

# **C. Data of Design and Work Quantities**

**C1 The Result of Dam Stability Analysis**

**C2 Relations between Project Cost and Development Water Volume per Unit Water Volume**

**C3 Work Quantities of Excavated Material for Badung River and Mati River**

**C4 Sabo-data**

## **C1 The Result of Dam Stability Analysis**

## C1. The Result of Dam Stability Analysis

### Stability Analysis Calculation

【Nonover flow crest section】

1) Reservoir level normal water level(EL. 366.000 m)

2) Design seismic coefficient : KH = 0.150

3) Downstream slope : 1 : 0.80

4) Fillet position : EL.315.000 m

5) Fillet slope : 1 : 0.40

6) Foundation level : EL.305.000 m

7) Drain position

Location of foundation drain well : 4.500 (m)

(Positions are the lower reaches from the dam axis. )

8) Uplift pressure coefficient : 0.200

Load item	Horizontal force	Vertical force	Active position		Moment
	H (t)		V (t)	X (m)	
Dam weight	-----	4,089.46	21.262	-----	86,948.60
Dam inertia force	613.419	-----	-----	22.158	13,592.40
Water pressure	1,959.38	-----	-----	20.867	40,885.70
Water weight	-----	230.4	1.942	-----	447.5
Sediment material weight	-----	66	1.778	-----	117.3
Sediment pressure	110	-----	-----	6.667	733.3
Dynamic water pressure	325.588	-----	-----	24.4	7,944.30
Uplift pressure	-----	-699.47	16.057	-----	-11,231.10
Total.	3,008.39	3,686.39	-----	-----	139,438.10

• Total horizontal force	$\Sigma H$ :	3,008.39	(t)
• Total vertical force	$\Sigma V$ :	3,686.39	(t)
• Total moment	$\Sigma M$ :	139,438.10	(t·m)
• Eccentricity distant	$\varepsilon$ :	9.425	(m)
• Edge stress upstream	$\sigma u$ :	0.285	(t/m <sup>2</sup> )
• Edge stress downstream	$\sigma d$ :	129.518	(t/m <sup>2</sup> )
• Length of shear plane	L :	56.8	(m)
• Shear strength	$\tau$ :	160	(t/m <sup>2</sup> )

### 1. Dam body

$$(1) H_{TOP} = CRB \div N = 5.000 \div 0.80 = 6.250$$

$$(2) H1(I) = DCR - BASE(I) = 371.000 - 305.000 = 66.000$$

$$(3) H2(I) = HF - BASE(I) = 315.000 - 305.000 = 10.000$$

(HF < BASE(I)の時 H2(I) = 0)

$$(4) L1(I) = H1(I) \times N = 66.000 \times 0.80 = 52.800$$

$$(5) L2(I) = H2(I) \times M = 10.000 \times 0.40 = 4.000$$

$$(6) LD(I) = L2(I) + DRL(I) = 4.000 + 4.500 = 8.500$$

$$(7) LL(I) = L1(I) + L2(I) = 52.800 + 4.000 = 56.800$$

$$(8) A1 = CRB \times H_{TOP} \div 2 \times WC = 5.000 \times 6.250 \div 2 \times 2.300 = 35.938$$

$$\cdot X1 = CRB \div 3 \times 2 + L2(I) = 5.000 \div 3 \times 2 + 4.000 = 7.333$$

$$\cdot Y1 = DCR - H_{TOP} \div 3 - BASE(I) = 371.000 - 6.250 \div 3 - 305.000 = 63.917$$

$$(9) A2 = H1(I) \times L1(I) \div 2 \times WC = 66.000 \times 52.800 \div 2 \times 2.300 = 4007.520$$

