Tong-Noy

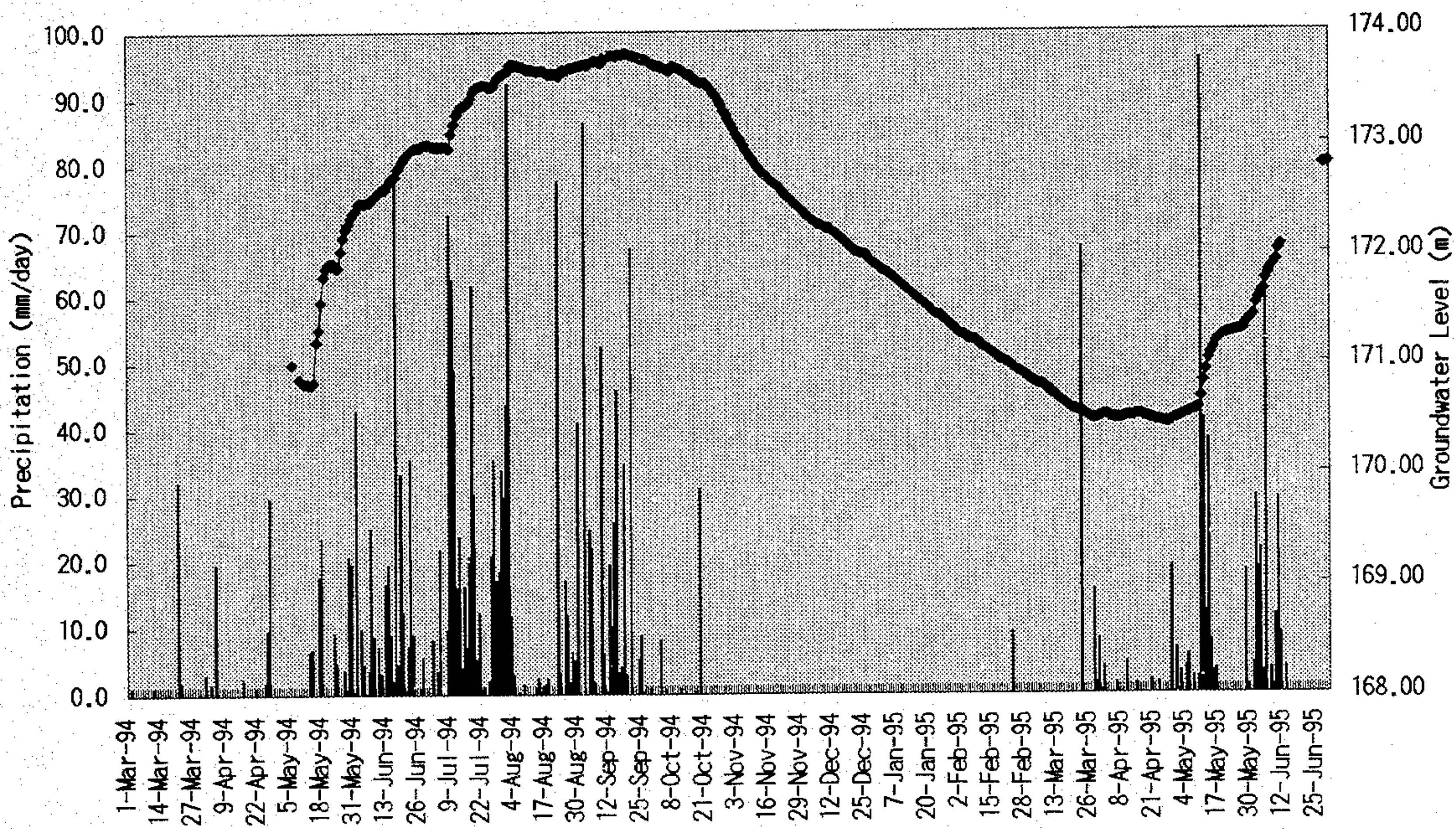

Figure 5.2.2(1/7) Groundwater Levels at the Automatic Recording Stations(Tong-Noy)

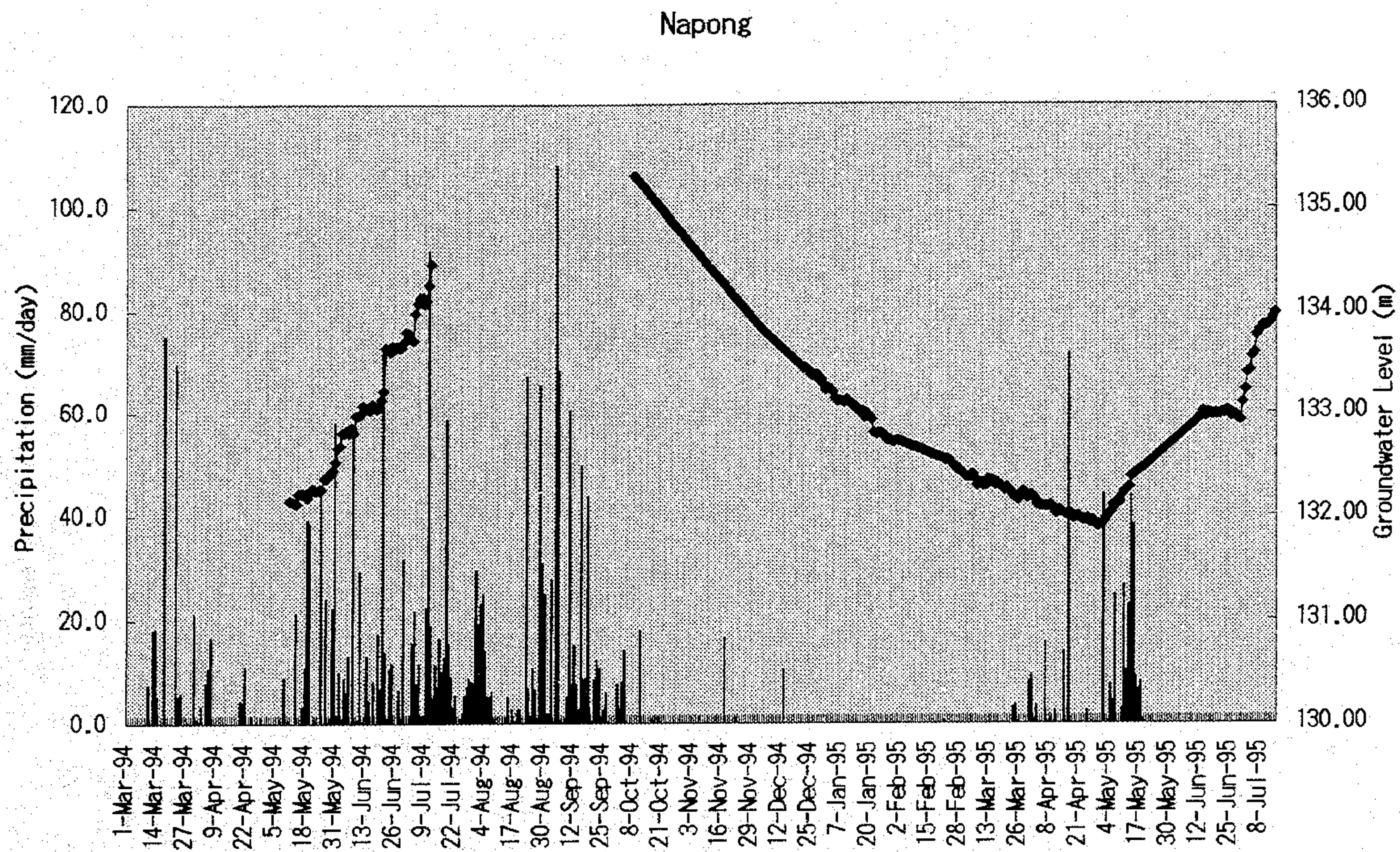

Figure 5.2.2(2/7) Groundwater Levels at the Automatic Recording Stations(Napong)

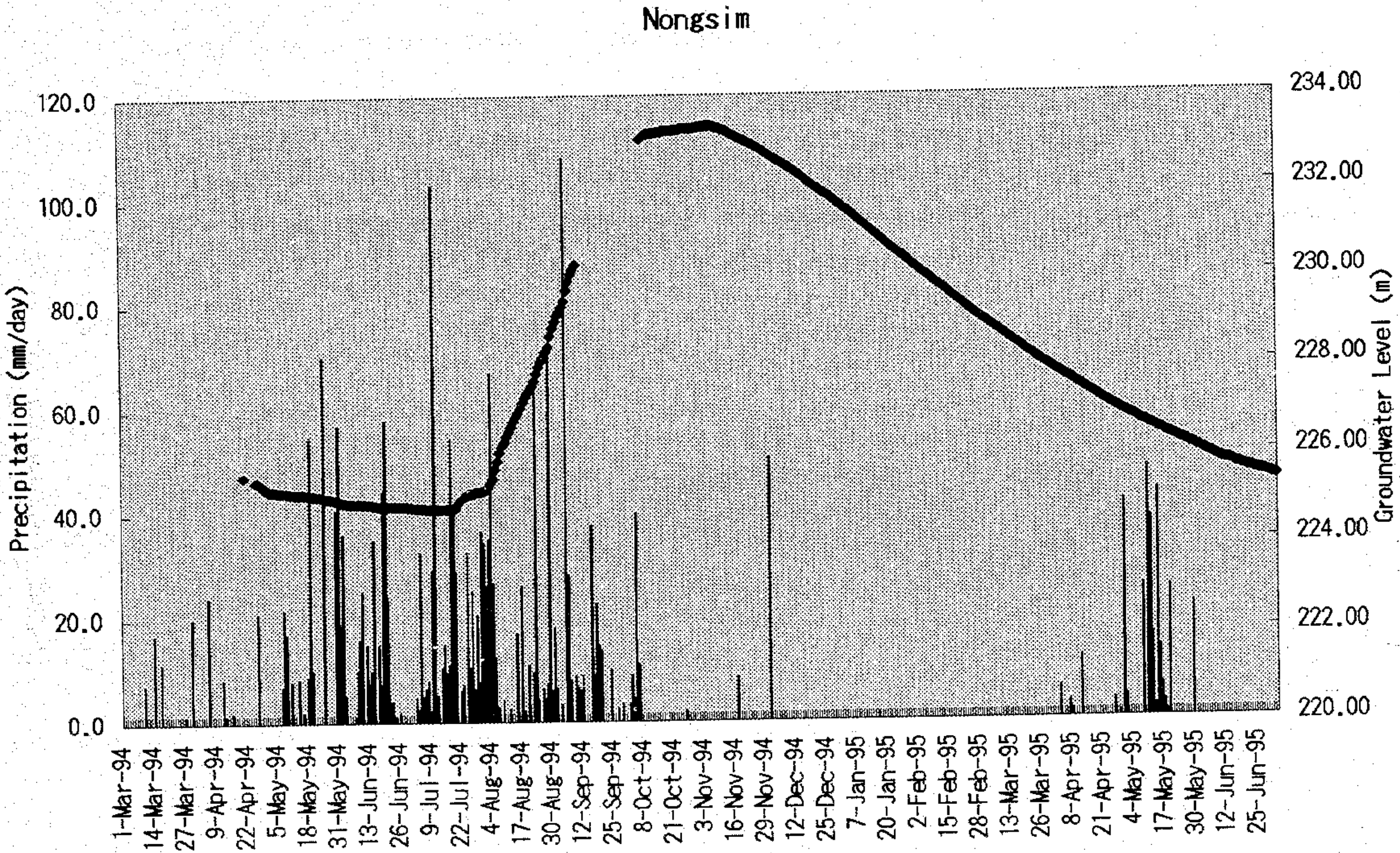

Figure 5.2.2(3/7) Groundwater Levels at the Automatic Recording Stations(Nongsim)

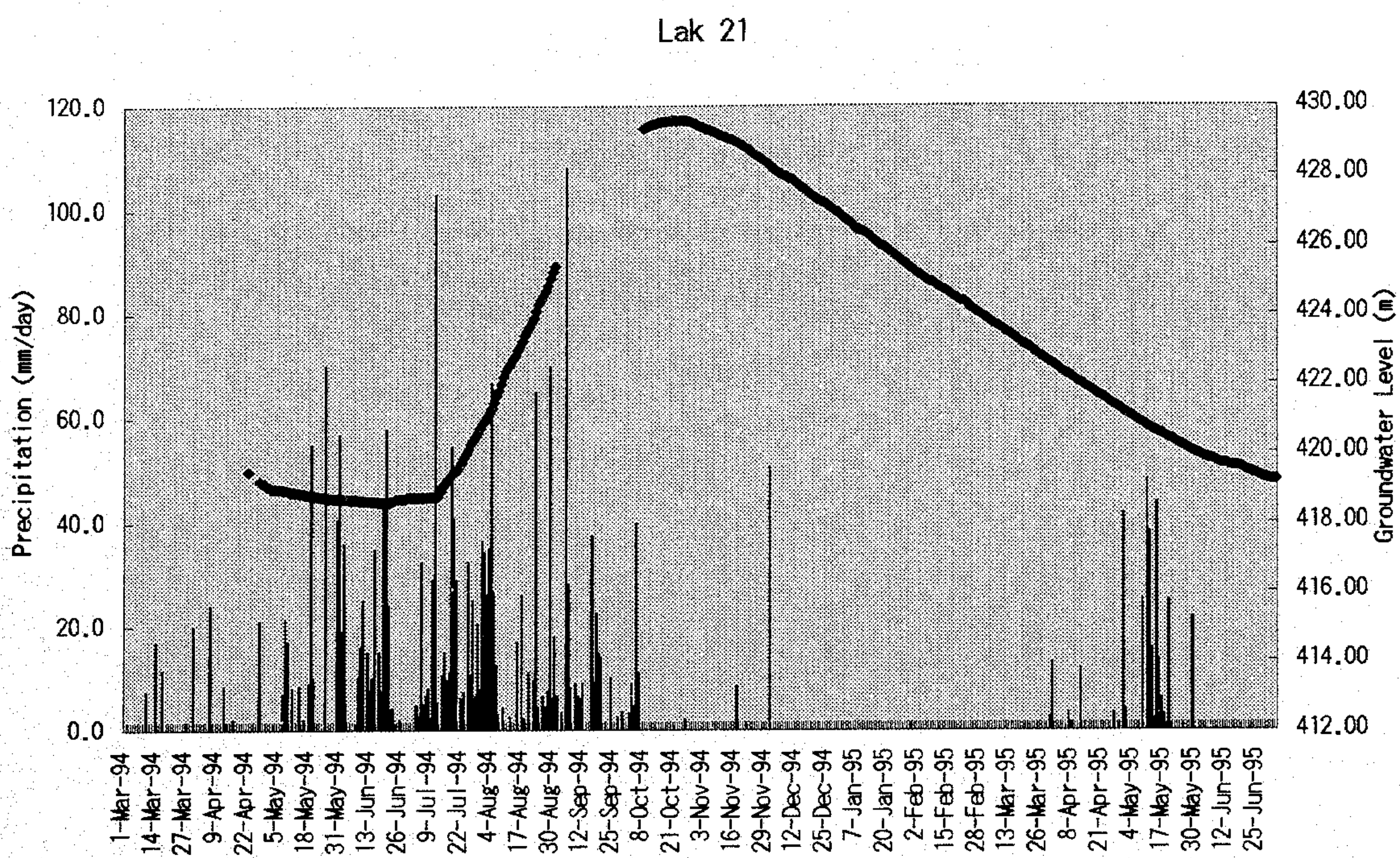

Figure 5.2.2(4/7) Groundwater Levels at the Automatic Recording Stations(Lak 21)

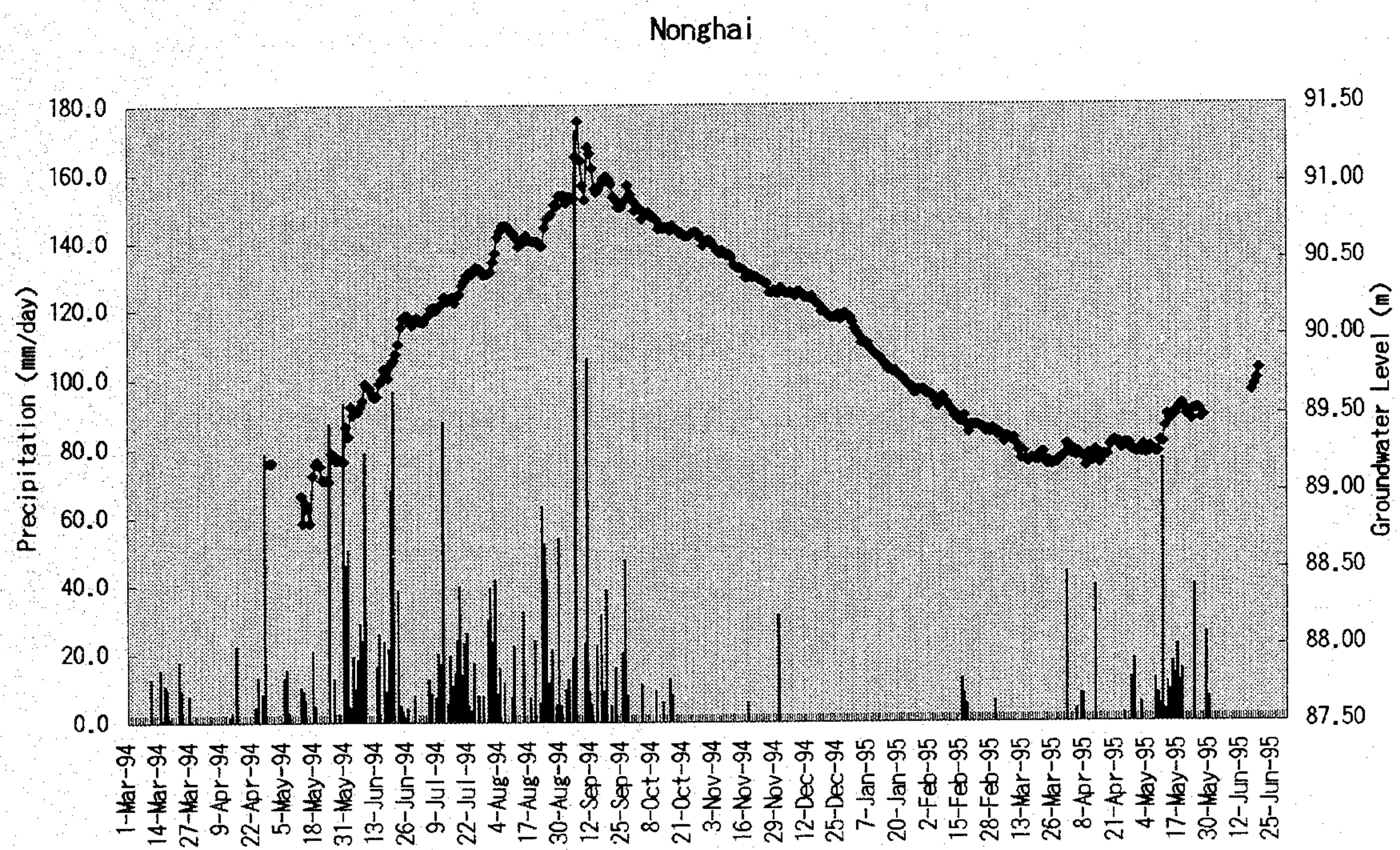

Figure 5.2.2(5/7) Groundwater Levels at the Automatic Recording Stations(Nonghai)

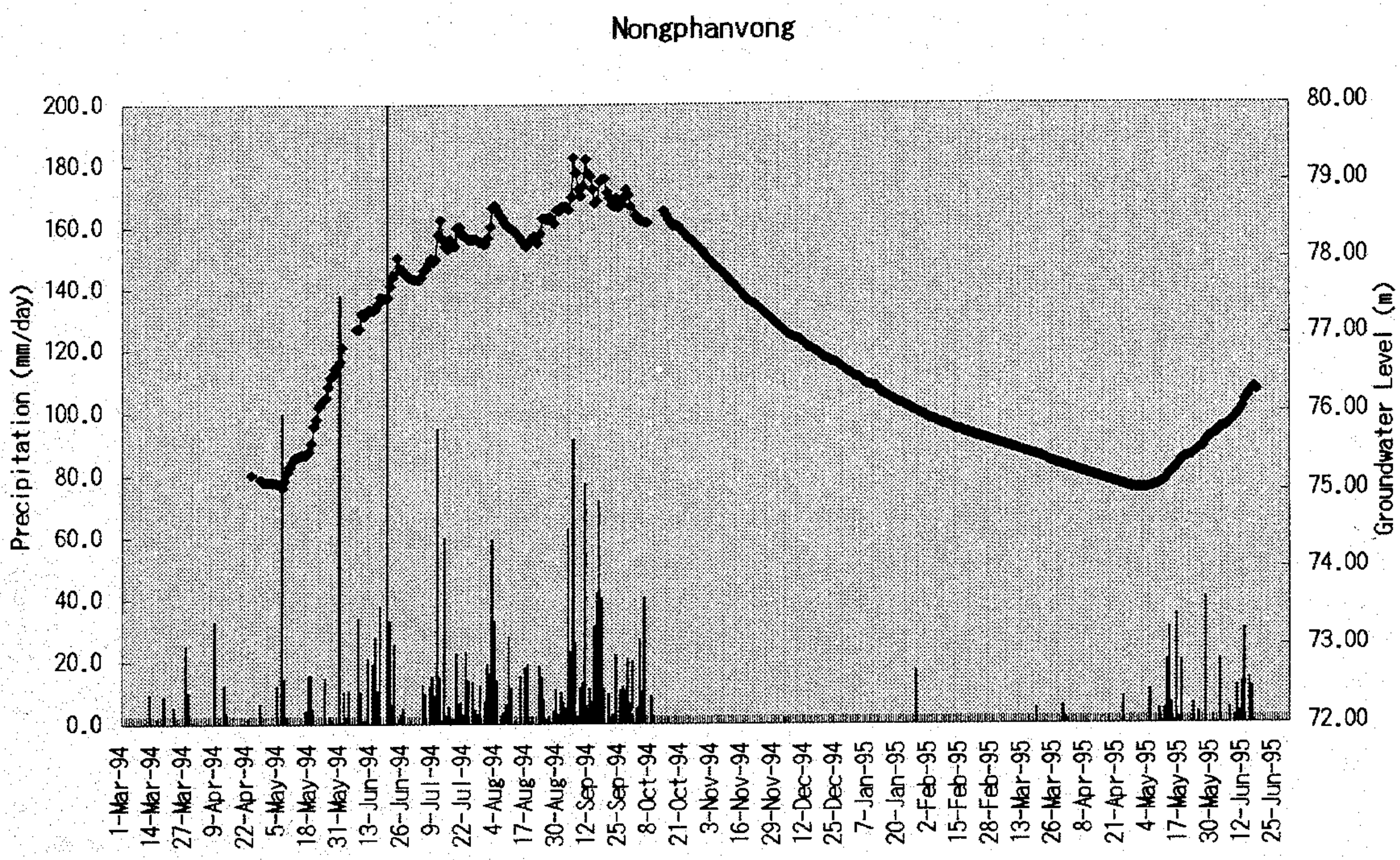

Figure 5.2.2(6/7) Groundwater Levels at the Automatic Recording Stations(Nongphanvong)

