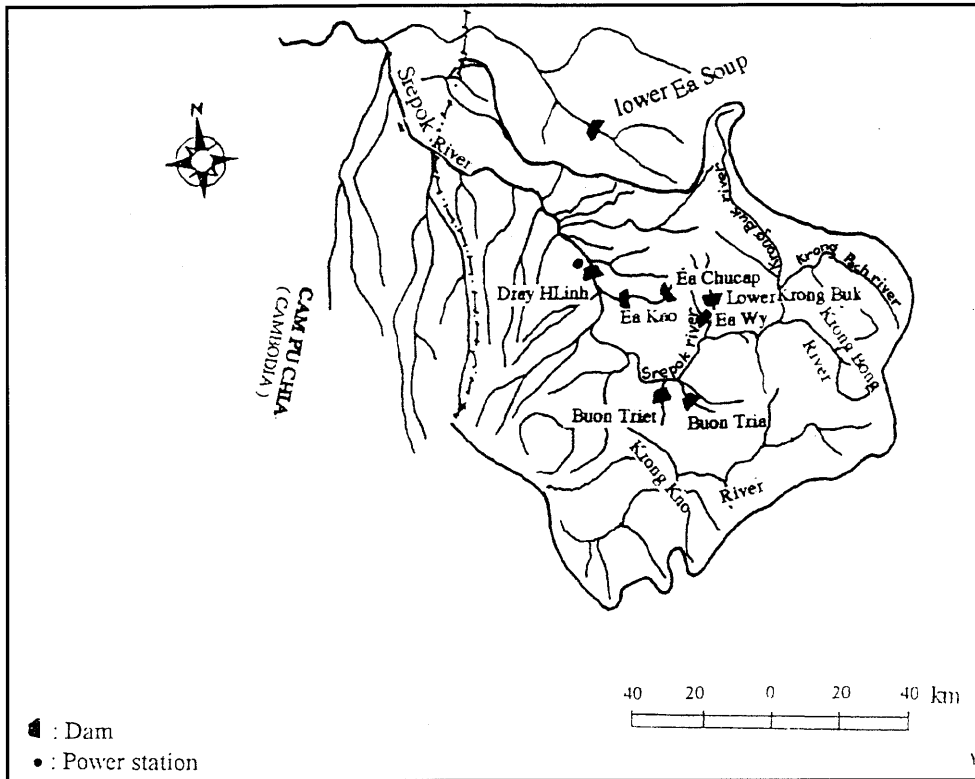


5. Water Resources
 5.1 General Description

The annual runoff of the basin is 987 mm. The water volume of Srepok is 30.0 km³, out of which one third is from Se San River. The specific discharge of the basin is 0.0313 m³/s/km². The ground water component makes 30% of the total runoff. The headwater area of Se San River and the south west of Pleikou highland are the wettest areas with specific discharges varying between 0.035~0.040 m³/s/km². The driest place is headwater area of Krong Buk River which has a specific discharge of 0.020 m³/s/km². For the remainder of the basin it varies between 0.020~0.035 m³/s/km². The flood runoff makes 65~75% of the annual flow with specific discharges between 0.040~0.070 m³/s/km².

There are many small reservoirs in the upper Srepok basin. They are built for irrigation and domestic use (except Dray Hlinh with total volume of 2.18 million m³ and 12 MW installed capacity to generate hydropower) and improvement of environment. The Dray Hlinh hydropower plant provided 90% of electricity for Dac Lac Province in 1992. The reservoirs play important roles in agricultural development (especially for coffee, pepper, rubber trees) and fish raising.

5.2 Map of Water Resources Systems



5.3 List of Major Water Resources Facilities

| Name of river | Name of dam | Catchment area [km ²] | Gross capacity [10 ⁶ m ³] | Effective capacity [10 ⁶ m ³] | Purpose | Year of completion |
|---------------|-----------------|-----------------------------------|--|--|------------|--------------------|
| Srepok | Lower EaSoup | 500 | 3.70 | 1.768 | A | 1978 |
| | Lower Krong Buk | 270 | 14.00 | 10.0 | A | 1980 |
| | Ea Wy | 13 | 3.08 | 2.78 | A | 1986 |
| | Ea Kao | 108 | 10.00 | 8.0 | A | 1976 |
| | Dray H'Linh | | | | A, F, P, W | Repaired (1986) |
| | Ea Chucap | 14 | 4.40 | 3.9 | A | 1982 |
| | Buon Tria | 17 | 3.60 | 3.2 | A | 1978 |
| | Buon Triet | 32 | 14.00 | 13.0 | A | 1978 |

A: Agricultural use; F: Flood control; P: Hydropower; W: Municipal water supply

5.4 Major Floods and Droughts

Major Flood at Ban Bon [10 700 km²]

| Date | Peak discharge [m ³ /s] | Rainfall [mm] duration | Meteorological cause | Dead and missing | Major damages (Districts affected) |
|---------------------|------------------------------------|--------------------------------------|----------------------|------------------|------------------------------------|
| 1977 9.20~10.12 | 1 540 | 344.0 9.20~9.22, 9.24~9.28 | Typhoon | | Ea Soup Centre |
| 1980 10.24~10.30 | 1 510 | 204.5 10.24~10.30, 11.02~11.03 | Typhoon | | Ea Soup Centre |
| 1981 10.10~11.30 | 1 810 | 238.8 10.09~10.18 | Typhoon | | Ea Soup Centre |
| 1983 10.07~10.31 | 2 400 | 265.2 9.23~10.09 | Typhoon | | Ea Soup Centre |
| 1990 8.13~9.24 | 1 650 | 156.0 9.02~9.04, 9.06~9.10 | Typhoon | | Ea Soup Centre |
| 1992 10.23~11.20 | 1 920 | 242.1 10.22~10.30 | Typhoon | | Ea Soup Centre |

5.5. Groundwater and Water Quality

Groundwater is rather abundant in basaltic, sandstone formations, with quality suitable for domestic uses. Ground water is intensively withdrawn for irrigation of coffee, rubber, rice plantations especially in long lasting dry season.

6. Socio-cultural Characteristics

The basin area is mostly covered with forests. The remaining area is used for paddy cultivation, coffee and rubber plantations and for animal husbandry. The Dray Hling hydropower station provides more than 90% of electricity for the region and plays an important role in the socio-economic-cultural developments in Dak Lac province. Many small reservoirs provide water for irrigation and hydropower for the population in the area.

7. References, Data Books and Bibliography (In Vietnamese)

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- State Programme N42 A Report, *Assessment of hydrometeorological natural conditions and resources in service of production and national defence with focus on agriculture*, Vol I: Meteorological data, Vol II: Hydrological data.
- Tran Tuat, Tran Thanh Xuan and Nguyen Duc Nhat (1987): *Hydrogeography of Vietnam rivers*, Science and Technique Publishing House.
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