$$\cdot X2 = L1(I) \div 3 + L2(I) = 52.800 \div 3 + 4.000 = 21.600$$

- $Y2 = H1(I) \div 3 = 66.000 \div 3 = 22.000$
- (10)  $A3 = H2(I) \times L2(I) \div 2 \times WC = 10.000 \times 4.000 \div 2 \times 2.300 = 46.000$ 
  - $X3 = L2(I) \times 2 \div 3 = 4.000 \times 2 \div 3 = 2.667$
  - $Y3 = H2(I) \div 3 = 10.000 \div 3 = 3.333$
- (11)  $A4=0$ 
  - $X4=0$  •  $Y4=0$
- (12)  $A5=0$ 
  - $X5=0$  •  $Y5=0$
- (13)  $TEITAI(I) = A1 + A2 + A3 + A4 + A5 = 35.938 + 4007.520 + 46.000 + 0.000 + 0.000 = 4089.457$
- (14)  $TEITAI X(I) = (A1 \times X1 + A2 \times X2 + A3 \times X3 + A4 \times X4 + A5 \times X5) \div TEITAI(I)$   
 $= (35.938 \times 7.333 + 4007.520 \times 21.600 + 46.000 \times 2.667 + 0.000 \times 0.000 + 0.000 \times 0.000) \div 4089.457 = 21.262$
- (15)  $TEITAI Y(I) = (A1 \times Y1 + A2 \times Y2 + A3 \times Y3 + A4 \times Y4 + A5 \times Y5) \div TEITAI(I)$   
 $= (35.938 \times 63.917 + 4007.520 \times 22.000 + 46.000 \times 3.333 + 0.000 \times 0.000 + 0.000 \times 0.000) \div 4089.457 = 22.158$
- (16)  $TEITAI K(I) = (A1 + A2 + A3 + A4 + A5) \times KH$   
 $= (35.938 + 4007.520 + 46.000 + 0.000 + 0.000) \times 0.150 = 613.419$

## 2. Water pressure

(1)  $SUIATSU(I) = (HU - BASE(I))^2 \div 2 = (367.600 - 305.000)^2 \div 2 = 1959.380$   
 •  $SUIATSUY(I) = (HU - BASE(I)) \div 3 = (367.600 - 305.000) \div 3 = 20.867$

## 3. Water weight

(1)  $SJ1 = L2(I) \times (HU - HF) = 4.000 \times (367.600 - 315.000) = 210.400$   
 •  $SJ1X = L2(I) \div 2 = 4.000 \div 2 = 2.000$

(2)  $SJ2 = L2(I) \times (HF - BASE(I)) \div 2 = 4.000 \times (315.000 - 305.000) \div 2 = 20.000$   
 •  $SJ2X = L2(I) \div 3 = 4.000 \div 3 = 1.333$

(3)  $SUIJYU(I) = SJ1 + SJ2 = 210.400 + 20.000 = 230.400$   
 •  $SUIJYUX(I) = (SJ1 \times SJ1X + SJ2 \times SJ2X) \div SUIJYU(I)$   
 $= (210.400 \times 2.000 + 20.000 \times 1.333) \div 230.400 = 1.942$

## 4 .Dynamic water pressure

(1)  $DOHSUIATSU1 = (7 \div 12) \times KH \times (HU0 - BASE(I))^2$   
 $= (7 \div 12) \times 0.150 \times (366.000 - 305.000)^2 = 325.588$   
 •  $DOHSUIATSUY1 = (HU0 - BASE(I)) \times 0.4 = (366.000 - 305.000) \times 0.4 = 24.400$

(2)  $DOHSUIATSU2=0$   $DOHSUIATSUY2=0$

(3)  $DOHSUIATSU(I) = DOHSUIATSU1 + DOHSUIATSU2 = 325.588 + 0.000 = 325.588$   
 •  $DOHSUIATSUY(I) = (DOHSUIATSU1 \times DOHSUIATSUY1 + DOHSUIATSU2 \times DOHSUIATSUY2) \div DOHSUIATSU(I)$   
 $= (325.588 \times 24.400 + 0.000 \times 0.000) \div 325.588 = 24.400$

## 5.Sediment material weight

(1)  $DJ1 = (SD - HF) \times (HF - BASE(I)) \times M \times WS$   
 $= (325.000 - 315.000) \times (315.000 - 305.000) \times 0.40 \times 1.100 = 44.000$   
 •  $DJ1X = (HF - BASE(I)) \times M \div 2 = (315.000 - 305.000) \times 0.40 \div 2 = 2.000$

(2)  $DJ2 = (HF - BASE(I))^2 \times M \times WS \div 2 = (315.000 - 305.000)^2 \times 0.40 \times 1.100 \div 2 = 22.000$   
 •  $DJ2X = (HF - BASE(I)) \times M \div 3 = (315.000 - 305.000) \times 0.40 \div 3 = 1.333$

(3)  $DEIJYU(I) = DJ1 + DJ2 = 44.000 + 22.000 = 66.000$   
 •  $DEIJYUX(I) = (DJ1 \times DJ1X + DJ2 \times DJ2X) \div DEIJYU(I)$   
 $= (44.000 \times 2.000 + 22.000 \times 1.333) \div 66.000 = 1.778$

## 6.Sediment pressure

(1)  $DEIATSU(I) = (SD - BASE(I))^2 \div 2 \times WS \times CE$   
 $= (325.000 - 305.000)^2 \div 2 \times 1.100 \times 0.500 = 110.000$   
 •  $DEIATSUY(I) = (SD - BASE(I)) \div 3 = (325.000 - 305.000) \div 3 = 6.667$