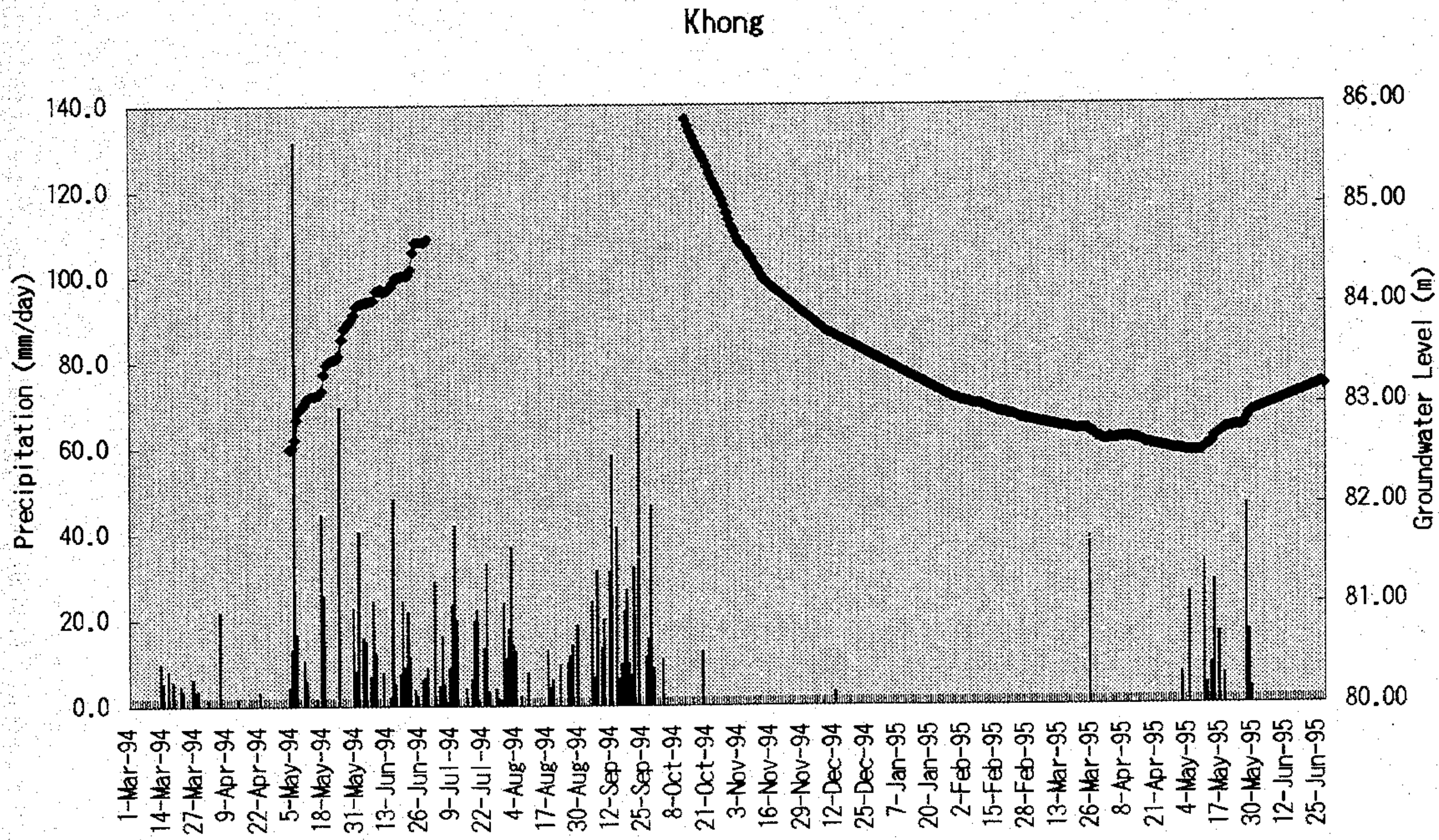

Figure 5.2.2(7/7) Groundwater Levels at the Automatic Recording Stations(Khong)

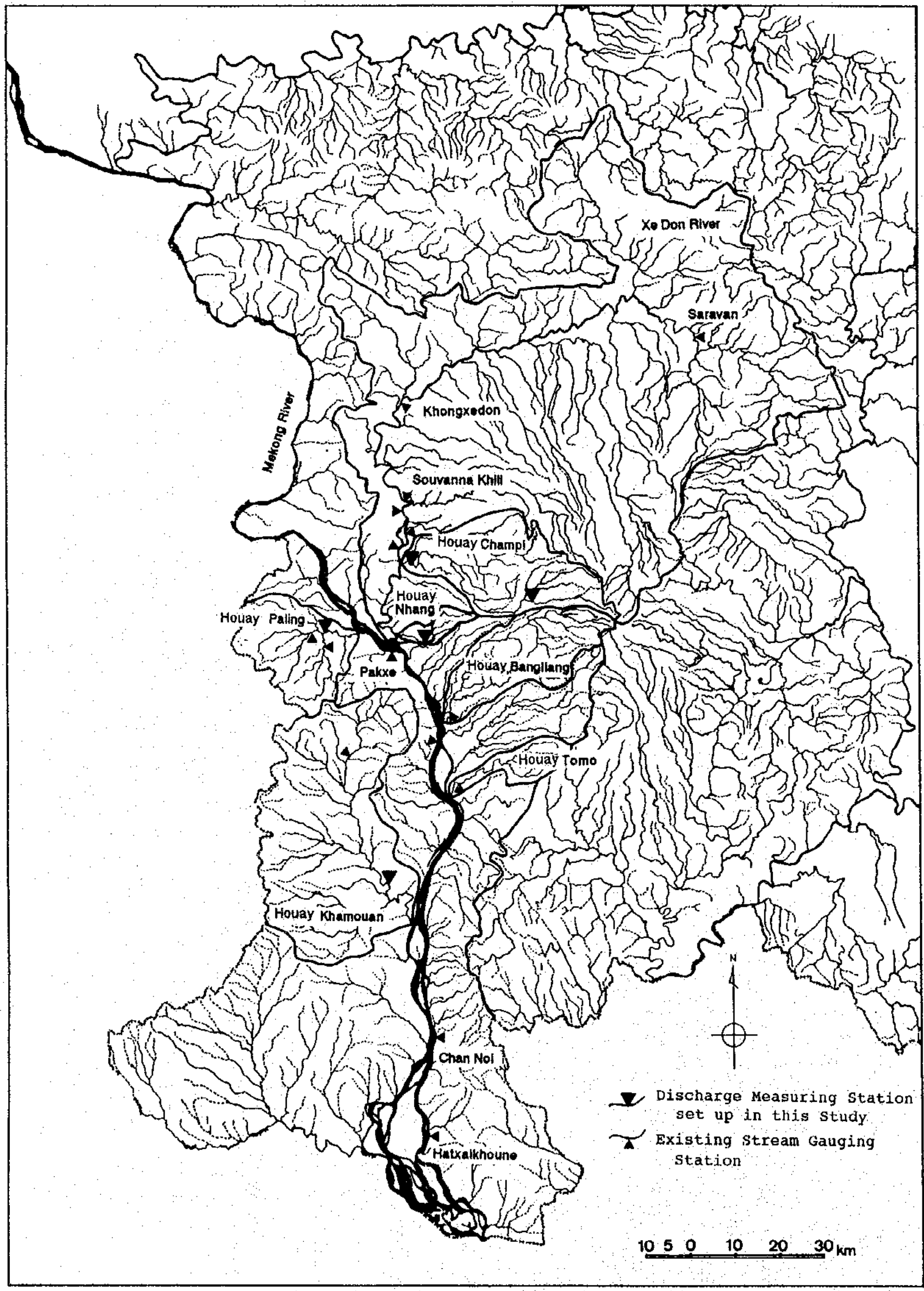

Figure **5.3.1** Location of Existing Gauging Stations and Discharge Measuring Stations Set up in This Study

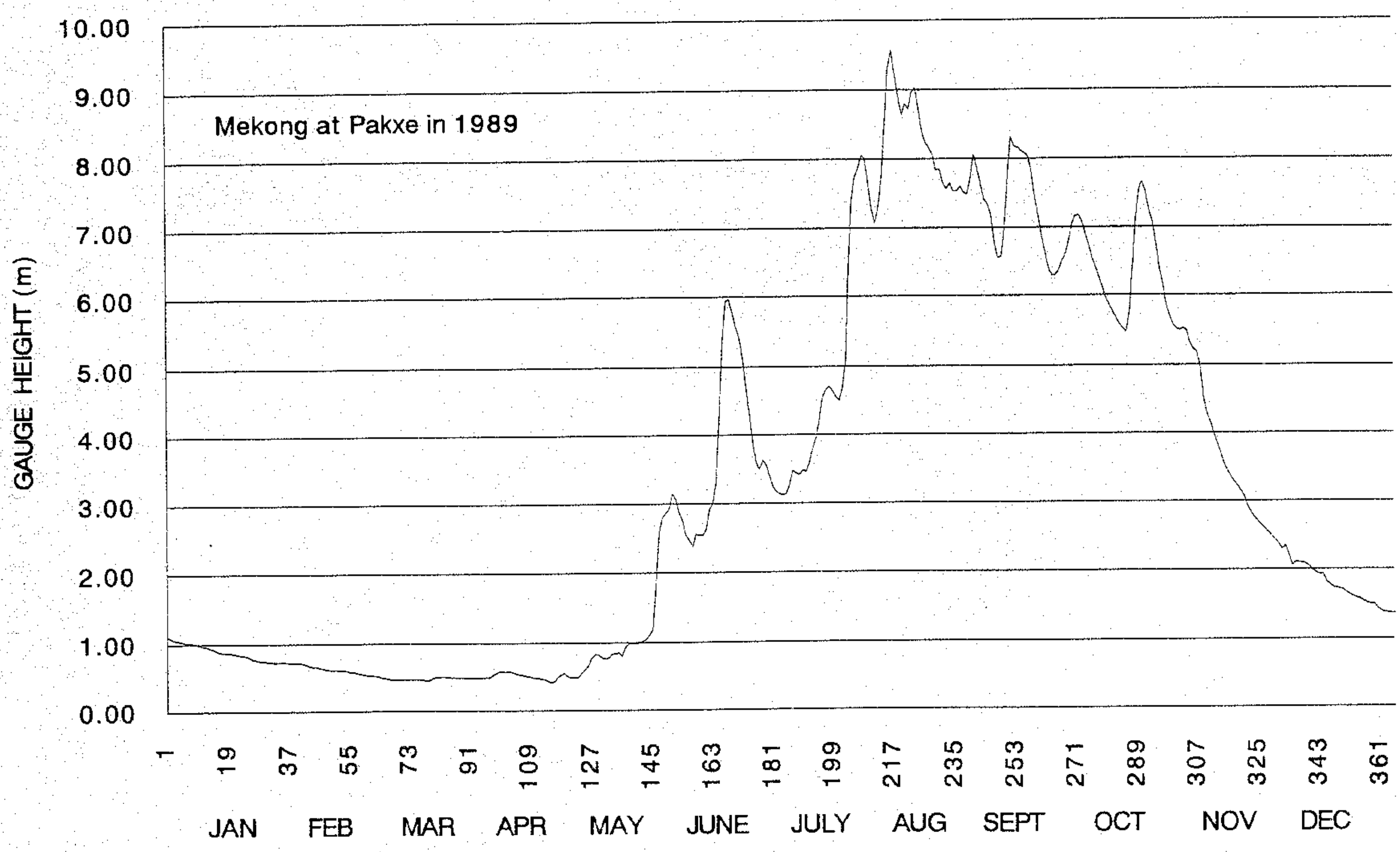

Figure **5.3.2** Gauge Height of the Mekong River at Pakxe in 1989

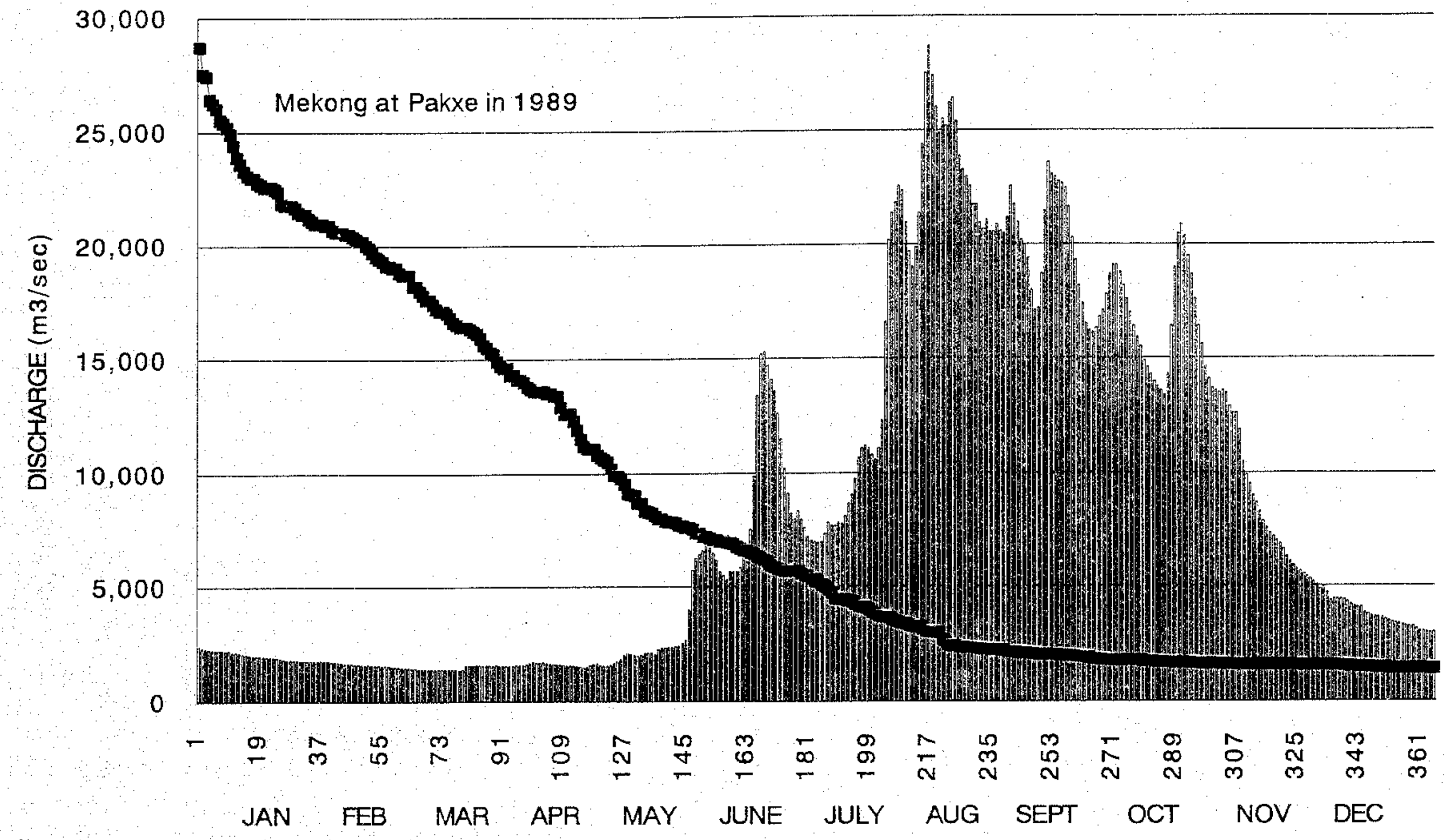

Figure **5.3.3** Discharge of the Mekong River at Pakxe in 1989

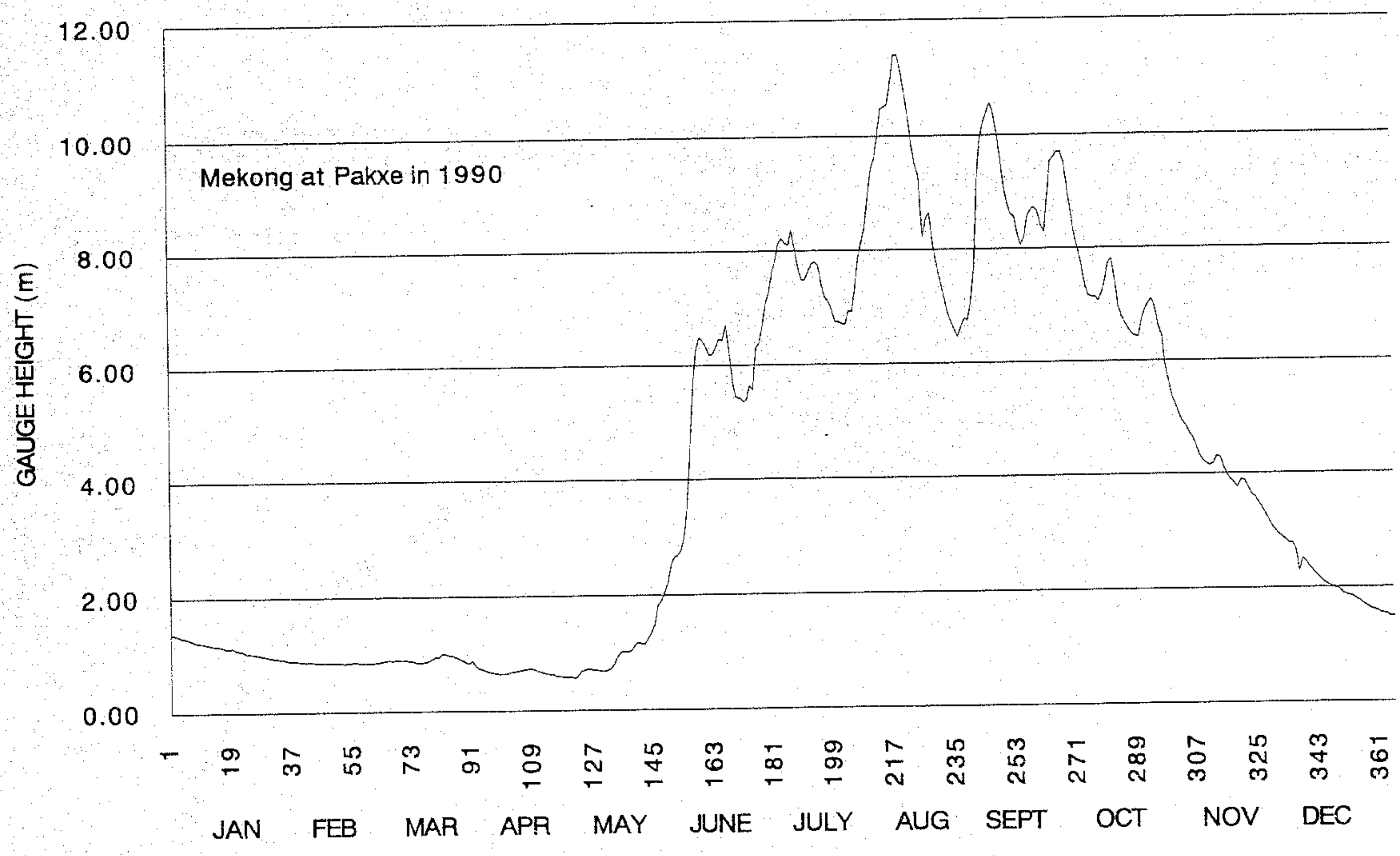

Figure **5.3.4** Gauge Height of the Mekong River at Pakxe in 1990

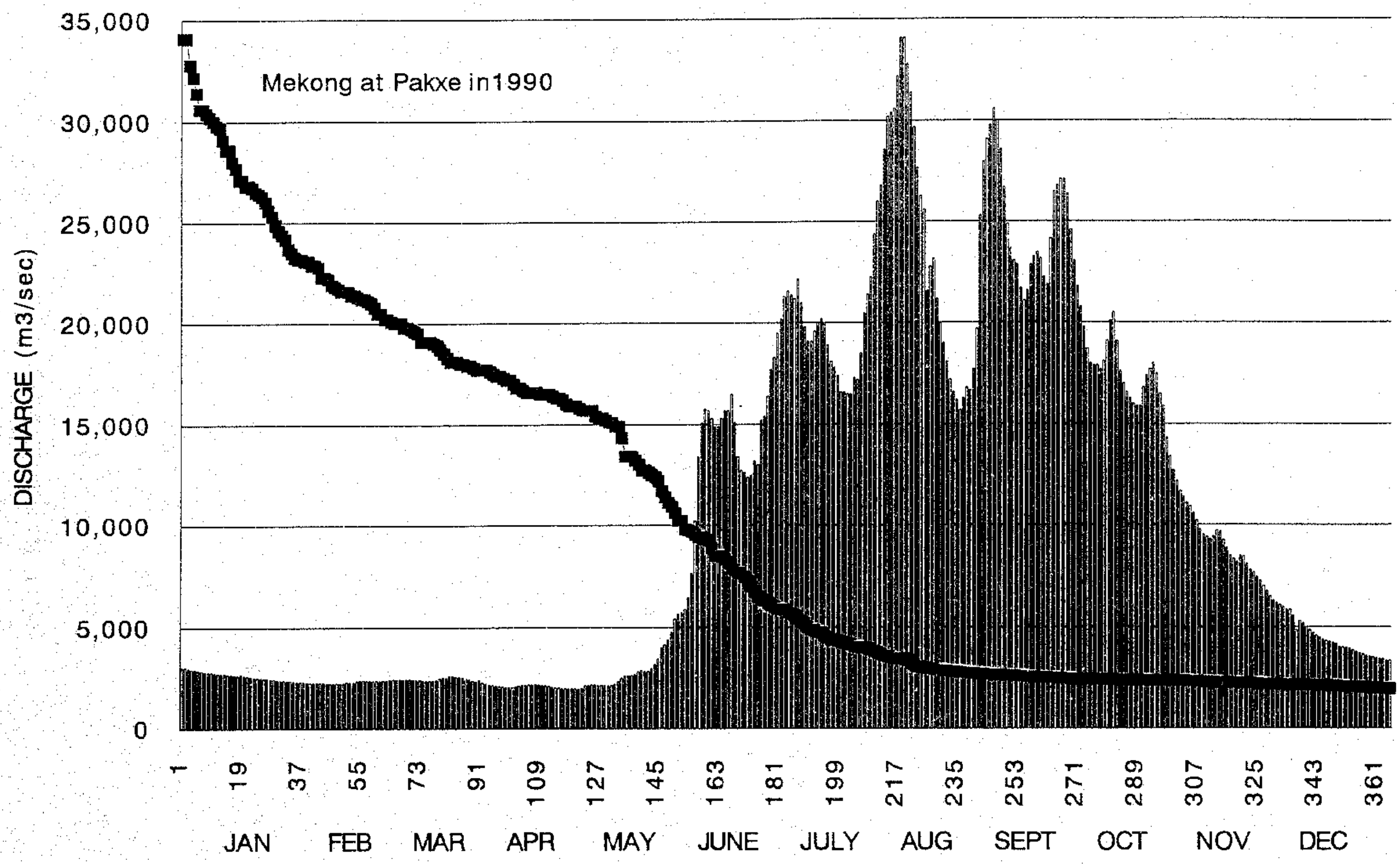

Figure **5.3.5** Discharge of the Mekong River at Pakxe in 1990

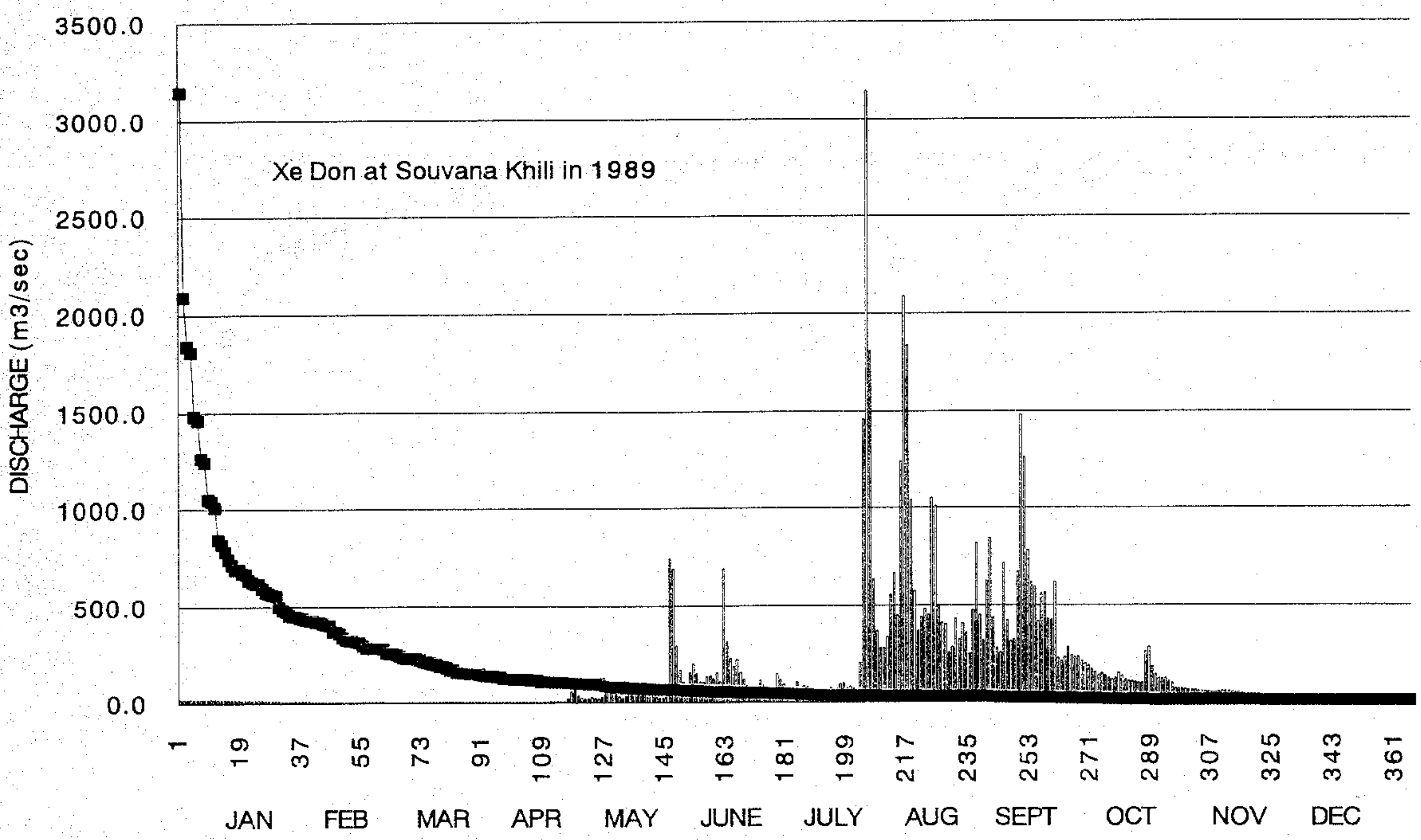

Figure **5.3.6** Discharge of the Xe Don River at Souvanna Khili in 1989

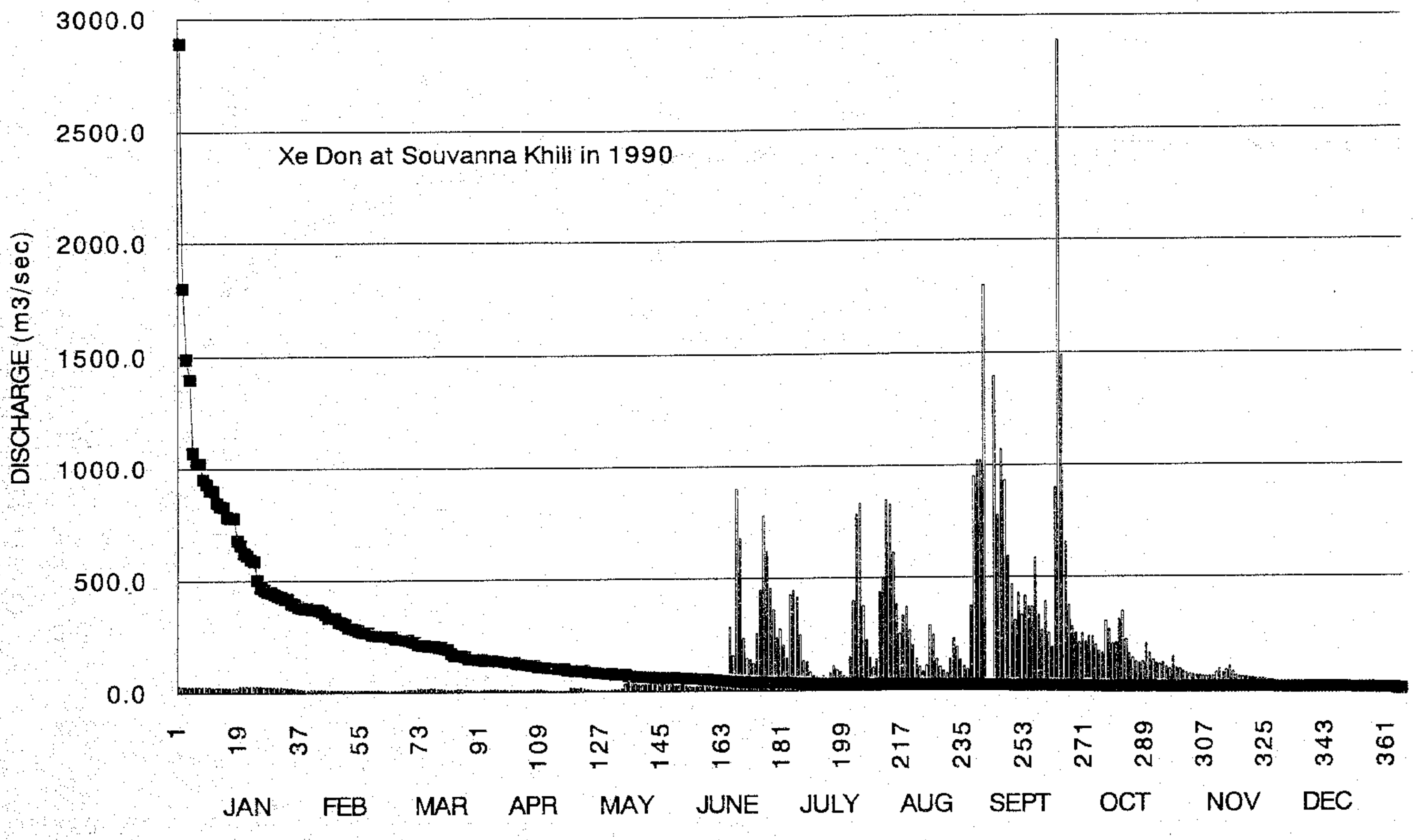

Figure **5.3.7** Discharge of the Xe Don River at Souvanna Khili in 1990

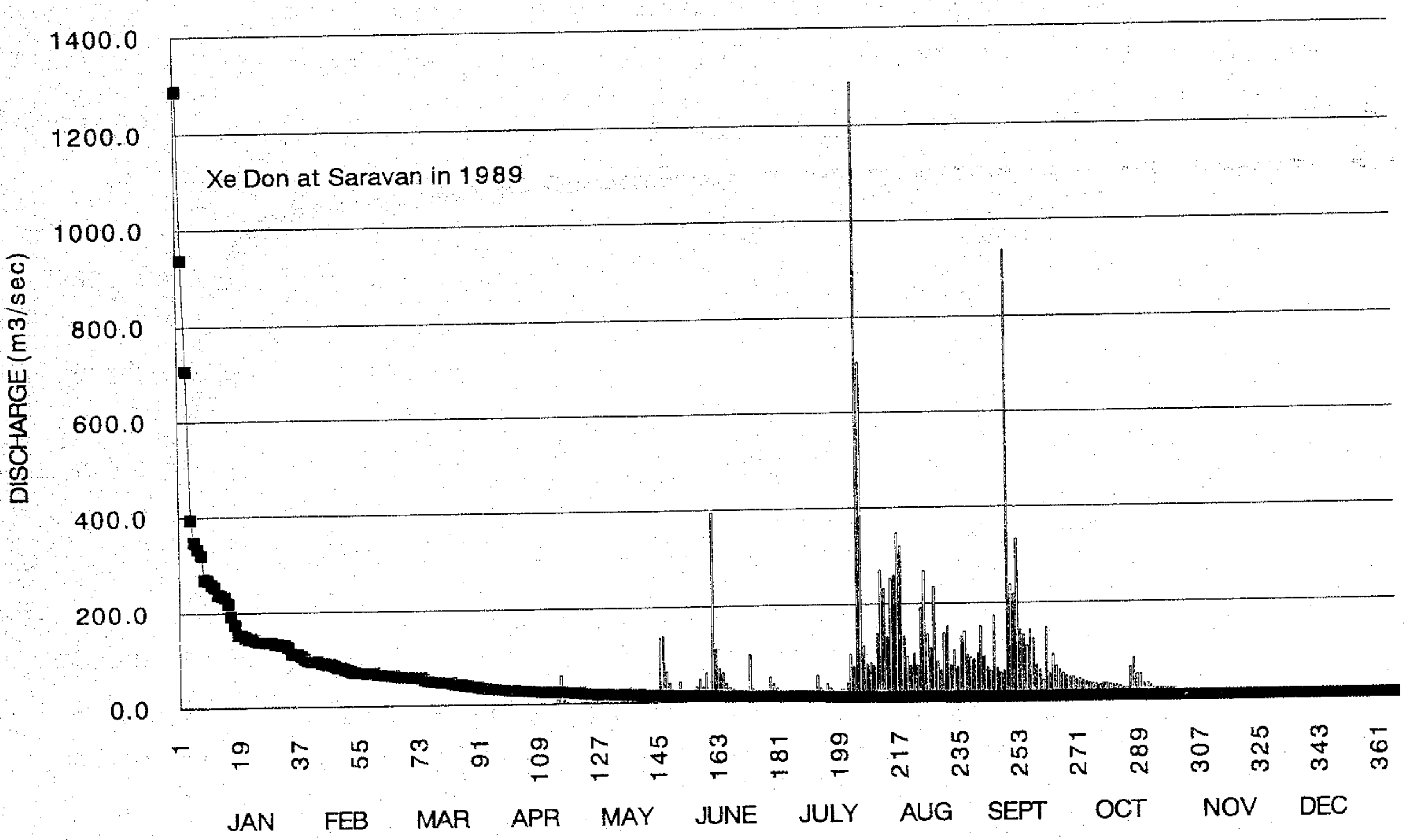

Figure **5.3.8** Discharge of the Xe Don River at Saravan in 1989

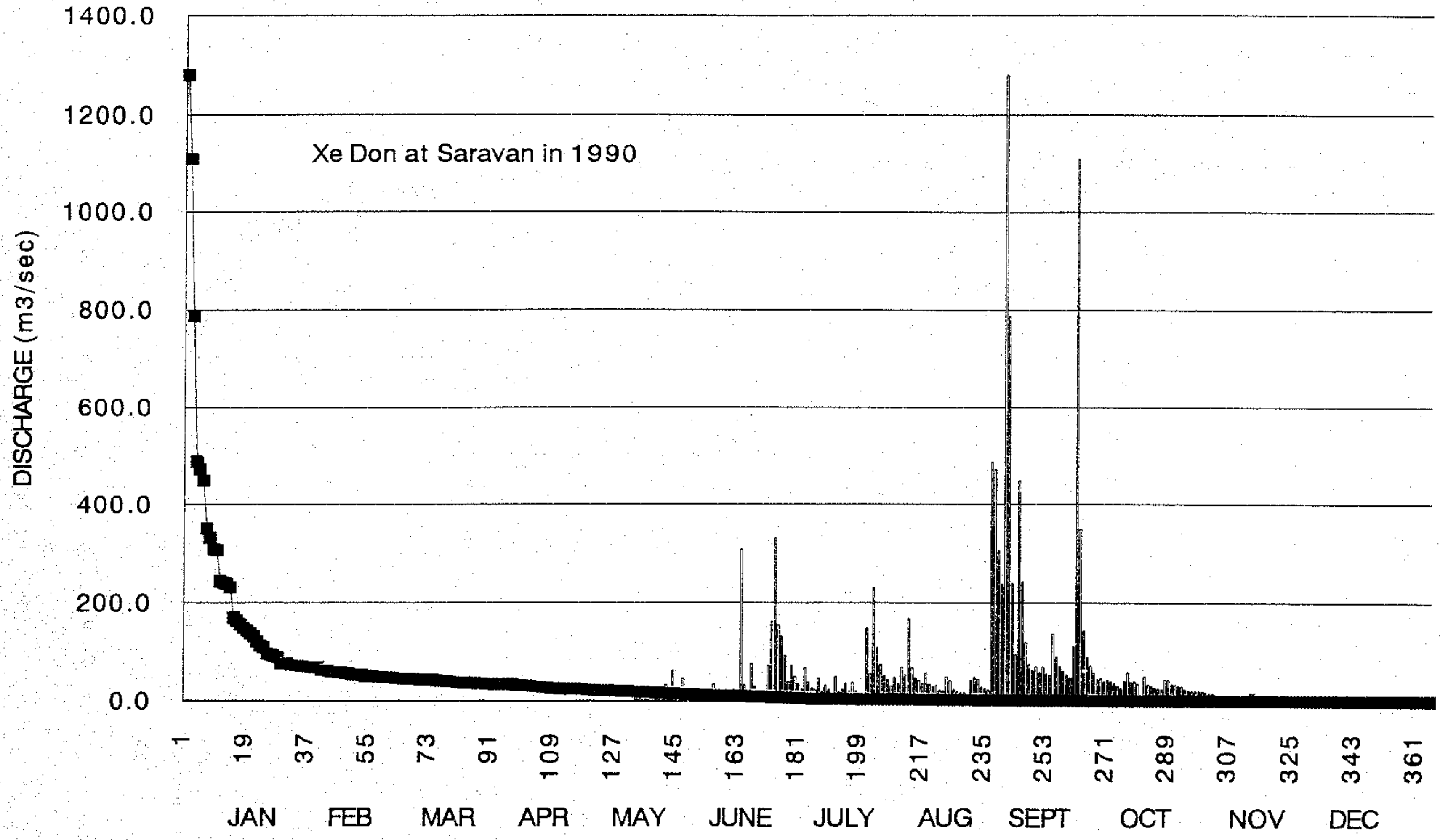