## 7.Uplift pressure

(1)  $UPU1 = HU0 - BASE(I) = 366.000 - 305.000 = 61.000$   
 •  $UPD = HD - BASE(I) = 307.000 - 305.000 = 2.000$

(2)  $UPU2 = (UPU1 - UPD) \times BETA(I) + UPD = (61.000 - 2.000) \times 0.000 + 2.000 = 13.800$   
 •  $UPDR = (UPU1 - UPD) \times ALPHA(I) + UPD = (61.000 - 2.000) \times 0.200 + 2.000 = 13.800$   
 •  $UPU=UPU1 = 61.000$

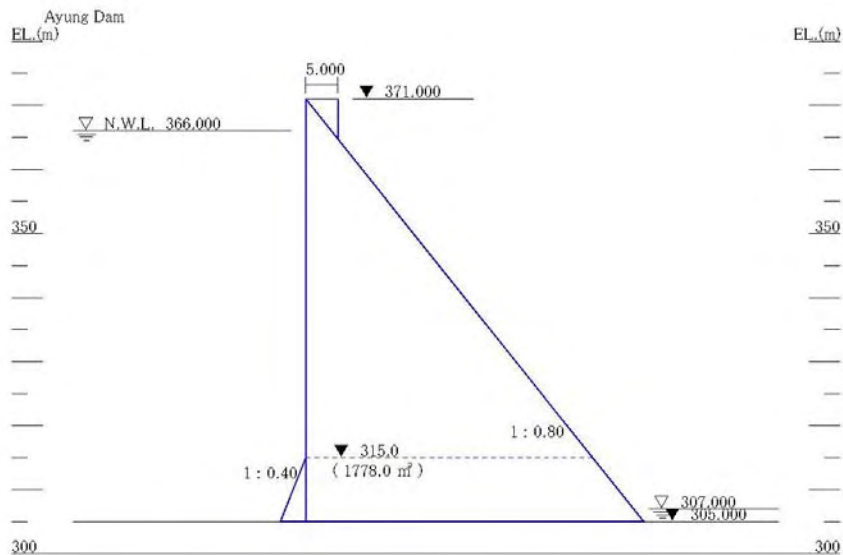
(3)  $UPLIFT1 = UPDR \times LL(I) = 13.800 \times 56.800 = 783.840$

- $UPX1 = LL(I) \div 2 = 56.800 \div 2 = 28.400$
- (4)  $UPLIFT2 = -(UPDR - UPD) \times (LL(I) - LD(I)) \div 2$   
 $= -(13.800 - 2.000) \times (56.800 - 8.500) \div 2 = -284.970$ 
  - $UPX2 = LL(I) - (LL(I) - LD(I)) \div 3 = 56.800 - (56.800 - 8.500) \div 3 = 40.700$
- (5)  $UPLIFT3 = (UPU - UPDR) \times LD(I) \div 2 = (61.000 - 13.800) \times 8.500 \div 2 = 200.600$ 
  - $UPX3 = LD(I) \div 3 = 8.500 \div 3 = 2.833$
- (6)  $UPLIFT(I) = -(UPLIFT1 + UPLIFT2 + UPLIFT3)$   
 $= -(783.840 + -284.970 + 200.600) = -699.470$ 
  - $UPLIFTX(I) = -(UPLIFT1 \times UPX1 + UPLIFT2 \times UPX2 + UPLIFT3 \times UPX3) \div UPLIFT(I)$   
 $= -(783.840 \times 28.400 + -284.970 \times 40.700 + 200.600 \times 2.833) \div -699.470 = 16.057$