Figure **5.3.9** Discharge of theXe Don River at Saravan in 1990

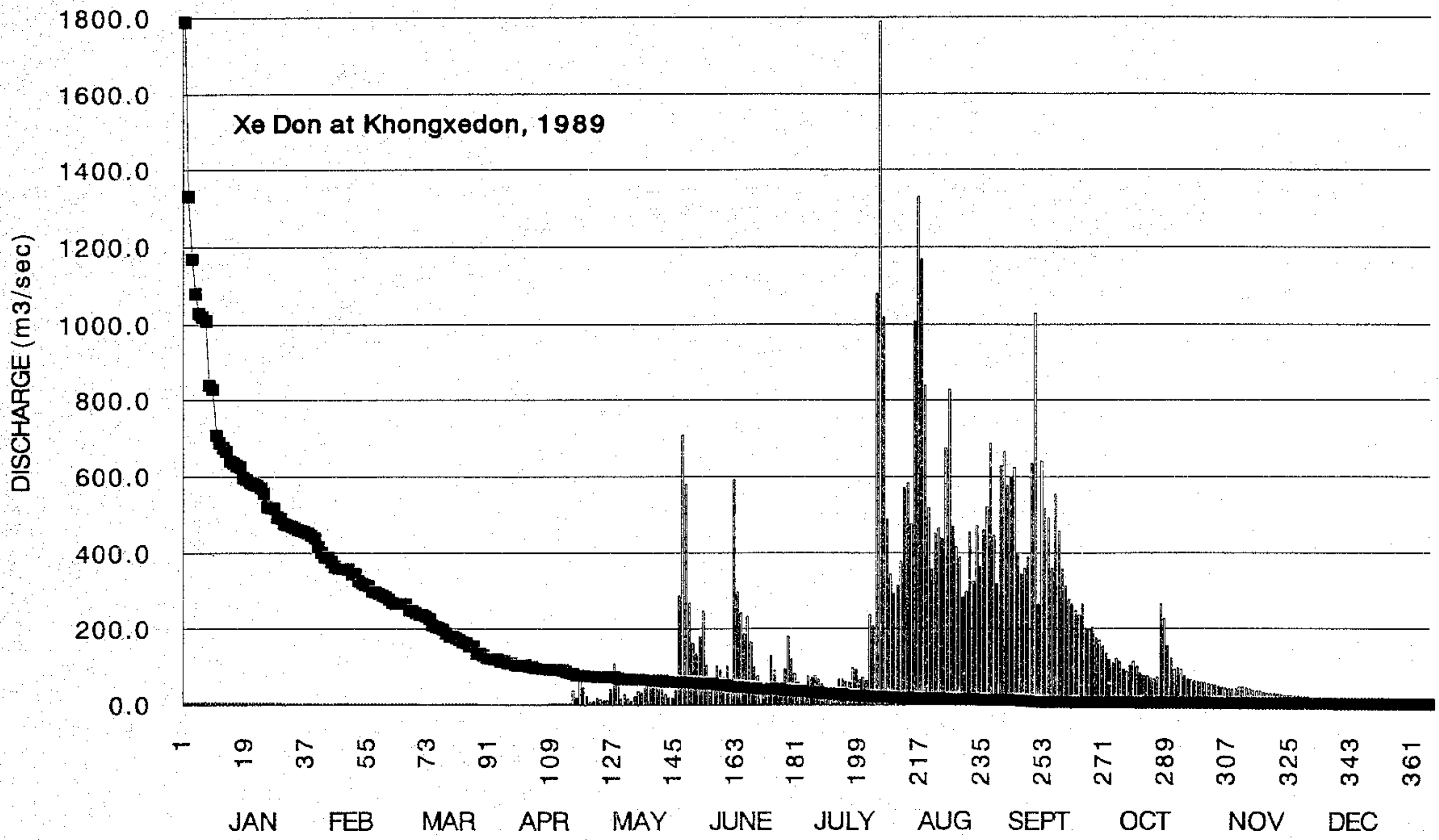

Figure **5.3.10** Discharge of the Xe Don River at Khongxedon in 1989

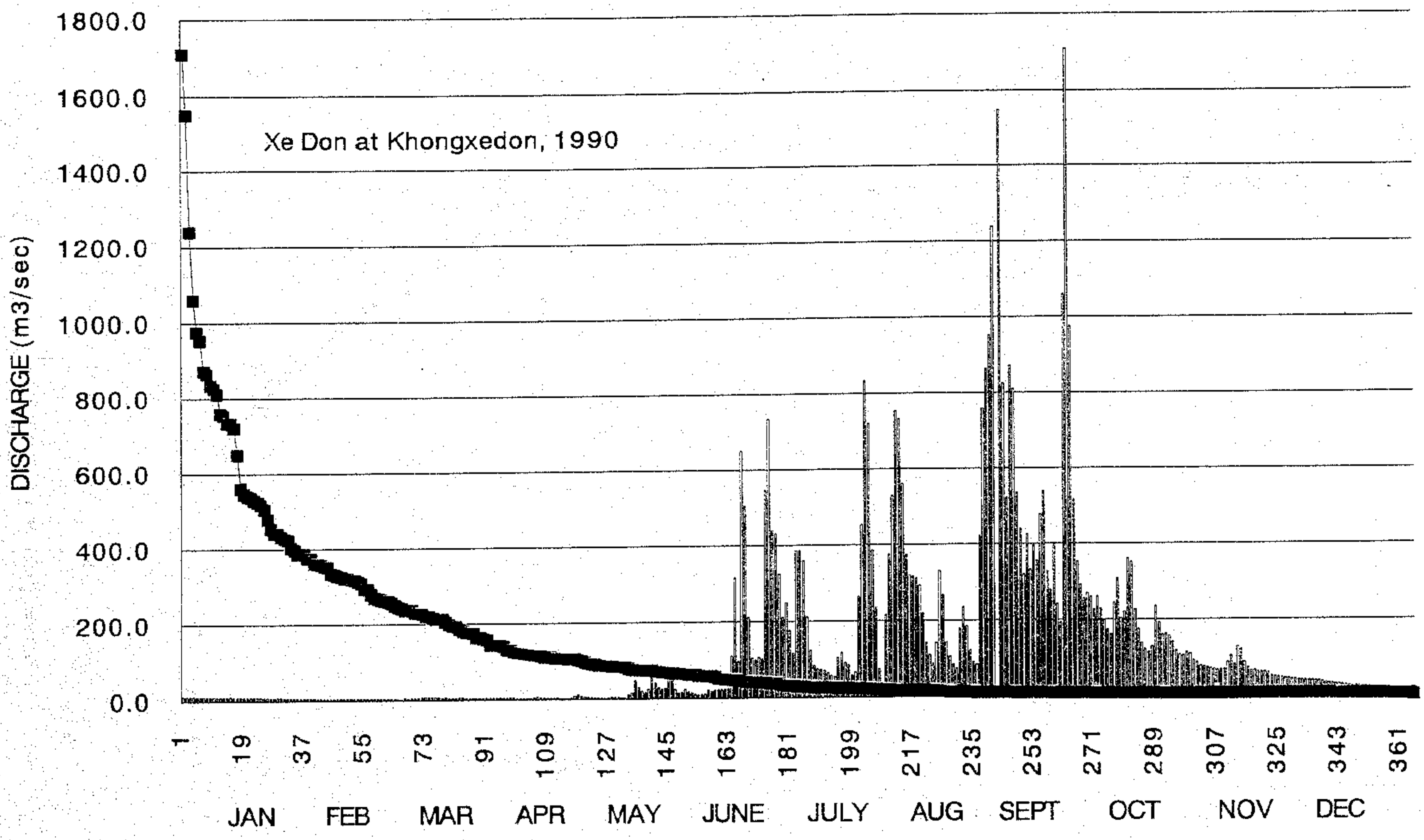

Figure **5.3.11** Discharge of the Xe Don River at Khongxedon in 1990

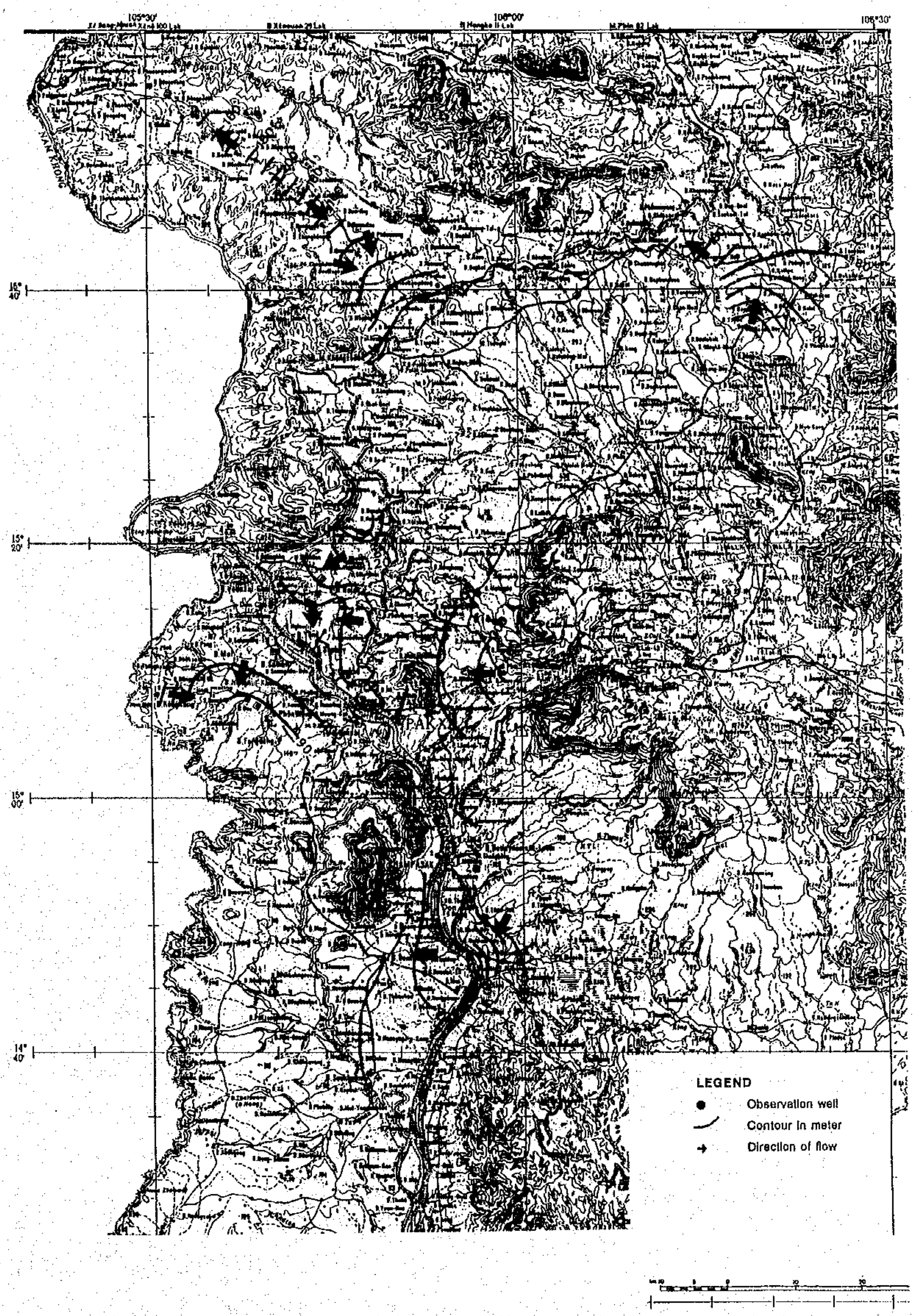

Figure 5.4.1 Groundwater Contour Map In the Wet Season, Apr. to May In 1994

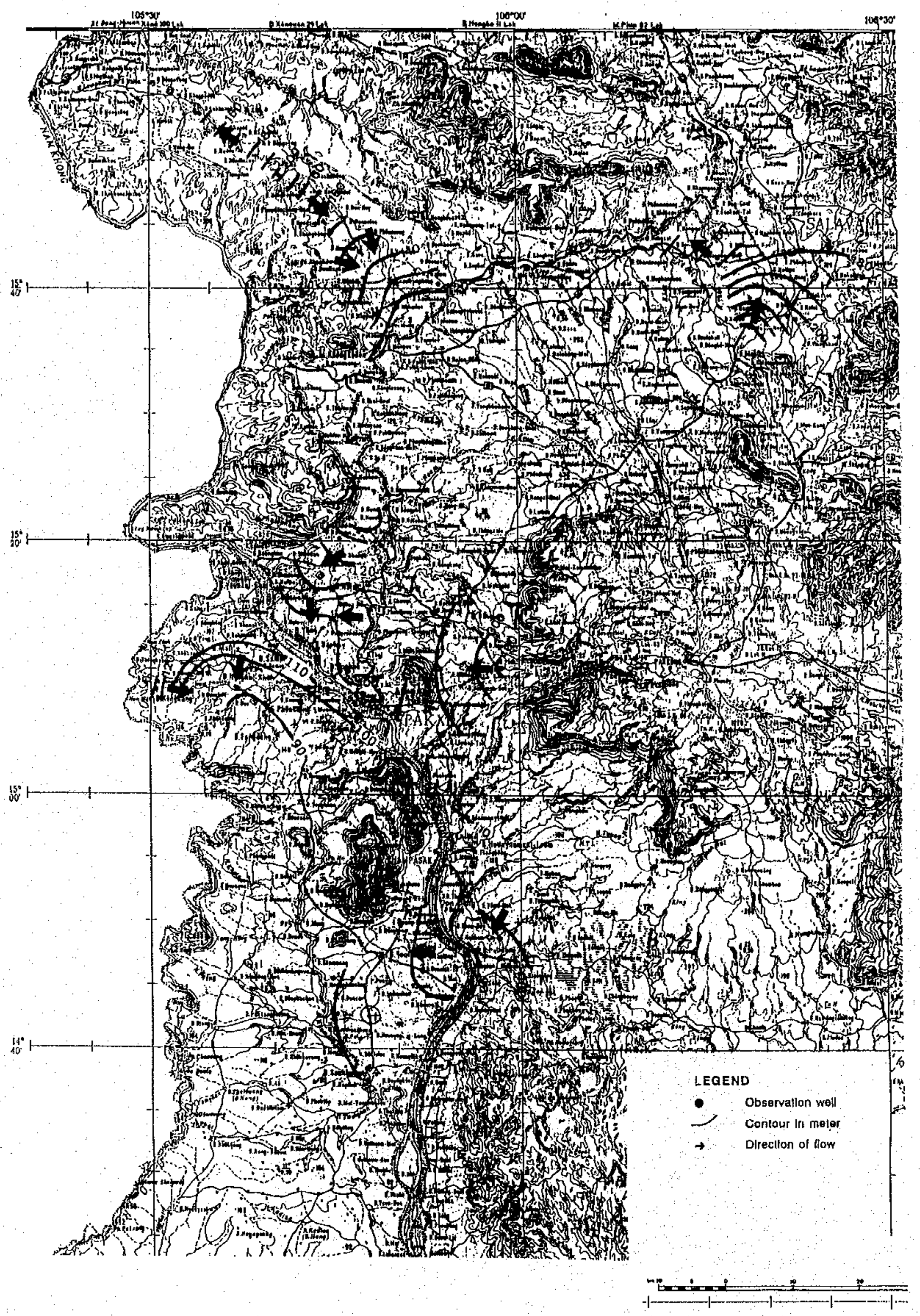

Figure 5.4.2   Groundwater Contour Map In the Dry Season, Nov. to Dec. In 1994

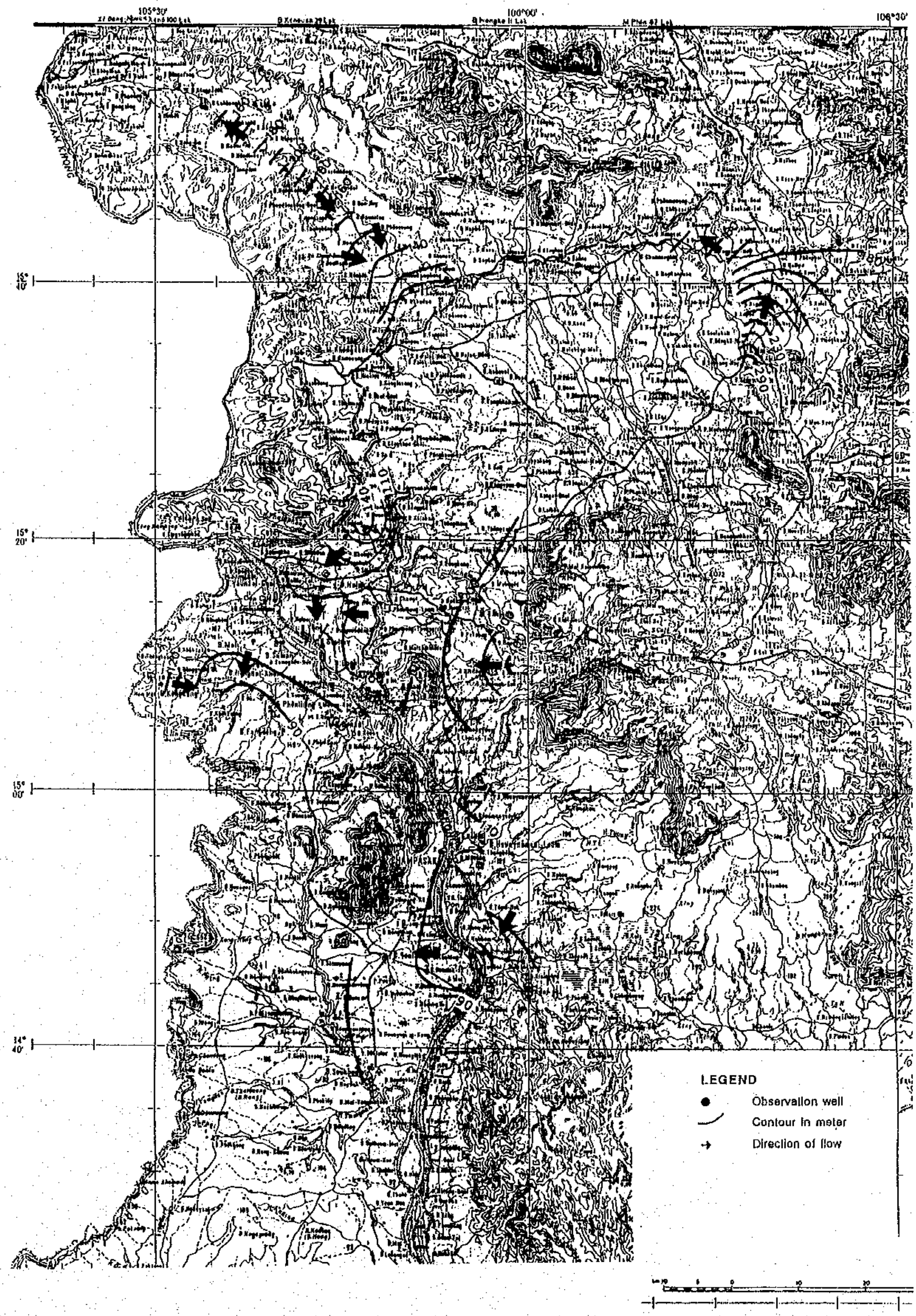

Figure 5.4.3 Groundwater Contour Map in the Dry Season, Jan. to Feb. in 1995

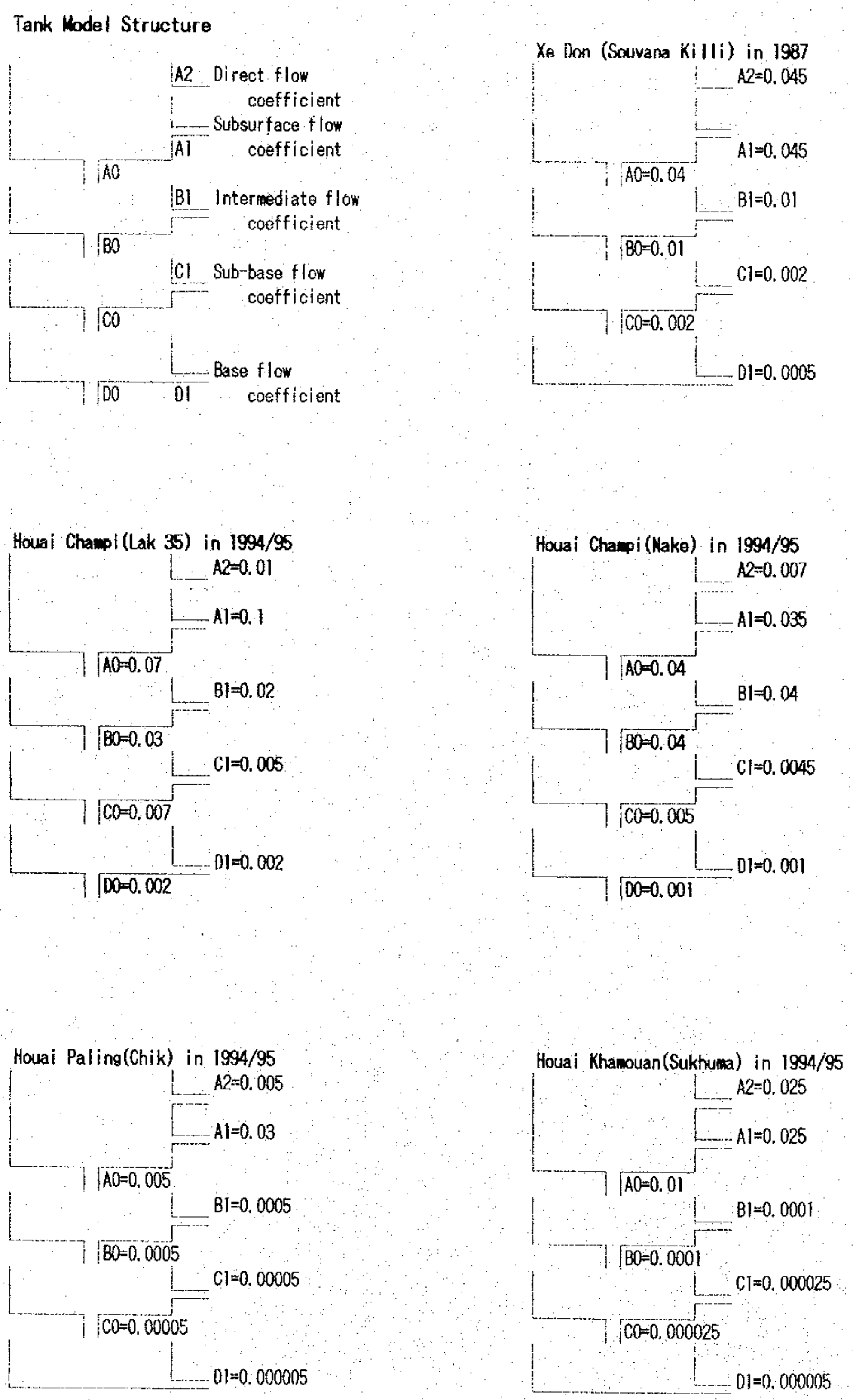

Figure 5.5.1 Identified Flow Coefficients of the Xe Don, Houay Champi, Phaling, Khamouan Dainage Basins

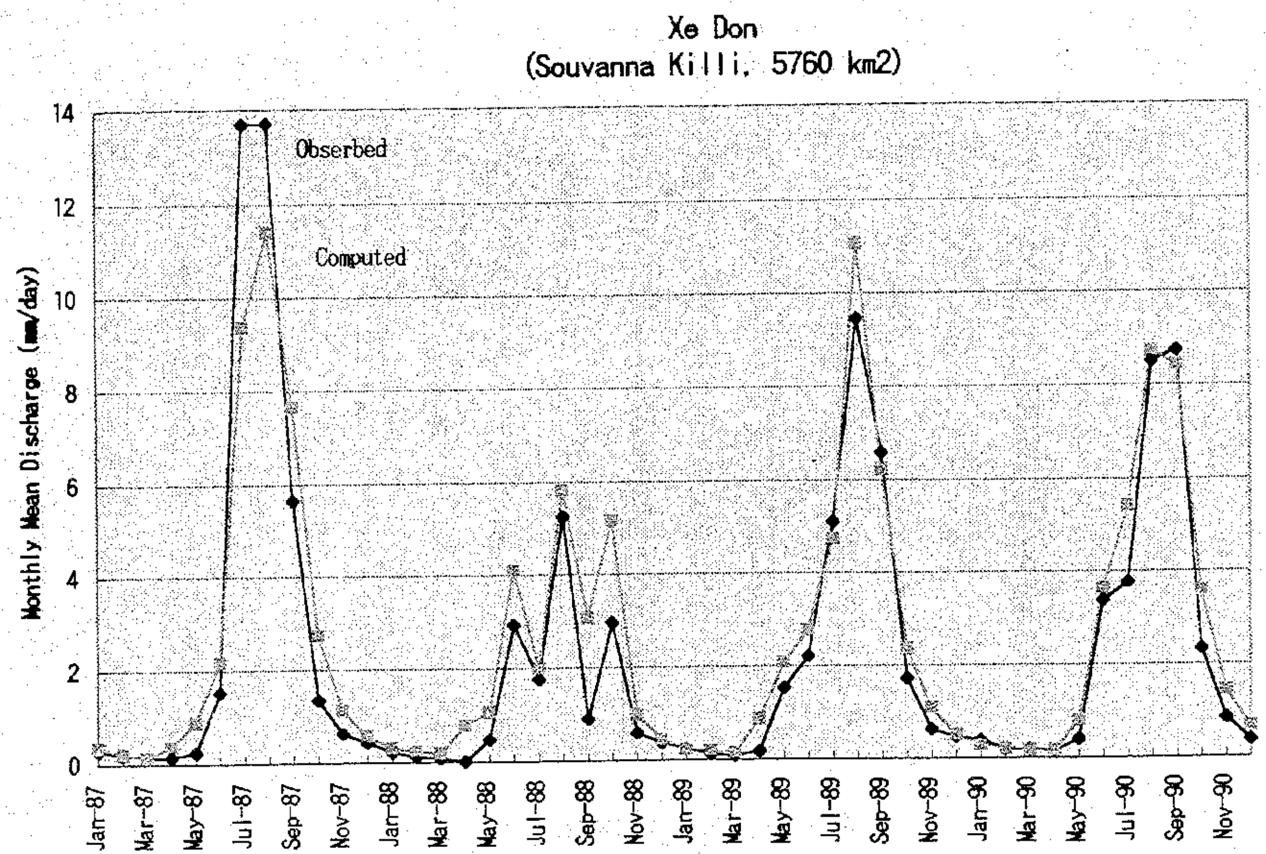

Figure 5.5.2 Comparison of Observed and Computed Discharges of the Xe Don River at Souvanna Killi

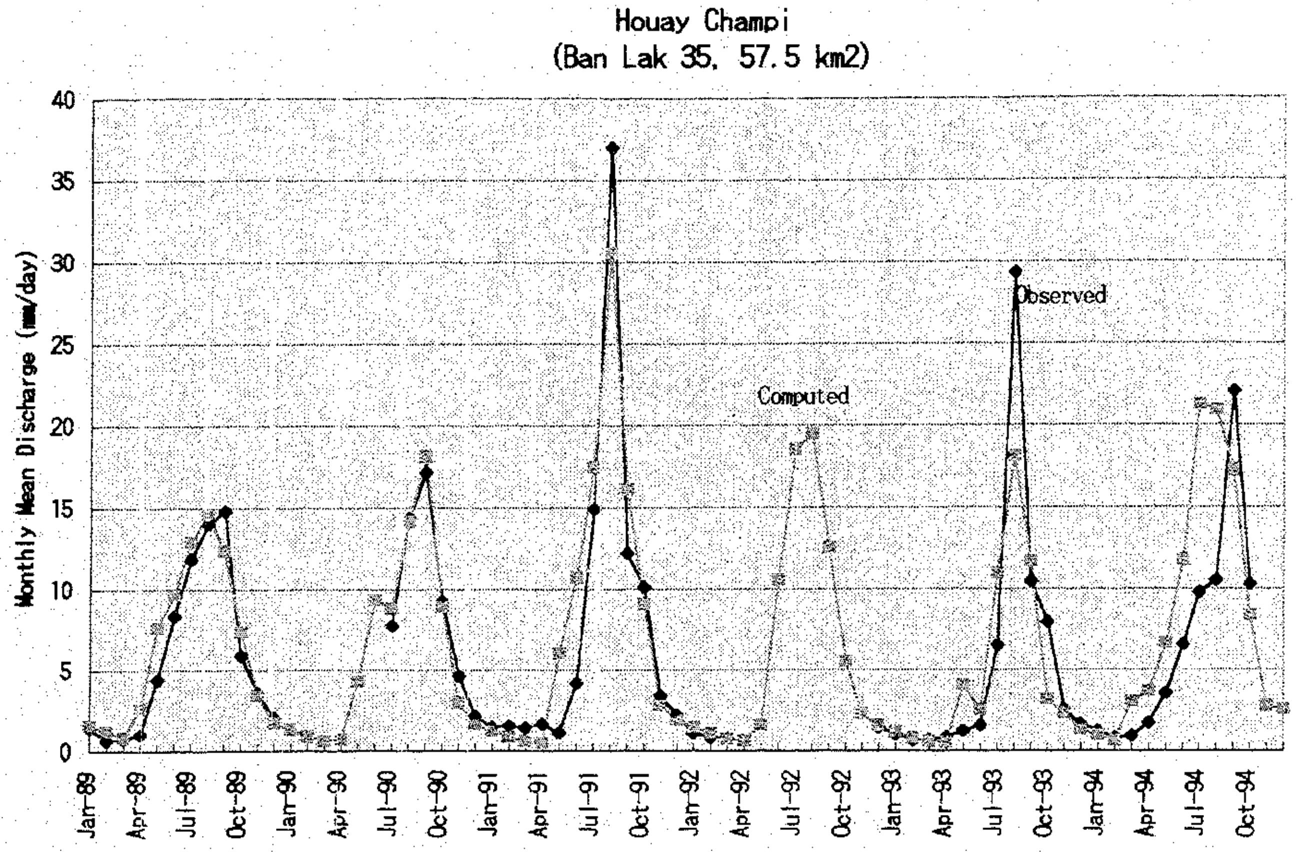

Figure 5.5.3 Comparison of observed and Computed Discharges of Houay Champi at Ban Lak 35

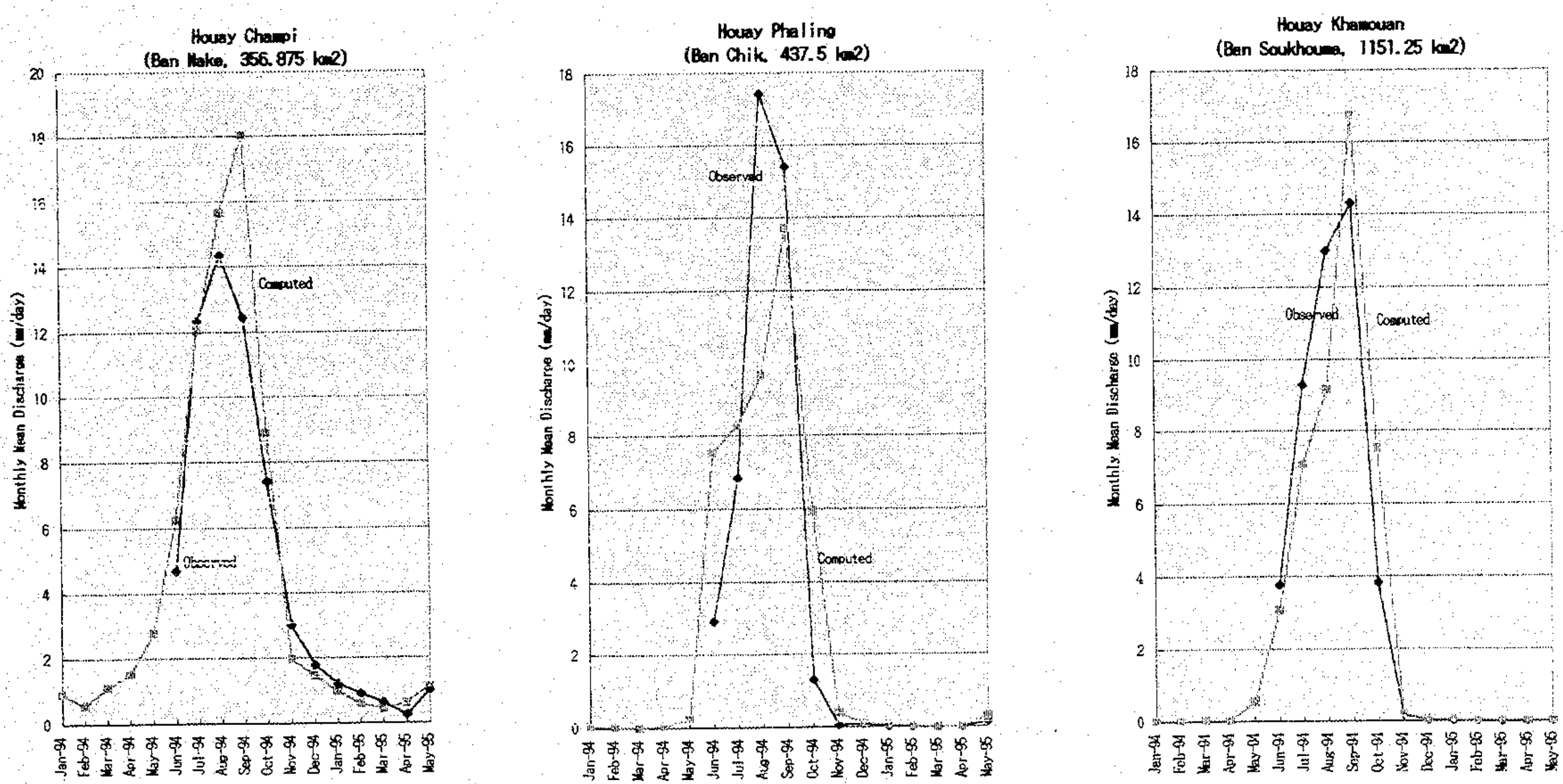

Figure 5.5.4 Comparison of Observed and Computed Discharges of Houay Champi at Ban Nake, Houay Phaling at Ban Chick and Houay Khamouan at Ban Sukhuma

CHAPTER 6 WATER QUALITY

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CHAPTER 6 WATER QUALITY

Groundwater and surface water constitute portions of the earth's water circulation system as the hydrological cycle. Groundwater dissolves parts of the soil and rocks as it infiltrates and percolates through them. The cations occurring in groundwater are commonly calcium, magnesium, sodium, iron, manganese, and potassium. The anions are mostly carbonate, hydrogen-carbonate(bicarbonate), sulfate, chloride, and nitrate.

6.1 Guidelines of water quality for various purposes

Whether water of a given quality is suitable for a particular purpose depends on the criteria or standards of acceptable quality for that use. Water standards or quality limits of water supplies for drinking, irrigation etc., apply to water.

6.1.1 Drinking use

The guidelines for drinking water most accepted are set out by the World Health Organization(1984) as shown in Tables 6.1.1 and 6.1.2. The basic requirements for drinking water are as follows;

- Free from disease causing microscopic organisms
- No compounds that affect human health
- Fairly clear (low turbidity and little color)
- Not saline
- No compounds that cause offensive taste or smell
- No compounds that cause corrosion of supply system
- No compounds that cause strain of clothes washed

It is practically impossible to establish rigid water standards for chemical quality. The permissible level for each ion may be a function of water availability and socio-economic factors.

6.1.2 Livestock use

No criteria exist for livestock use. In general, there is a wide range of ions, bacteria, and viruses affecting water quality.

A guideline of water quality for livestock use is shown in the following table.

Parameter	Threshold	Limit
TDS	2500	5000
Calcium (mg/l)	500	1000
Magnesium (mg/l)	250	500
Sodium (mg/l)	1000	2000
Hydrogen-carbonate (mg/l)	500	1500
Chloride (mg/l)	1500	3000
Fluoride (mg/l)	1	6
Nitrate (mg/l)	200	400
Sulfate (mg/l)	500	1000
pH	6.0-8.5	5.6-9.0

6.1.3 Irrigation

Good water for irrigation has the potential to allow maximum economic returns. In general, poor water causes soil and cropping problems that reduce yields. Water considered "unsuitable" under the prior concept of quality may really be "unable" under certain conditions. In fact, poor water is often better than no water.

Some guidelines on classification of irrigation water are shown in Tables 6.1.3 and 6.1.4 (FAO, 1980).

6.2 Sampling of water

The Mekong Secretariat of Lao has carried out water quality analysis bi-monthly at the following 2 dug wells in this Study area;

Location	District	Description
Ban Phonesikhay	Pakxe	Dug well with a hand pump
Ban Lak 15	Bachiang	Dug well

The chemical data analyzed by the Mekong Secretariat are compiled as shown in Table 6.2.1. However, the water quality analysis of groundwater has not been carried out in the central part of the Saravan Province, the right side of the Mekong River, the slope of the Bolaven Plateau, and the southern part of the Champasak Province. At the same time, the water quality analysis of surface water has been conducted for only one station, the Mekong River at Pakxe.

In this Study, additional water samplings for non-biological analysis were conducted three times from the viewpoints of geology, hydrology, and accessibility to the points as shown in Table 6.2.2. The following table shows itemization of water sampled.

Season	Dug well	Borehole	Spring	River	Pond	Total
Wet season, Apr to May in 1994	15	14	3	17	1	50
Dry season, Nov to Dec in 1994	21	7	1	1	-	30
Dry season, Jan to Feb in 1995	19	9	1	1	-	30
Feb in 1995, New boreholes	-	20	-	-	-	20

The water quality analysis for the water samples is entrusted to a private laboratory under the contract with the JICA Study Team.

The following table shows itemization of water sampled for biological analysis.

Season	Dug well	Borehole	Spring	River	Pond	Total
Wet season, Apr to May in 1994	10	11	2	8	1	32
Dry season, Jan to Feb in 1995	16	9	1	1	-	27
Feb in 1995, New boreholes	-	20	-	-	-	20

6.3 Result of Water Quality Analysis

6.3.1 Result in the wet season of 1994

(1) Non-biological chemistry

Table 6.3.1 shows chemical data analyzed at the 50 points. According to ion balance analysis, the accuracy of five(5) samples(No. 9, 29, 34, 37, and 43) is not satisfactory. Ion balance is calculated as follows; each ion value is converted to milli-equivalent/liter(meq/l) and the sum of all the converted cations is divided by the sum of the converted anions.

In comparison with the drinking water quality standards set by WHO, 3 chemical components(Fe, Mn and NO_3) have some problems. The concentration of iron(Fe) exceeds the WHO's guideline value of 0.3 mg/l regarding 64 % of 50 water sampled. At the guideline value of 0.3 mg/l, iron stains laundry and plumbing fixtures and causes an undesirable taste. The presence of iron may lead to deposits in pipes and at levels higher than 0.3 mg/l there may be increased maintenance costs.

The concentration of manganese(Mn) has no problem regarding surface water. The concentration of manganese(Mn) exceeds the WHO's guideline value of 0.1 mg/l regarding about 30 % of well water sampled. At levels higher than 0.15 mg/l, manganese in water supplies stains plumbing fixtures and laundry. In common with iron, its presence in drinking water may lead to the accumulation of deposits in the distribution systems. Even at a concentration of 0.05 mg/l, manganese will often form a coating on pipes that may slough off as a black precipitate.

The concentration of nitrate(NO_3) exceeds the WHO's guideline value of 10 mg/l regarding about 22 % of 50 water sampled. Nitrate is toxic when present in excessive amounts in drinking water.

Figure 6.3.1 shows a tri-linear diagram of water quality in the wet season. The water including groundwater and surface water is generally of a hydrogen-carbonate type in anions. The groundwater sampled from the boreholes is of a calcium type in cations. The groundwater sampled from the dug wells can not be classified regarding cations.

Figure 6.3.2 shows a Stiff diagram of water quality in the wet season. The groundwater sampled from the dug wells contains a very small amount of components and the Stiff diagram shows a vertical bar pattern. The groundwater sampled from the boreholes contains a large amount of hydrogen-carbonate in anions and calcium in cations and the Stiff diagram shows a block pattern.

(2) Biological chemistry
Numbers of coliforms and bacteria exceed 100,000 for 29 out of total water samples(32) regardless of river water and groundwater as shown in Table 6.3.2. These numbers are remarkably over the WHO's guideline values. The WHO's guideline values of coliforms and bacteria are recommended to be not detected except for the case of emergency.

6.3.2 Result in the dry season

(1) Non-biological chemistry
Tables 6.3.3 and 6.3.4 show chemical data analyzed at the 80 points for existing wells and new boreholes drilled by the JICA Study team. According to ion balance analysis, the accuracy of fourteen(14) samples(No. 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 47, 57, and 59) is not satisfactory.

In comparison with the drinking water quality standards set by WHO, 3 chemical components(Fe, Mn and NO_3) have some problems. The concentration of iron(Fe) exceeds the WHO's guideline value of 0.3 mg/l regarding about 41 % of 58 water sampled for existing wells. The Fe concentration of only 2 samples out of 20 new boreholes exceeds the WHO's guideline value.

The concentration of manganese(Mn) exceeds the WHO's guideline value of 0.1 mg/l regarding about 17 % of 58 water sampled for existing wells. The Mn concentration of 10 samples 20 new boreholes exceeds the WHO's guideline value.

The concentration of nitrate(NO_3) exceeds the WHO's guideline value of 10 mg/l regarding about 10 % of 58 water sampled for existing wells. There is no nitrate problem regarding 20 new boreholes.

Regarding the water sampled for new boreholes, the concentration of zinc(Zn) is larger in comparison with the water sampled for existing wells.

Figures 6.3.3 and 6.3.5 show tri-linear diagrams of water quality in the dry season. The water including groundwater and surface water is generally of a hydrogen-carbonate type in anions. The groundwater sampled from the boreholes is of a calcium type in cations. The groundwater sampled from the dug wells can not be classified regarding cations.

Figures 6.3.4 and 6.3.6 show Stiff diagrams of water quality in the dry season. The groundwater sampled from the dug wells contains a very small amount of components and the Stiff diagram shows a vertical bar pattern. The groundwater sampled from the boreholes contains a large amount of hydrogen-carbonate in anions and calcium in cations and the Stiff diagram shows a block pattern.

Figure 6.3.7 shows a tri-linear diagram of water quality for the new boreholes in the dry season. The groundwater sampled from the new boreholes is of hydrogen-carbonate type and can not classify regarding cations.

Figure 6.3.8 shows a Stiff diagram of water quality for the new boreholes. The groundwater sampled from the boreholes contains a large amount of hydrogen-carbonate in anions and calcium in cations and the Stiff diagram shows a block pattern. However, the amount of calcium in cations is not so larger in comparison with the existing boreholes. As the groundwater was sampled from the new boreholes right after the completion, various kinds of water are mixed and disperse distribution in cations of the Stiff diagram is considered to appear.

It is considered that the water quality of the groundwater sampled from dug wells changes through chemical reactions between rocks and water and shifts to that of the groundwater sampled from boreholes.

(2) Biological chemistry

Numbers of coliforms and bacteria do not exceed 100,000 for most of water samples regardless of river water and groundwater as shown in Table 6.3.5. The biological quality for water samples of existing wells and rivers is better in the dry season than in the wet season.

At the same time, biological chemistry is analyzed for water samples of twenty(20) boreholes drilled by the JICA Study team as shown in Table 6.3.6. The biological quality is remarkably better than the existing water sources sampled.

Table 6.1.1 Aesthetic Quality

Constituent	Unit	Guideline value	Remarks
Aluminum	mg/l	0.2	
Chloride	mg/l	250	
Chlorobenzenes and chlorophenols	--	no guideline value set	these compounds may affect taste and odour
colour	true colour units (TCU)	15	
copper	mg/l	1.0	
detergents	--	no guideline value set	there should not be any foaming or taste and odour problems
hardness	mg/l (as $CaCO_3$)	500	
hydrogen sulfide	--	not detectable by consumers	
iron	mg/l	0.3	
manganese	mg/l	0.1	
oxygen-dissolved	--	no guideline value set	
pH	--	6.5-8.5	
sodium	mg/l	200	
solids-total dissolved	mg/l	1000	
sulfate	mg/l	400	
taste and odour	--	inoffensive to most consumers	
temperature	--	no guideline value set	
turbidity	nephelometric turbidity units (NTU)	5	preferably <1 for disinfection efficiency
zinc	mg/l	5.0	

Source : WHO(1984)

Table 6.1.2 Inorganic Constituents of Health Significance

Constituent	Unit	Guideline value
arsenic	mg/l	0.05
asbestos	--	no guideline value set
barium	--	no guideline value set
beryllium	--	no guideline value set
cadmium	mg/l	0.005
chromium	mg/l	0.05
cyanide	mg/l	0.1
fluoride	mg/l	1.5
hardness	--	no health-related guideline value set
lead	mg/l	0.05
mercury	mg/l	0.001
nickel	--	no guideline value set
nitrate	mg/l (N)	10
nitrite	--	no guideline value set
selenium	mg/l	0.01
silver	--	no guideline value set
sodium	--	no guideline value set

* : natural or deliberately added; local or climatic conditions may necessitate adaptation
Source : WHO(1984)

Table 6.1.3 Guidelines for Interpretation of Water Quality for Irrigation

Irrigation problem	Degree of problem		
	No problem	Increasing problem	Severe problem
1. Salinity (affects crop water availability)			
ECw (mmhos/cm)	< 0.75	0.75 - 3.0	>3.0
2. Permeability (affects infiltration rate into soil)			
ECw (m S/cm)	> 0.5	0.5 - 0.2	< 0.2
Adj.SAR */ **/			
Montmorillonite (2:1 crystal lattice)	< 6	6 - 9 ***	> 9
Illite-Vermiculite (2:1 crystal lattice)	< 8	8 - 16 ***	> 16
Kaolinite-sesquioxides (1:1 crystal lattice)	< 16	16 - 24 ***	> 24
3. Specific ion toxicity (affects sensitive crops)			
Sodium ****/ *****/ (adj.SAR)	< 3	3 - 9	> 9
Chloride ****/ *****/ (meq/l)	< 4	4 - 10	> 10
Boron (mg/l)	< 0.75	0.75 - 2.0	> 2.0
4. Miscellaneous effects (affects susceptible crops)			
NO3-N (or NH4-N (mg/l)	< 5	5 - 30	> 30
HCO3 (meq/l) [overhead sprinkling]	< 1.5	1.5 - 8.5	> 8.5
pH	[Normal range 6.5 - 8.4]		

Source : FAO (1980)

* Adj.SAR means adjusted Sodium Adsorption Ratio and can be calculated using the procedure

** Values presented are for the dominant type of clay mineral in the soil since structural stability varies between the various clay types (Rallings, 1966, and Rhoades, 1975). Problems are less likely to develop if water salinity is high; more likely to develop if water salinity is low

*** Use the lower range if ECw < .4 mmhos/cm; Use the intermediate range if ECw = 0.4 - 1.6 mmhos/cm; Use upper limit if ECw > 1.6 mmhos/cm

**** Most tree crops and woody ornamentals are sensitive to sodium and chloride. Most annual crops are not sensitive (use the salinity tolerance tables).

***** With sprinkler irrigation on sensitive crops, sodium or chloride in excess of 3 meq/l under certain conditions has resulted in excessive leaf absorption and crop damage.

< means less than
> means more than

Table 6.1.4 Recommended Maximum Concentrations of Trace Elements in Irrigation

	Element	For waters used continuously on all soils [mg/l]	For use up to 20 years on fine textured soils of PH 6.0 to 8.5 [mg/l]
1.	Aluminum	5	20
2.	Arsenic	0.1	2
3.	Beryllium	0.1	0.5
4.	Boron	0.75	2
5.	Cadmium	0.01	0.05
6.	Chromium	0.1	1
7.	Cobalt	0.05	5
8.	Copper	0.2	5
9.	Fluoride	1	15
10.	Iron	5	20
11.	Lead	5	10
12.	Lithium	2.5**	2.5**
13.	Manganese	0.2	10
14.	Molybdenum	0.01	0.050**
15.	Nickel	0.2	2
16.	Selenium	0.02	0.02
17.	Tin**		
18.	Titanium***		
19.	Tungsten****		
20.	Vanadium	0.1	1
21.	Zinc	2	10

Source : FAO (1980)

* These levels will normally not adversely affect plants or soils.

** Recommended maximum concentration for irrigating citrus is 0.075 mg/l

*** See Water Quality Criteria, EPA Publication R.3-73-033, 1972, pp. 337-353, for a discussion of these elements.

**** For only fine textured soils or acid soils with relatively high iron oxide contents

Table 6.2.1 Water Quality Analysis by the Mekong Secretariat

Sampling location : Ban Phonesikhay

Date	SWL	pH	EC	Ca	Mg	Na	K	Alk	Cl	SO4	Fe	NO3	PO4	CO3	CO2	Mn	Si	TSS	THN	NCH	TDS
	(m)		mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
20-Jun-90	4.48	6.00	4.90	2.20	0.39	7.59	0.78	7.20	5.67	17.77	0.08	0.05	0.03	-	12.80	-	-	12.00	0.14	0.02	54.56
22-Aug-90	3.37	6.20	8.20	5.09	0.71	8.51	0.04	20.94	9.15	9.03	0.02	0.30	0.01	-	22.27	0.24	-	2.00	0.31	-	76.31
18-Oct-90	2.17	6.09	10.40	8.74	1.52	11.49	0.04	30.48	6.38	13.35	0.25	0.23	-	-	42.74	0.19	-	2.00	0.56	0.05	115.42
15-Dec-90	5.54	7.28	48.00	55.23	12.17	22.99	0.12	212.94	2.41	22.19	0.10	-	0.07	0.26	18.05	0.16	20.80	5.00	3.76	0.21	367.49
20-Feb-91	5.47	6.95	46.10	50.10	14.02	32.65	1.56	256.14	0.43	15.08	0.02	0.01	0.03	0.13	47.52	0.11	16.80	1.00	3.65	-	434.60
29-Apr-91	-	4.97	13.40	2.50	0.24	27.59	0.04	18.54	26.81	7.54	0.03	0.01	0.01	-	-	0.02	7.40	-	0.15	-	90.73
15-Jun-91	5.84	7.00	13.10	7.98	5.76	9.89	1.80	52.14	5.74	15.23	0.10	0.03	0.02	0.03	8.78	0.08	3.60	21.00	0.87	-	111.18
16-Aug-91	0.68	5.20	4.80	4.53	1.80	0.34	0.08	12.78	0.43	10.04	0.37	0.02	-	-	-	0.04	2.20	1.00	0.37	0.16	32.63
22-Oct-91	1.51	7.14	49.00	68.20	5.87	26.99	1.17	252.60	7.52	11.72	0.46	0.03	0.05	0.20	29.30	0.14	1.96	-	3.89	-	406.21
20-Dec-91	-	7.19	49.00	52.48	14.59	44.00	0.20	312.42	0.43	9.65	-	0.01	0.06	0.31	33.06	0.19	20.70	-	3.82	-	488.10
17-Feb-92	-	7.57	48.50	50.42	11.53	24.78	1.02	259.44	0.21	18.59	0.03	-	0.06	0.31	10.90	0.30	21.30	-	3.46	-	398.89
21-Apr-92	-	7.11	48.70	64.37	12.44	2.67	0.98	255.54	4.36	11.67	0.14	0.02	0.03		32.53	0.09	21.90	2.00	4.24	-	406.74

SWL : Static Water Level

Sampling location : Ban Lak 15

Date	SWL	pH	EC	Ca	Mg	Na	K	Alk	Cl	SO4	Fe	NO3	PO4	CO3	CO2	Mn	Si	TSS	THN	NCH	TDS
	(m)		mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
16-Aug-91	0.37	7.01	56.20	64.65	25.86	1.33	0.31	275.04	0.60	48.51	0.21	0.01	0.03	0.17	44.09	0.16	18.10	36.00	5.35	0.77	479.07
22-Oct-91	0.43	7.08	9.10	17.33	0.43	0.53	0.12	37.20	1.17	12.01	0.24	0.01	0.01	0.02	6.26	0.06	15.51	-	0.90	0.28	90.90
20-Dec-91	0.50	7.47	0.70	0.60	0.17	0.64	0.04	1.20	0.25	1.44	-	0.01	0.02	-	0.11	0.04	2.00	-	0.04	0.01	6.52
17-Feb-92	-	5.80	1.50	2.53	0.05	0.41	0.08	0.90	1.81	4.27	0.21	0.01	-	-	-	0.03	2.30	-	0.13	-	12.61
21-Apr-92	0.80	5.75	2.20	2.32	1.06	0.62	0.23	8.64	1.56	1.54	0.17	0.01	-	-	-	0.02	2.00	1.00	0.20	0.06	18.17

SWL : Static Water Level

Table 6.2.2 (1/3) Water Samplings for Non-biological Chemistry in the Wet Season, June in 1994

No	Code	District	Village	Water sampled	Type of facilit	Date sampled
1	C-2	Sanasomboun	Ban Phonthat	Borehole	Dempster HP	94/06/09
2	C-8	Sanasomboun	Ban Houaxe	Xe Don	River	94/06/09
3	C-12	Sanasomboun	Ban Nangkham	Borehole	Dempster HP	94/06/09
4	C-27	Sanasomboun	Ban Dongkalong	Dug well		94/06/09
5	C-30	Sanasomboun	Ban Thangbengsivilai	Borehole	Motor pump	94/06/09
6	C-38	Bachiang	Ban Bachiang	Dug well	Tara HP	94/06/08
7	C-38	Bachiang	Ban Bachiang	H. Champi	River	94/06/09
8	C-42	Bachiang	Ban Thongkim	H. Palai	River	94/06/08
9	C-47	Bachiang	Ban Oudomsouk	Dug well		94/06/08
10	C-52	Pathoumphon	Ban Lak-25	Spring		94/06/21
11	C-62	Pathoumphon	Ban Lak-19	Dug well		94/06/05
12	C-65	Pathoumphon	Ban Lak-24	H. Bangliang	River	94/06/21
13	C-71	Pathoumphon	Ban Tomo-Nak	Dug well		94/06/21
14	C-74	Pathoumphon	Ban Thangbeng	Dug well		94/06/21
15	C-89	Khong	Ban Nasenphan	Dug well		94/06/20
16	C-94	Khong	Ban Hatxaykhoun	Nam Khong	River	94/06/20
17	C-94	Khong	Ban Hatxaykhoun	Borehole	India Mark III	94/06/20
18	C-98	Khong	Ban Khinak Wat	Dug well		94/06/20
19	C-100	Khong	Ban Tapusy	Dug well		94/06/20
20		Pakxe	Ban Houaxe(Lak 8)	Dug well		94/06/05
21		Champasak	Ban Phanthakham Wat	Dug well		94/06/05
22		Champasak	Ban Phabhin	Nam Khong	River	94/06/05
23		Champasak	Ban Mai	Dug well		94/06/05
24		Sukhuma	Ban Sukhuma	Dug well		94/06/05
25		Sukhuma	Ban Sukhuma	H. Khamouang	River	94/06/19
26		Phonthong	Ban Nonghai	Borehole		94/06/19
27		Phonthong	Ban Donggnang	Dug well		94/06/19
28		Pakxe	Pakse	Waterworks	Faucet	94/06/22
29		Pakxe	Pakse	Waterworks	River	94/06/21
30	S-5	Lakhounepheng	Ban Lakhonsi-Tai	Borehole	India Mark III	94/06/02
31	S-5	Lakhounepheng	Ban Phengnai	Dug well		94/06/02
32	S-9	Lakhounepheng	Ban Nondinxay	Borehole	India Mark III	94/06/02
33	S-16	Lakhounepheng	Ban Houaykhen	Borehole	Lucky HP	94/06/09
34	S-20	Khongxedon	Ban Khong-Noy	Xe Don	River	94/06/07
35	S-28	Khongxedon	Ban Namouang	Borehole	India Mark III	94/06/03
36	S-36	Khongxedon	Ban Nakadao	Borehole	India Mark III	94/06/02
37	S-38	Khongxedon	Ban Kouttabeng	H. Zuak	River	94/06/02
38	S-44	Vapi	Ban Vapy-Tai	Xe Don	River	94/06/08
39	S-51	Vapi	Ban Khoumta-Lat	Dug well		94/06/08
40	S-54	Saravan	Ban Nongsai	Xe Set	River	94/06/23
41	S-56	Saravan	Ban Chong	Dug well		94/06/08
42	S-66	Saravan	Ban Nadonkhoang	Borehole		94/06/08
43	S-75	Saravan	Ban Nakasao	Pond		94/06/08
44	S-80	Saravan	Ban Naxai-Gnai	Borehole	Lucky HP	94/06/08
45	S-80	Saravan	Ban Naxai-Noy	Spring		94/06/09
46	S-84	Saravan	Ban Beng	H. Than	River	94/06/08
47	S-90	Laongam	Ban Kiangtat	Xe Set	River	94/06/08
48	S-97	Laongam	Ban Laongam	Waterworks	Faucet	94/06/08
49		Saravan	Salavan	Waterworks	River	94/06/16
50		Saravan	Salavan	Waterworks	Faucet	94/06/16

Table 6.2.2 (2/3) Water Samplings for Non-biological Chemistry in the Dry Season

No	Code no	District	Village	Water sampled	Date sampled
1	C-7	Sanasomboun	Nongdou	Dug well	94/11/28
2	C-27	Sanasomboun	Dongkalong	Dug well	94/11/28
3	C-30	Sanasomboun	Thangbengsivilai	Dug well	94/11/28
4	C-38	Bachiang	Bachiang	Dug well	94/11/29
5	C-38	Bachiang	Bachiang	H. Champi	94/11/29
6	C-47	Bachiang	Oudomsouk	Dug well	94/11/29
7	S-54	Saravan	Nongsai	Dug well	94/11/30
8	S-66	Saravan	Nadonkhoang	Borehole	94/11/30
9	S-81	Saravan	Naxai-Noy	Dug well	94/11/30
10	C-52	Bachiang	Lak-25	Spring	94/12/10
11		Pakse	Houaxe	Dug well	94/12/01
12	S-5	Lakhonepheng	Phengnai	Dug well	94/12/03
13		Lakhonepheng	Lak-94	Dug well	94/12/03
14	S-14	Lakhonepheng	Thangbeng	Dug well	94/12/03
15	S-28	Khongxedon	Namouang	Borehole	94/12/03
16	S-36	Lakhonepheng	Nakadao	Borehole	94/12/03
17		Champasak	Phanthakham	Dug well	94/12/05
18		Champasak	Mai	Dug well	94/12/05
19		Sukhuma	Sukhuma	Dug well	94/12/05
20		Phonthong	Nonghai	Borehole	94/12/06
21		Phonthong	Donggnang	Dug well	94/12/06
22		Phonthong	Nachan	Borehole	94/12/06
23	C-62	Pathoumphon	Pathoumphone	Dug well	94/12/09
24	C-73	Pathoumphon	Nakam-Noy	Dug well	94/12/09
25	C-74	Pathoumphon	Thangbeng	Dug well	94/12/09
26	C-89	Khong	Nasenphan	Dug well	94/12/08
27	C-94	Khong	Hatxaykhoun	Borehole	94/12/08
28	C-100	Khong	Tapusy	Dug well	94/12/08
29	C-12	Sanasomboun	Nangkam	Dug well	94/12/07
30	C-12	Pakxe	Dongkalong	Dug well	94/12/07
31	S-25	Khongxedon	Hinxiou	Borehole	95/01/25
32	C-24	Sanasomboun	Boungkha	Borehole	95/01/25
33	C-30	Sanasomboun	Thangbengsivilai	Dug well	95/01/25
34	C-38	Bachiang	Bachiang	Dug well	95/01/27
35		Bachiang	Nake	H. Champi	95/01/27
36	C-47	Bachiang	Oudomsouk	Dug well	95/01/27
37	S-54	Saravan	Nongsai	Dug well	95/01/23
38	S-66	Saravan	Nadonkhoang	Borehole	95/01/23
39	S-81	Saravan	Naxai-Noy	Dug well	95/01/23
40	C-52	Bachiang	Lak-25	Spring	95/01/27
41		Pakxe	Houaxe	Dug well	95/01/31
42	S-5	Lakhonepheng	Phengnai	Dug well	95/01/23
43		Lakhonepheng	Lak-94	Dug well	95/01/23
44	S-14	Lakhonepheng	Thangbeng	Dug well	95/01/23
45		Khongxedon	Namouang	Borehole	95/01/25
46	S-36	Khongxedon	Koumkeo	Dug well	95/01/23
47	C-78	Champasak	Bak	Dug well	95/01/24
48		Champasak	Dontalat	Borehole	95/01/24
49		Sukhuma	Sukhuma	Dug well	95/01/24
50		Phonthong	Nonghai	Borehole	95/02/03
51		Phonthong	Nonkoun	Borehole	95/01/28
52		Phonthong	Nachan	Borehole	95/02/03
53	C-67	Pathoumphon	Lak 29	Dug well	95/01/31
54	C-71	Pathoumphon	Tomo-Nok	Dug well	95/01/31
55	C-74	Pathoumphon	Thangbeng	Dug well	95/01/31
56	C-98	Khong	Kinak	Dug well	95/01/30
57	C-10	Sanasoumboun	Don	Dug well	95/01/31
58	C-100	Khong	Taposy	Dug well	95/01/30
59	C-12	Sanasoumboun	Nangkam	Dug well	95/01/25
60		Pakxe	Dongkalong	Dug well	95/01/25

Table 6.2.2 (3/3) Water Sampligs for Non-biological Analysis for the New Boreholes, Feb. in 1995

No.	Code no.	District	Village	Water sampled	Date sampled
1	C-4	Sanasomboun	Nongphai	Borehole	1-Feb-95
2	C-16	Sanasomboun	Louy	Borehole	1-Feb-95
3	C-44	Bachiang	Thongsala	Borehole	1-Feb-95
4	C-49	Bachiang	Lak 21	Borehole	28-Jan-95
5	S-24	Khongxedon	Donmuang	Borehole	1-Feb-95
6	S-38	Khongxedon	Nongngong	Borehole	1-Feb-95
7	S-50	Vapi	Samia	Borehole	1-Feb-95
8	S-56	Saravan	Chong	Borehole	1-Feb-95
9	S-64	Saravan	Phonphai	Borehole	1-Feb-95
10	S-75	Saravan	Nakasao	Borehole	1-Feb-95
11	S-100	Laongam	Houn-Tai	Borehole	1-Feb-95
12	C-8	Sanasomboun	Houaxe	Borehole	17-Feb-95
13	C-65	Pathoumphon	Lak 24	Borehole	18-Feb-95
14	C-75	Pathoumphon	Nongke	Borehole	20-Feb-95
15	C-79	Pathoumphon	Samkhanaboua	Borehole	18-Feb-95
16	C-88	Khong	Maisivilai	Borehole	20-Feb-95
17	C-89	Khong	Nasenphan	Borehole	20-Feb-95
18	S-4	Lakhonepheng	Houay Kapho	Borehole	21-Feb-95
19	S-12	Lakhonepheng	Nongsano	Borehole	21-Feb-95
20	S-84	Saravan	Beng	Borehole	20-Feb-95

Table 6.3.1 Summary of Water Quality Analysis in the Wet Season, June in 1994

Unit : mg/l

No.	Village	Sampled	pH	Temp C	E. C. uS/cm	Ca	Mg	Na	K	Fe	Mn	Cu	Zn	Pb	Cl	SO4	HCO3	NO3	NO2	F	PO4	NH4	I	Total Hard	SiO2	TDS	Ion Balance	Date Sampled
1	Phonthat	Borehole	7.1	24.8	645	100	7.3	39	1.6	*0.31	*0.49	0.02	0.21	0.01	9.6	9.0	425	3.5	0.02	0.3	0.5	0.02	0.008	290	32	413	0.98	94/06/09
2	Houaxe	Xe Don		24.7	82	6.4	3.1	2	3.1	*8.90	0.00	0.01	0.07	0.01	5.2	5.0	24	*14	0.21	0.1	1.4	0.10	0.001	29	7.3	60	1.22	94/06/09
3	Nangkham	Borehole		24.9	542	95	8	14	2.3	*0.50	0.06	0.03	0.06	0.00	11	4.0	344	*32	0.01	0.2	2.7	0.37	0.006	270	45	384	0.93	94/06/09
4	Dongkhalong	Dug well		24.8	27	0.8	1.5	2	1.6	*0.41	0.05	0.01	0.89	0.01	7.6	3.0	0	*11	0.00	0.1	1.0	0.12	0.000	8	2.7	33	0.68	94/06/09
5	Thangbengsivilai	Borehole	7.4	24.7	568	78	13	35	2	0.16	0.00	0.00	0.01	0.01	11	5.0	377	*17	0.30	0.1	1.6	0.18	0.006	250	2.6	352	0.95	94/06/09
6	Bachiang	Dug well		24.9	182	34	0.5	9	2	0.17	0.00	0.02	0.07	0.00	11	5.0	112	5.8	0.03	0	0.9	0.18	0.001	86	26	150	0.93	94/06/08
7	Bachiang	H. Champi		24.8	64	2.4	3.5	5	1.6	0.04	0.00	0.00	0.90	0.00	3.2	3.0	30	0	0.01	0	0.0	0.00	0.001	20	8	42	1.04	94/06/09
8	Thongkim	H. Palai		24.9	101	5	5.9	7	2.3	*1.80	0.03	0.01	0.07	0.01	2.8	2.0	52	1.5	0.06	0	0.2	0.00	0.000	37	19	71	1.17	94/06/08
9	Oudomsouk	Dug well		24.8	133	15	1	12	0.8	*73.00	*1.30	0.00	0.56	0.00	15	3.0	63	0.1	0.01	0	0.0	0.00	0.001	41	7.1	87	2.66	94/06/08
10	Lak 25(Pakxong)	Spring	6.8	25.2	100	9.8	3.8	5	0.8	0.20	0.00	0.01	0.03	0.00	4	1.0	46	0.9	0.02	0	0.0	0.00	0.002	40	13	61	1.16	94/06/21
11	Lak 19	Dug well		24.8	70	3.8	1.6	9	0	0.20	0.00	0.00	0.02	0.00	8.8	3.0	20	2.8	0.04	0	0.4	0.00	0.004	16	4.3	44	1.05	94/06/05
12	Lak 24	H. Bangliang	6.8	25.4	46	1.8	3.1	2	1.2	*0.44	0.00	0.02	0.04	0.00	4	1.0	18	0.8	0.03	0	0.0	0.00	0.003	17	4.8	28	1.09	94/06/21
13	Tomo-Nak	Dug well	7.1	25.0	52	4.5	0.7	7	1.6	0.11	0.00	0.00	0.10	0.01	6	2.0	17	*11	0.03	0	0.8	0.12	0.000	14	5.1	47	0.95	94/06/21
14	Thangbeng	Dug well	6.4	25.2	239	19	10	16	2	0.10	0.00	0.00	0.06	0.00	16	6.0	65	*58	0.04	0	4.2	0.18	0.005	89	21	185	0.98	94/06/21
15	Nasenphan	Dug well	6.3	25.2	102	4	5	7	0.4	*1.20	0.02	0.02	0.07	0.00	8	2.0	31	*15	0.04	0	1.1	0.14	0.006	30	6.5	66	0.95	94/06/20
16	Hatxaykhoun	Mekong	7.5	25.2	138	18	3.9	7	0.8	*5.80	0.02	0.01	0.05	0.00	7.2	8.0	68	1.9	0.08	0.1	0.2	0.00	0.006	61	7.5	88	1.16	94/06/20
17	Hatxaykhoun	Borehole	7.2	25.4	735	100	4.5	64	0.8	0.23	0.01	0.02	0.83	0.01	14	7.0	483	4.7	0.03	0.4	0.3	0.09	0.025	280	39	474	1.00	94/06/20
18	Khinak Wat	Dug well	6.9	25.2	80	8.6	3.1	7	0	*0.39	0.00	0.01	0.10	0.00	9.6	2.0	36	3.6	0.03	0.1	0.1	0.03	0.000	34	11	63	1.04	94/06/20
19	Tapusy	Dug well	7.6	25.1	546	69	7.4	48	0.4	*0.52	0.00	0.02	0.07	0.00	23	10.0	318	0.7	0.05	0.3	0.0	0.00	0.014	200	19	335	1.02	94/06/20
20	Houaxe(Lak 8)	Dug well		24.9	78	2.6	1.9	12	0	*2.00	0.04	0.00	0.11	0.00	12	3.0	20	3.4	0.13	0	0.7	0.00	0.003	14	7.2	53	1.12	94/06/05
21	Phanthakham Wat	Dug well		24.8	70	5.1	0.4	9	0	*0.88	0.02	0.00	0.07	0.00	8.8	3.0	24	1.4	0.02	0.1	0.2	0.00	0.003	14	6.4	47	0.98	94/06/05
22	Phabhin	Me Khong		24.9	202	31	3.2	12	0.8	*6.30	0.00	0.00	0.01	0.00	20	17.0	87	1.3	0.11	0.1	0.1	0.00	0.003	91	7.2	136	1.09	94/06/05
23	Mai Champasak	Dug well		24.7	66	0.8	3	9	0	0.15	0.06	0.00	2.70	0.00	14	2.0	8	4.9	0.05	0	0.6	0.05	0.002	14	4.3	46	1.06	94/06/05
24	Sukhuma	Dug well		24.9	290	8.6	2.6	37	9.8	0.08	*0.16	0.00	0.23	0.00	65	3.0	6	*39	0.03	0.1	1.8	0.20	0.012	32	10	180	0.96	94/06/05
25	Sukhuma	H. Khamouan	8.1	25.1	81	16	0.1	2	2.3	*7.50	0.04	0.01	0.12	0.00	3.2	4.0	53	2	0.13	0.4	0.1	0.00	0.001	40	3.9	61	1.14	94/06/19
26	Nonghai	Borehole	7.6	25.1	754	100	4	62	0	*2.30	*0.19	0.01	0.28	0.00	34	110	315	0.5	0.02	0.1	0.0	0.00	0.034	270	26	492	0.96	94/06/19
27	Dongnang	Dug well	5.4	25.3	37	1.4	2	5	0.8	*1.40	0.06	0.02	0.34	0.01	5.2	3.0	11	6.7	0.06	0	0.1	0.00	0.000	12	4.8	35	1.06	94/06/19
28	Pakxe(Waterworks)	Faucet	6.9	25.2	84	13	1.6	5	1.2	0.18	0.00	0.01	0.07	0.00	3.2	16.0	32	1.5	0.02	0	0.2	0.00	0.000	39	4.3	61	1.07	94/06/22
29	Pakxe(Waterworks)	Mekong	7.1	25.3	49	4.5	1.6	7	3.9	*13.00	0.02	0.03	0.07	0.02	4	4.0	26	2	0.17	0.1	0.0	0.01	0.000	18	5.1	45	1.88	94/06/21
30	Lakhonsi-Tai	Borehole		24.6	644	82	13	46	0	0.29	*0.85	0.00	0.25	0.00	18	4.0	433	0	0.03	0.1	0.1	0.02	0.013	260	29	405	0.94	94/06/02
31	Phengnai	Dug well		24.7	248	16	2.3	28	5.1	*0.32	0.01	0.00	0.01	0.00	33	5.0	57	*37	0.05	0.1	0.0	0.05	0.005	49	13	168	0.92	94/06/02
32	Nondinxay	Borehole		24.8	760	110	7.3	51	0	0.13	0.06	0.01	0.02	0.01	66	4.0	391	2.8	0.04	0.1	0.2	0.01	0.023	300	26	460	0.99	94/06/02
33	Houaykhen	Borehole	7.1	24.9	539	79	7.2	37	2	0.16	0.00	0.00	0.00	0.01	14	4.0	352	*19	0.01	0.1	1.2	0.06	0.002	230	29	366	0.95	94/06/09
34	Khong-Noy	Xe don		24.7	36	3.4	2.6	5	0	*11.00	0.03	0.00	0.13	0.01	6.4	5.0	19	0	0.05	0.1	0.0	0.00	0.000	19	2.7	34	1.67	94/06/07
35	Namouang	Borehole		24.9	766	92	8.5	76	0	0.20	*0.26	0.00	0.10	0.01	26	11.0	477	4.6	0.09	0.4	0.0	0.00	0.036	270	29	483	0.97	94/06/03
36	Nakadao	Borehole		24.7	665	100	7.2	44	0	0.18	0.00	0.01	0.00	0.00	15	4.0	433	0.4	0.05	0.2	0.0	0.00	0.010	280	26	415	0.97	94/06/02
37	Kouttabeng	H. Zuak		24.8	52	3	0.3	7	1.2	*8.00	0.03	0.02	0.06	0.05	7.2	4.0	16	0	0.07	0.1	0.0	0.00	0.000	9	2.7	34	1.45	94/06/02
38	Vapy-Tai	Xe Don		24.7	96	7.2	2.1	9	2	*6.40	0.01	0.02	0.07	0.01	8.4	5.0	37	0.4	0.06	0.1	0.0	0.00	0.000	27	6.4	59	1.26	94/06/08
39	Khoumta-Lat	Dug well		24.7	146	12	8.1	2	0.4	*2.00	0.02	0.01	0.04	0.01	2.8	2.0	84	0.7	0.03	0.1	0.0	0.00	0.000	63	64	134	0.95	94/06/08
40	Nongsai	Xe Set	7.0	25.4	73	4	4	7	1.2	*4.00	0.00	0.02	0.04	0.01	2.4	2.0	38	1.7	0.11	0	0.0	0.01	0.002	26	13	54	1.33	94/06/23
41	Chong	Dug well		24.8	200	14	11	14	0	*1.80	0.00	0.02	0.07	0.01	13	7.0	89	*16	0.05	0.1	1.8	0.26	0.001	80	48	169	1.02	94/06/08
42	Nadonkhoang	Borehole		24.9	561	77	0.5	60	0	*0.72	0.00	0.02	0.00	0.01	25	5.0	341	0.3	0.20	0.1	0.0	0.00	0.013	190	32	368	1.02	94/06/08
43	Nakasao	Pond		24.9	181	5.6	1.9	41	26	*138.00	*0.18	0.04	0.32	0.10	16	17.0	87	0	0.82	0.2	0.0	0.00	0.000	22	1.9	156	3.53	94/06/08
44	Naxai-Gnai	Borehole		24.7	697	44	81	35	1.6	*3.00	*0.21	0.00	0.26	0.00	53	29.0	511	0.2	0.01	0	0.0	0.00	0.011	440	45	541	1.01	94/06/08
45	Naxai-Noy	Spring		24.9	177	21	14	12	1.2	0.17	0.01	0.01	0.04	0.00	7.2	4.0	145	3.1	0.05	0.1	0.3	0.08	0.007	110	64	199	1.02	94/06/09
46	Beng	H. Than		24.7	96	6.6	4.1	7	0.8	*1.00	0.00	0.01	1.60	0.00	6.4	4.0	46	0.1	0.09	0.1	0.0	0.00	0.001	33	16	69	1.01	94/06/08
47	Kiangtal	Xe Set		24.9	85	5	3.4	7	0	*0.45	0.01	0.00	0.39	0.02	5.6	3.0	41	0.2	0.02	0	0.0	0.00	0.002	26	22	67	0.95	94/06/08
48	Laongam(Waterworks)	Spring		24.8	173	16	9.5	14	2	0.27	0.02	0.00	0.18	0.00	7.2	3.0	115	2.6	0.00	0	0.0	0.00	0.001	78	45	156	1.03	94/06/08
49	Saravan(Waterworks)	Xe Don	6.8	25.2	62	6.3	1.7	2	2	*2.00	0.05	0.02	0.07	0.00	3.2	4.0	41	1.2	0.07	0.1	0.0	0.01	0.001	28	8	49	0.77	94/06/16
50	Saravan(Waterworks)	Faucet	6.7	25.0	63	5.6	3.1	2	1.6	*3.20	0.04	0.02	0.13	0.00	1.6	9.0	29	1.1	0.07	0.1	0.0	0.00	0.001	27	6.4	45	1.07	94/06/16

* : more than WHO's Guideline value for drinking water

Table 6.3.2 Biological Analysis in the Wet Season, Apr. to May In 1994

Code	Village	Water	Coliforms	Bacteria	Handpump
C-2	Ban Phonthat	Borehole	Innumerable	Innumerable	Dempster HP
C-8	Ban Houaxe	Xe Don	Innumerable	Innumerable	River
C-12	Ban Nangkham	Borehole	85000	85000	Dempster HP
C-27	Ban Dongkalong	Dug well	Innumerable	Innumerable	
C-30	Ban Thangbengsivilai	Borehole	Innumerable	Innumerable	Motor pump
C-38	Ban Bachiang	Dug well	Innumerable	Innumerable	Tara HP
C-38	Ban Bachiang	H. Champi	Innumerable	Innumerable	River
C-42	Ban Thongkim	H. Palai	Innumerable	Innumerable	River
C-47	Ban Oudomsouk	Dug well	Innumerable	Innumerable	
C-62	Ban Lak-19	Dug well	Innumerable	Innumerable	
	Ban Houaxe(Lak 8, Pakse)	Dug well	Innumerable	Innumerable	
	Ban Phanthakham Wat	Dug well	Innumerable	Innumerable	
	Ban Phabhin(Champasak)	Nam Khong	Innumerable	Innumerable	River
	Ban Mai(Champasak)	Dug well	Innumerable	Innumerable	
	Ban Soukhouma	Dug well	Innumerable	Innumerable	
S-5	Ban Lakhonsi-Tai	Borehole	Innumerable	Innumerable	India Mark III
S-5	Ban Phengnai(Lakhonsi-Tai)	Dug well	60000	40000	
S-9	Ban Nondinxay	Borehole	Innumerable	Innumerable	India Mark III
S-16	Ban Houaykhen	Borehole	Innumerable	Innumerable	Lucky HP
S-28	Ban Namouang	Borehole	1000	10000	India Mark III
S-36	Ban Nakadao	Borehole	Innumerable	Innumerable	India Mark III
S-38	Ban Kouttabeng	H. Zuak	Innumerable	Innumerable	River
S-51	Ban Khoumta-Lat	Dug well	Innumerable	Innumerable	
S-54	Ban Nongsai	Xe Set	Innumerable	Innumerable	River
S-56	Ban Chong	Dug well	Innumerable	Innumerable	
S-66	Ban Nadonkhouang	Borehole	Innumerable	Innumerable	
S-75	Ban Nakasao	Pond	Innumerable	Innumerable	
S-80	Ban Naxai-Gnai	Borehole	Innumerable	Innumerable	Lucky HP
S-80	Ban Naxai-Noy	Spring	Innumerable	Innumerable	
S-84	Ban Beng	H. Than	Innumerable	Innumerable	River
S-90	Ban Kiangtat	Xe Set	Innumerable	Innumerable	River
S-97	Ban Laongam	Waterworks	Innumerable	Innumerable	Faucet

Innumerable : more than 100,000

Unit in number/ml

Table 6.3.3 (1/2) Summary of Water Quality Analysis in the Dry Season, Nov. to Dec. in 1994

Unit : mg/l

No.	Village	Sampled	pH	Temp C	E. C. uS/cm	Ca	Mg	Na	K	Fe	Mn	Cu	Zn	Pb	Cl	SO4	HCO3	NO3	NO2	F	PO4	NH4	I	Total Hard	SiO2	TDS	Ion Balance	Date Sampled
1	Nongdou	Dug well	6.3	26.5	98	11.0	0.4	8.5	0.4	0.28	0.00	0.01	0.04	0.00	2.0	4.0	37	0.0	0.09	0.1	0.0	0.02	0.00	29	12.0	66	1.303	94/11/28
2	Dongkalong	Dug well	4.7	27.7	37	1.9	0.0	4.6	1.6	0.30	0.00	0.03	0.12	0.00	3.2	3.0	3	10.0	0.17	0.1	0.8	0.10	0.00	5	9.9	25	0.957	94/11/28
3	Thangbengsivilai	Dug well	7.2	27.2	129	18.0	2.0	4.4	0.0	0.28	0.01	0.03	0.02	0.00	1.8	3.0	76	0.3	0.02	0.1	0.2	0.05	0.00	53	14.0	88	0.932	94/11/28
4	Bachiang	Dug well	6.3	29.2	72	8.8	2.0	2.3	0.4	0.21	0.01	0.04	0.11	0.00	0.0	2.0	35	0.0	0.02	0.1	0.0	0.02	0.01	30	32.0	50	1.175	94/11/29
5	Bachiang	H.Champi	6.9	27.5	45	4.5	1.4	2.3	0.4	*0.51	0.00	0.03	0.01	0.00	0.0	4.0	27	0.0	0.00	0.0	0.1	0.00	0.00	17	14.0	31	0.892	94/11/29
6	Oudomsouk	Dug well	5.8	28.7	38	3.8	0.6	2.3	2.0	0.24	0.05	0.02	0.24	0.00	1.2	4.0	16	0.1	0.03	0.1	0.0	0.00	0.00	12	9.1	24	0.585	94/11/29
7	Nongsai	Dug well	5.5	28.9	64	3.4	1.6	8.0	1.2	0.19	0.01	0.03	0.07	0.00	8.8	3.0	18	3.8	0.00	0.0	0.2	0.00	0.00	15	13.0	38	1.032	94/11/30
8	Nadonkhoeng	Borehole	7.5	27.8	533	63.0	6.8	41.0	0.4	*0.84	0.00	0.03	0.04	0.00	17.0	7.0	328	0.4	0.00	0.1	0.1	0.00	0.01	185	36.0	325	0.920	94/11/30
9	Naxai-Noy	Dug well	6.8	25.6	185	8.0	11.0	11.0	0.8	0.10	0.00	0.02	0.03	0.00	6.0	5.0	98	3.0	0.01	0.1	0.4	0.05	0.01	66	26.0	115	0.938	94/11/30
10	Lak-25	Spring	5.8	26.5	41	2.1	2.6	2.3	0.8	0.05	0.00	0.03	0.03	0.00	0.0	2.0	20	1.2	0.05	0.1	0.0	0.00	0.00	16	15.0	28	1.137	94/12/10
11	Houaxe	Dug well	5.7	27.2	37	2.1	1.9	2.3	0.4	0.07	0.01	0.03	0.03	0.00	1.2	5.0	13	0.0	0.02	0.0	0.2	0.02	0.00	13	16.0	26	1.069	94/12/01
12	Phengnai	Dug well	6.4	29.2	322	24.0	0.5	48.0	3.9	*0.50	0.00	0.03	0.03	0.00	46.0	5.0	62	*40.0	0.03	0.0	0.0	0.05	0.01	62	14.0	203	1.125	94/12/03
13	Lak-94	Dug well	5.4	28.5	138	7.2	2.4	18.0	0.8	*0.36	*0.19	0.04	0.01	0.01	31.0	5.0	12	4.0	0.00	0.1	0.1	0.02	0.01	28	15.4	81	1.114	94/12/03
14	Thangbeng	Dug well	6.2	28.2	98	13.0	0.1	7.4	0.4	*3.00	0.00	0.06	0.00	0.00	6.0	3.0	43	0.0	0.00	0.1	0.2	0.01	0.00	33	11.5	55	1.173	94/12/03
15	Namouang	Borehole	7.4	27.7	770	90.0	10.0	70.0	0.0	*0.53	*0.37	0.05	0.13	0.13	22.0	12.0	475	4.0	0.01	0.5	0.0	0.00	0.03	267	27.0	478	0.962	94/12/03
16	Nakadao	Borehole	7.2	27.7	629	93.0	3.0	28.0	0.0	0.14	0.00	0.05	0.00	0.00	6.0	4.0	423	0.3	0.05	0.2	0.0	0.05	0.01	285	32.0	403	0.850	94/12/03
17	Phanthakham	Dug well	6.2	26.5	96	6.1	0.2	12.0	0.0	*0.70	0.02	0.05	0.19	0.19	13.0	4.0	19	1.2	0.02	0.1	0.0	0.00	0.00	16	11.1	64	1.115	94/12/05
18	Mai	Dug well	5.3	28.2	42	1.4	0.6	5.3	0.0	*0.70	0.02	0.05	0.01	0.01	5.2	3.0	5.8	1.2	0.03	0.1	0.5	0.01	0.00	6	8.2	29	1.166	94/12/05
19	Sukhuma	Dug well	4.6	29.1	290	9.3	3.1	39.0	10.0	0.15	*0.20	0.06	0.06	0.06	62.0	3.0	5.8	*42.0	0.02	0.1	1.5	0.16	0.01	36	10.4	172	1.039	94/12/05
20	Nonghai	Borehole	7.5	25.6	722	95.0	8.0	58.0	0.0	*1.40	0.00	0.06	0.19	0.19	27.0	114.0	304	0.2	0.01	0.1	0.0	0.05	0.03	270	28.0	462	0.982	94/12/06
21	Dongngnang	Dug well	6.0	28.7	40	1.9	1.0	4.2	0.0	*0.90	0.00	0.08	0.02	0.02	5.2	2.0	9.8	0.1	0.00	0.2	0.1	0.00	0.00	8.8	10.0	28	1.125	94/12/06
22	Nachan	Borehole	7.4	28.9	536	68.0	2.3	47.0	0.8	*0.53	0.00	0.06	0.15	0.15	32.0	4.0	286	0.0	0.01	0.1	0.3	0.10	0.01	179	28.0	354	0.993	94/12/06
23	Pathoumphone	Dug well	6.0	29.0	330	9.9	3.7	53.0	0.4	0.04	0.00	0.07	0.01	0.01	52.0	42.0	46	0.1	0.00	0.1	0.0	0.05	0.00	40	15.3	191	1.007	94/12/09
24	Nakam-Noy	Dug well	5.8	28.0	39	3.2	11.0	2.8	0.0	0.29	0.00	0.07	0.01	0.01	0.8	3.0	16	0.0	0.01	0.1	0.2	0.00	0.00	12	14.1	27	3.463	94/12/09
25	Thangbeng	Dug well	6.3	30.2	176	15.0	4.5	16.0	0.4	*0.45	0.00	0.08	0.04	0.00	12.0	4.0	363	*30.0	0.02	0.0	3.0	0.14	0.01	56	29.0	109	0.289	94/12/09
26	Nasenphan	Dug well	6.8	29.1	197	22.0	6.3	9.9	0.8	*1.20	0.00	0.09	0.36	0.00	7.2	2.0	173	0.0	0.00	0.0	1.0	0.10	0.01	81	21.0	130	0.686	94/12/08
27	Hatxaykhoun	Borehole	7.4	28.2	728	109.0	4.0	66.0	0.8	*0.69	0.00	0.09	0.14	0.00	12.0	6.0	72	3.9	0.03	0.4	0.2	0.06	0.02	288	42.0	414	5.091	94/12/08
28	Tapusy	Dug well	7.4	27.6	535	68.0	7.4	45.0	0.4	0.30	0.00	0.09	0.01	0.00	14.0	12.0	40	0.5	0.03	0.3	0.0	0.00	0.01	200	35.0	300	4.573	94/12/08
29	Nangkam	Dug well	5.4	28.2	57	4.2	0.1	7.4	0.0	0.19	0.00	0.09	0.18	0.00	9.0	2.0	33	0.0	0.00	0.0	0.0	0.00	0.00	11	7.5	37	0.657	94/12/07
30	Dongkalong	Dug well	7.2	28.5	729	100.0	6.4	46.0	0.4	0.09	0.00	0.08	0.02	0.00	39.0	3.0	10	0.0	0.00	0.1	0.1	0.00	0.00	276	37.0	415	5.679	94/12/07

* : more than WHO's Guideline value for drinking water

Table 6.3.3 (2/2) Summary of Water Quality Analysis in the Dry Season, Jan. to Feb. in 1995

Unit : mg/l

No.	Village	Sampled	pH	Temp C	E. C. uS/cm	Ca	Mg	Na	K	Fe	Mn	Cu	Zn	Pb	Cl	SO4	HCO3	NO3	NO2	F	PO4	NH4	I	Total Hard	SiO2	TDS	Ion Balance	Date Sampled
31	Hinxiou	Borehole	7.2	27.8	500	64.0	0.3	48.0	0.0	0.18	0.06	0.00	0.05	0.00	0	4.0	65	0	0.01	0.2	0.1	0.00	0.00	161	40	345	4.827	95/01/25
32	Boungkha	Borehole	7.0	27.5	271	16.0	3.2	40.0	0.4	1.50	0.13	0.00	0.00	0.00	0	4.0	118	0.3	0.02	0.1	0.0	0.05	0.01	53	28	192	1.419	95/01/25
33	Thangbengsivilai	Dug well	7.0	29.2	139	16.0	3.2	8.1	0.0	0.21	0.02	0.00	0.03	0.00	1.2	3.0	499	0.1	0.00	0.1	0.3	0.06	0.00	53	16	90	0.172	95/01/25
34	Bachiang	Dug well	8.2	27.6	76	5.9	2.5	6.4	0.4	0.09	0.01	0.00	0.02	0.00	0.8	2.0	341	0.2	0.00	0.1	0.0	0.02	0.01	25	27	51	0.140	95/01/27
35	Nake	H. Champi	7.0	28.3	55	2.7	3.9	1.6	0.4	0.12	0.01	0.00	0.01	0.00	0	4.0	8.6	0	0.00	0	0.6	0.06	0.00	23	14	37	2.409	95/01/27
36	Oudomsouk	Dug well	5.4	26.1	30	0.6	1.1	3.5	0.8	0.19	0.05	0.00	0.13	0.00	0	3	4.1	0	0.02	0.1	0.0	0.00	0.00	6	8.4	22	0.045	95/01/27
37	Nongsai	Dug well	5.4	26.5	58	1.1	1.8	8.1	0.8	0.03	0.01	0.00	0.02	0.00	4	4.0	6	3.2	0.07	0	0.2	0.01	0.00	10	11	37	1.668	95/01/23
38	Nadonkhoang	Borehole	7.3	26.8	528	61.0	6.1	45.0	0.4	0.32	0.05	0.03	0.03	0.00	15	6.0	319	0.2	0.13	0.1	0.1	0.02	0.01	177	40	320	0.956	95/01/23
39	Naxai-Noy	Dug well	6.6	27.8	173	12.0	6.0	13.0	0.8	0.17	0.09	0.00	0.00	0.00	6	5.0	85	2.8	0.00	0.1	0.4	0.04	0.01	56	28	116	0.936	95/01/23
40	Lak-25	Spring	5.7	26.8	47	1.6	1.9	4.8	0.8	0.02	0.01	0.00	0.01	0.00	0	2.0	20	1.2	0.02	0.1	0.1	0.01	0.00	12	14	30	1.200	95/01/27
41	Houaxe	Dug well	5.4	28.7	44	0.8	1.6	6.5	0.4	0.07	0.01	0.00	0.06	0.01	0.8	5.0	14	0.1	0.01	0	0.3	0.00	0.00	9	14	25	1.307	95/01/31
42	Phengnai	Dug well	6.7	28.5	240	12.0	2.3	40.0	1.6	3.20	0.25	0.00	0.05	0.00	32	7.0	58	16	0.03	0.1	0.1	0.02	0.01	39	15	208	1.176	95/01/23
43	Lak-94	Dug well	4.7	28.2	101	1.9	1.3	20.0	0.4	1.20	0.09	0.00	0.01	0.00	17	4.0	10	4.8	0.00	0.1	0.2	0.00	0.01	10	12	64	1.403	95/01/23
44	Thangbeng	Dug well	5.7	29.1	68	5.8	0.4	7.6	0.4	0.70	0.09	0.00	0.00	0.00	6	3.0	23	0	0.00	0.2	0.3	0.02	0.00	17	8.9	45	1.136	95/01/23
45	Namouang	Borehole	7.1	29.3	72	83.0	12.0	62.0	0.8	0.00	0.33	0.00	0.23	0.01	12	3.0	449	0.1	0.02	0.1	0.1	0.08	0.00	256	48	403	1.012	95/01/25
46	Koumkeo	Dug well	7.0	27.4	214	16.0	1.7	13.0	1.2	2.50	0.77	0.00	0.35	0.01	12	4.0	111	0.3	0.01	0	0.0	0.02	0.01	47	32	139	0.736	95/01/23
47	Bak	Dug well	6.1	28.5	147	5.6	4.4	20.0	0.8	1.40	0.22	0.00	0.02	0.00	6	2.0	27	0.1	0.01	0.1	0.0	0.00	0.00	32	28	94	2.428	95/01/24
48	Dontalat	Borehole	6.0	27.9	170	7.5	4.4	24.0	0.4	0.96	0.09	0.00	0.50	0.01	20	3.0	40	0	0.00	0.1	0.1	0.00	0.00	37	12	105	1.426	95/01/24
49	Soukhouma	Dug well	4.4	27.5	313	5.3	4.3	52.0	9.6	0.05	0.17	0.00	0.04	0.01	48	3.0	2	35	0.01	0.1	1.8	0.12	0.01	31	9.4	203	1.556	95/01/24
50	Nonghai	Borehole	7.3	27.8	514	61.0	8.7	31.0	0.0	0.10	0.01	0.00	0.05	0.00	2	84.0	283	0.3	0.00	0.2	0.3	0.03	0.03	188	33	293	0.793	95/02/03
51	Nonkoun	Borehole	7.2	28.2	585	76.0	9.0	33.0	0.0	0.31	0.15	0.02	0.02	0.00	8	3.0	333	0.1	0.02	0.1	0.1	0.00	0.01	228	29	345	1.041	95/01/28
52	Nachan	Borehole	7.3	29.1	522	53.0	8.7	42.0	0.8	0.09	0.02	0.00	0.00	0.00	28	4.0	281	0	0.00	0.1	0.2	0.08	0.00	168	34	313	0.951	95/02/03
53	Lak 29	Dug well	5.8	26.8	42	1.6	2.2	3.7	0.4	0.01	0.00	0.00	0.09	0.00	0.8	2.0	17	0	0.01	0.1	0.0	0.00	0.00	13	11	26	1.281	95/01/31
54	Tomo-Nok	Dug well	5.2	28.2	28	0.0	0.8	5.0	0.8	0.08	0.03	0.00	0.07	0.00	0	3.0	9	0	0.02	0	0.0	0.00	0.00	3	6.2	18	1.466	95/01/31
55	Thangbeng	Dug well	6.1	28.5	176	11.0	7.4	15.0	0.0	0.40	0.02	0.00	0.02	0.00	9.2	3.0	72	32	0.01	0	3.1	0.12	0.01	58	27	116	0.904	95/01/31
56	Kinak	Dug well	7.3	30.1	470	60.0	4.0	29.0	0.4	0.10	0.04	0.00	0.05	0.00	10	3.0	284	0.1	0.03	0.1	1.4	0.08	0.01	166	26	305	0.920	95/01/30
57	Don	Dug well	4.2	29.4	89	0.8	11.0	0.0	0.4	0.03	0.02	0.00	0.00	0.00	6.8	2.0	0	0.1	0.00	0.1	0.2	0.05	0.02	47	10	51	4.072	95/01/31
58	Taposy	Dug well	7.3	25.6	458	48.0	15.0	22.0	0.4	0.40	0.20	0.00	0.04	0.00	4.4	10.0	304	0.4	0.03	0.3	0.0	0.01	0.01	181	26	279	0.868	95/01/30
59	Nangkam	Dug well	4.5	26.5	59	0.8	0.7	10.0	0.0	0.10	0.01	0.00	0.13	0.00	4	3.0	3	0.1	0.01	0.1	0.0	0.00	0.00	5	6.7	37	2.373	95/01/25
60	Congkalong	Dug well	7.2	27.7	736	79.0	17.0	52.0	2.0	0.04	0.00	0.00	0.00	0.00	48	3.0	383	0.1	0.01	0.1	0.2	0.00	0.00	267	32	426	0.995	95/01/25

* : more than WHO's Guideline value for drinking water

Table 6.3.4 Summary of Water Quality Analysis for the New Boreholes in the Dry Season, Feb. in 1995

Unit : mg/l

No.	Village	Sampled	pH	Temp C	E. C. uS/cm	Ca	Mg	Na	K	Fe	Mn	Cu	Zn	Pb	Cl	SO4	HCO3	NO3	NO2	F	PO4	NH4	I	Total Hard	SiO2	TDS	Ion Balance	Date Sampled
1	Nonephai	Borehole	6.8	28.2	785	84.0	22.0	53.0	1.2	0.06	*.58	0.00	4.40	0.00	17.0	4.0	497	0.0	0.00	0.2	0.2	0.10	0.01	300	32.0	452	0.960	95/02/01
2	Loay	Borehole	5.6	27.5	96	4.3	3.0	3.0	0.4	0.00	0.07	0.00	4.90	0.01	8.0	3.0	20	0.3	0.01	0.1	0.0	0.00	0.00	23	8.7	58	0.974	95/02/01
3	Thongsala	Borehole	6.4	27.3	230	16.0	12.0	12.0	0.8	0.03	0.03	0.00	4.80	0.00	0.0	4.0	140	0.2	0.02	0.1	0.3	0.00	0.01	89	18.0	133	0.979	95/02/01
4	Lak 21	Borehole	5.6	27.8	55	1.6	4.1	2.5	0.0	0.02	0.03	0.08	*6.00	0.00	0.4	3.0	28	0.1	0.00	0.0	0.0	0.05	0.00	21	13.0	35	0.991	95/01/28
5	Donmueng	Borehole	7.1	26.6	580	55.0	10.0	83.0	1.2	0.02	*0.32	0.00	0.81	0.02	0.8	7.0	391	1.6	0.01	0.2	0.8	0.30	0.02	179	44.0	336	0.962	95/02/01
6	Nongnгong	Borehole	7.0	26.8	627	74.0	15.0	44.0	2.4	0.02	0.07	0.00	0.62	0.03	9.2	5.0	399	2.4	0.04	0.1	0.2	0.22	0.01	245	45.0	358	0.995	95/02/01
7	Samia	Borehole	7.0	29.1	767	78.0	10.0	64.0	1.6	0.01	0.07	0.00	0.24	0.00	31.0	3.0	426	0.3	0.00	0.3	0.0	0.02	0.01	236	32.0	422	0.952	95/02/01
8	Chong	Borehole	7.0	28.2	569	55.0	29.0	27.0	1.2	0.10	*0.25	0.00	3.20	0.00	3.2	2.0	373	0.1	0.01	0.1	0.0	0.00	0.00	256	38.0	324	1.016	95/02/01
9	Phonphai	Borehole	7.0	25.8	593	75.0	13.0	39.0	0.8	0.04	0.01	0.00	0.47	0.01	6.8	2.0	385	0.0	0.00	0.1	0.4	0.02	0.00	240	40.0	343	0.998	95/02/01
10	Naknsao	Borehole	6.8	29.1	651	71.0	13.0	51.0	0.8	0.07	*0.41	0.02	1.40	0.00	19.0	4.0	391	0.2	0.00	0.3	0.1	0.00	0.01	230	38.0	358	0.977	95/02/01
11	Houn-Tai	Borehole	5.9	29.2	115	5.6	7.8	8.4	0.4	0.07	0.08	0.00	*7.40	0.02	0.8	2.0	60	0.3	0.02	0.0	0.0	0.05	0.01	46	32.0	76	1.155	95/02/01
12	Houaxe	Borehole	7.1	28.8	10000	440.0	25.0	1880.0	14.0	*0.66	*0.31	0.02	1.20	0.00	*3480	18.0	36	0.4	0.01	0.2	0.1	0.05	0.04	*1200	16.0	203	1.062	95/02/17
13	Lak 24	Borehole	7.1	26.8	488	23.0	6.9	75.0	0.8	0.05	*0.4	0.00	1.00	0.00	0.8	4.0	335	0.0	0.02	0.1	0.0	0.10	0.01	86	32.0	298	0.864	95/02/18
14	Nonghe	Borehole	7.3	27.2	447	49.0	11.0	29.0	0.8	0.00	*0.28	0.00	1.30	0.00	4.0	4.0	262	0.1	0.00	0.0	0.0	0.00	0.00	168	41.0	268	1.034	95/02/20
15	Saakhanaboua	Borehole	7.4	28.1	378	33.0	13.0	25.0	1.2	0.18	0.05	0.00	0.49	0.00	2.0	3.0	447	0.1	0.00	0.1	0.2	0.00	0.00	136	28.0	218	0.516	95/02/18
16	Maisivilai	Borehole	6.8	28.2	763	100.0	33.0	19.0	2.0	0.24	*0.60	0.00	2.50	0.00	0.8	5.0	547	0.0	0.00	0.1	0.3	0.00	0.01	384	42.0	420	0.947	95/02/20
17	Nasenphan	Borehole	7.3	29.2	430	43.0	13.0	28.0	0.8	*0.54	0.00	0.00	0.28	0.00	3.2	3.0	285	0.1	0.00	0.2	0.0	0.05	0.00	160	27.0	245	0.927	95/02/20
18	Houay Kapho	Borehole	6.7	28.5	790	137.0	9.3	9.2	0.4	0.11	*0.28	0.00	1.20	0.00	43.0	4.0	455	0.0	0.00	0.2	0.5	0.05	0.00	380	42.0	434	0.917	95/02/21
19	Nongsano	Borehole	6.6	27.5	433	61.0	9.9	15.0	0.0	0.06	*0.68	0.00	2.40	0.00	7.2	3.0	289	0.0	0.00	0.1	0.1	0.00	0.00	193	27.0	264	0.971	95/02/21
20	Bang	Borehole	6.4	28.2	165	12.0	10.0	4.1	0.0	0.06	0.00	0.00	1.20	0.00	0.8	3.0	96	0.1	0.00	0.1	0.0	0.00	0.09	71	14.0	102	0.986	95/02/20

Table 6.3.5 Biological Analysis for Existing Wells in the Dry Season, Jan. to Feb. in 1995

Code	Village	Water	Coliforms	Bacteria	Handpump
C-10	Ban Dong	Dug well	30000	40000	
C-12	Ban Nangkham	Dug well	10000	7000	Dempster
C-24	Ban Boungka	Borehole	10000	5000	Lucky
C-30	Ban Thangbengsivilai	Dug well	Innumerable	Innumerable	
C-38	Ban Bachiang	Borehole	Innumerable	50000	Tara
	Ban Nake	Houay Champi	Innumerable	30000	River
C-47	Ban Oudomsouk	Dug well	80000	40000	
C-52	Ban Lak 25	Spring	80000	70000	
	Ban Lak 29	Dug well	30000	25000	
C-71	Tomo-Nak	Dug well	70000	60000	
C-74	Ban Thangbeng	Dug well	Innumerable	Innumerable	
C-98	Ban Kinak Wat	Dug well	Innumerable	Innumerable	
C-100	Ban Tapusy	Dug well	20000	25000	
	Ban Donkalong(Pakxe)	Dug well	Innumerable	Innumerable	
C-78	Ban Bak	Dug well	49000	48000	
	Ban Dontalat	Borehole	Innumerable	Innumerable	Dempster
	Ban Soukhouma	Dug well	Innumerable	50000	
	Ban Nachan	Borehole	1000	1000	Dempster
	Ban Nonkhoun	Borehole	80000	0	India Mark III
	Ban Nonghai	Borehole	20000	20000	Tara
S-5	Ban Phengnai(Lakhonsi-Tai)	Dug well	20000	10000	
	Ban Lak 94	Dug well	10000	7000	
	Ban Thangbeng	Dug well	50000	50000	
S-25	Ban Hinxiou	Borehole	0	0	Dempster
S-28	Ban Namouang	Borehole	0	0	India Mark III
S-54	Ban Nongsai	Dug well	50000	15000	
S-66	Ban Nadonkhouang	Borehole	50000	25000	

Innumerable : more than 100,000

Unit in number/ml

Table 6.3.6 Biological Analysis for New Boreholes in the Dry Season, Jan. to Feb. in 1995

Code	Village	Water	Coliforms	Bacteria	Handpump
C-4	Ban Nongphai	Borehole	0	2000	India Mark III
C-8	Ban Houaxe	Borehole	0	2000	India Mark III
C-16	Ban Louy	Borehole	6000	1000	India Mark III
C-44	Ban Thongsala	Borehole	0	2000	India Mark III
C-49	Ban Lak 21	Borehole	0	0	India Mark III
C-65	Ban lak 24	Borehole	5000	0	India Mark III
C-75	Ban Nongke	Borehole	30000	5000	India Mark III
C-79	Ban Samkhanaboua	Borehole	18000	12000	India Mark III
C-88	Ban Maisivilai	Borehole	5000	0	India Mark III
C-89	Ban Nasenphan	Borehole	10000	0	India Mark III
S-4	Ban Houay Kapho	Borehole	0	0	India Mark III
S-12	Ban Nongsano	Borehole	6000	5000	India Mark III
S-24	Ban Donmuang	Borehole	0	2000	India Mark III
S-38	Ban Nongngong	Borehole	3000	1000	India Mark III
S-50	Ban Samia	Borehole	0	1000	India Mark III
S-56	Ban Chong	Borehole	0	0	India Mark III
S-64	Ban Phonphai	Borehole	7000	3000	India Mark III
S-75	Ban Nakasao	Borehole	0	0	India Mark III
S-84	Ban Beng	Borehole	25000	8000	India Mark III
S-100	Ban Houn-Tai	Borehole	0	7000	India Mark III

Unit in number/ml

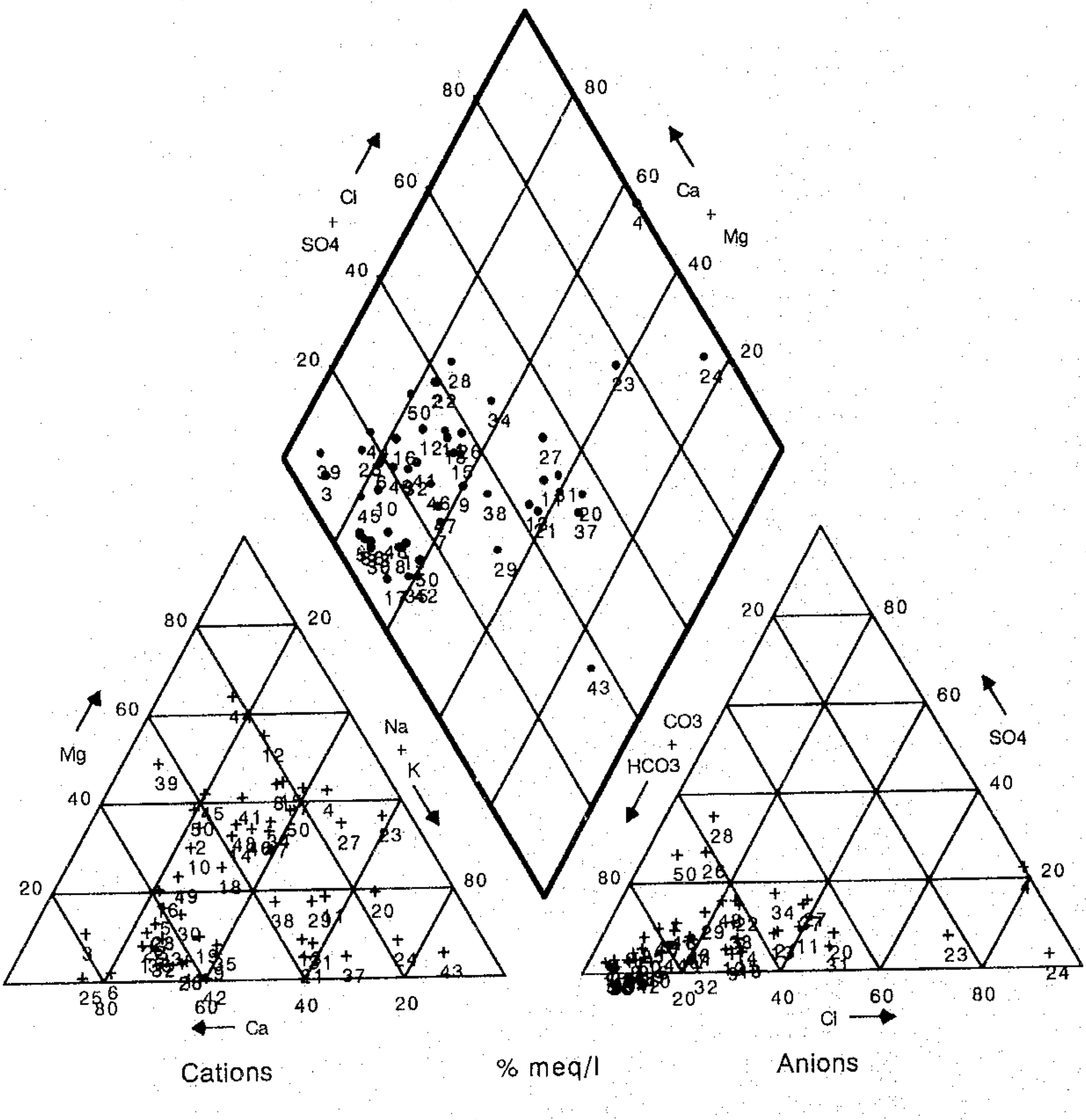

Figure 6.3.1 Tri-linear Diagram of Water Quality in the Wet Season, June in 1994