### 8. Total of external force

- (1)  $SH(I) = TEITAIK(I) + SUIATSU(I) + DOHSUIATSU(I) + DEIATSU(I)$   
 $= 613.419 + 1959.380 + 325.588 + 110.000 = 3008.386$
- (2)  $SV(I) = TEITAI(I) + SUIJYU(I) + DEIJYU(I) + UPLIFT(I)$   
 $= 4089.457 + 230.4 + 66 + -699.47 = 3686.387$
- (3)  $SM1 = TEITAIK(I) \times TEITAIY(I) + SUIATSU(I) \times SUIATSUY(I)$   
 $+ DOHSUIATSU(I) \times DOHSUIATSUY(I) + DEIATSU(I) \times DEIATSUY(I)$   
 $= 613.419 \times 22.158 + 1959.380 \times 20.867 + 325.588 \times 24.400 + 110.000 \times 6.667 = 63155.780$
- (4)  $SM2 = TEITAI(I) \times TEITAIY(I) + SUIJYU(I) \times SUIJYUX(I)$   
 $+ DEIJYU(I) \times DEIJYUX(I) + UPLIFT(I) \times UPLIFTX(I)$   
 $= 4089.457 \times 21.262 + 230.400 \times 1.942 + 66.000 \times 1.778 + -699.470 \times 16.057 = 76282.300$
- (5)  $SM(I) = SM1 + SM2 = 63155.780 + 76282.300 = 139438.100$
- (6)  $E(I) = -LL(I) \div 2 + SM(I) \div SV(I) = -56.800 \div 2 + 139438.100 \div 3686.387 = 9.425$
- (7)  $EU1(I) = SV(I) \times (1 - 6 \times E(I) \div LL(I)) \div LL(I) = 3686.387 \times (1 - 6 \times 9.425 \div 56.800) \div 56.800 = 0.285$
- (8)  $EU2(I) = SV(I) \times (1 + 6 \times E(I) \div LL(I)) \div LL(I) = 3686.387 \times (1 + 6 \times 9.425 \div 56.800) \div 56.800 = 129.518$
- (9)  $TAUN(I) = (FF(I) \times SV(I) + TAU(I) \times LL(I)) \div SH(I)$   
 $= (1.000 \times 3686.387 + 160.000 \times 56.800) \div 3008.386 = 4.246$
- (10)  $TNEED(I) = (NALLOCATE \times SH(I) - FF(I) \times SV(I)) \div LL(I)$   
 $= (4.050 \times 3008.386 - 1.000 \times 3686.387) \div 56.800 = 149.605$

### 9. Calculation result.



## **C2 Relations between Project Cost and Development Water Volume per Unit Water Volume**

## C2. Relations between Project Cost and Development Water Volume per Unit Water Volume

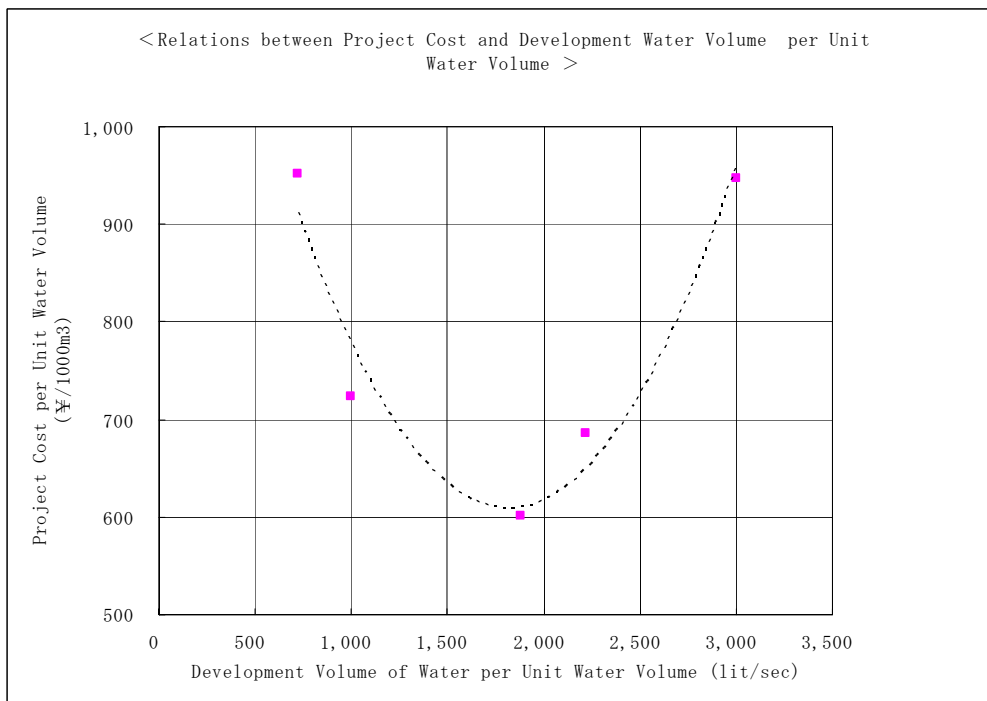
### (1) Relations between Development Water Volume and Storage Capacity

The development water volume.	Storage Capacity + Storage Capacity for Sedimentation	Storage Capacity
litre/sec	(Million m <sup>3</sup> )	(Million m <sup>3</sup> )
<b>100.00</b>	<b>2.5</b>	
500.00	4.3	3.3
<b>720.00</b>	<b>5.0</b>	
1000.00	5.9	4.9
1500.00	7.5	6.5
1800.00	9.4	8.4
<b>1880.00</b>	<b>10.0</b>	
2000.00	10.8	9.8
2200.00	14.5	13.5
<b>2220.00</b>	<b>15.0</b>	
2500.00	20.6	19.6
3000.00	30.8	29.8

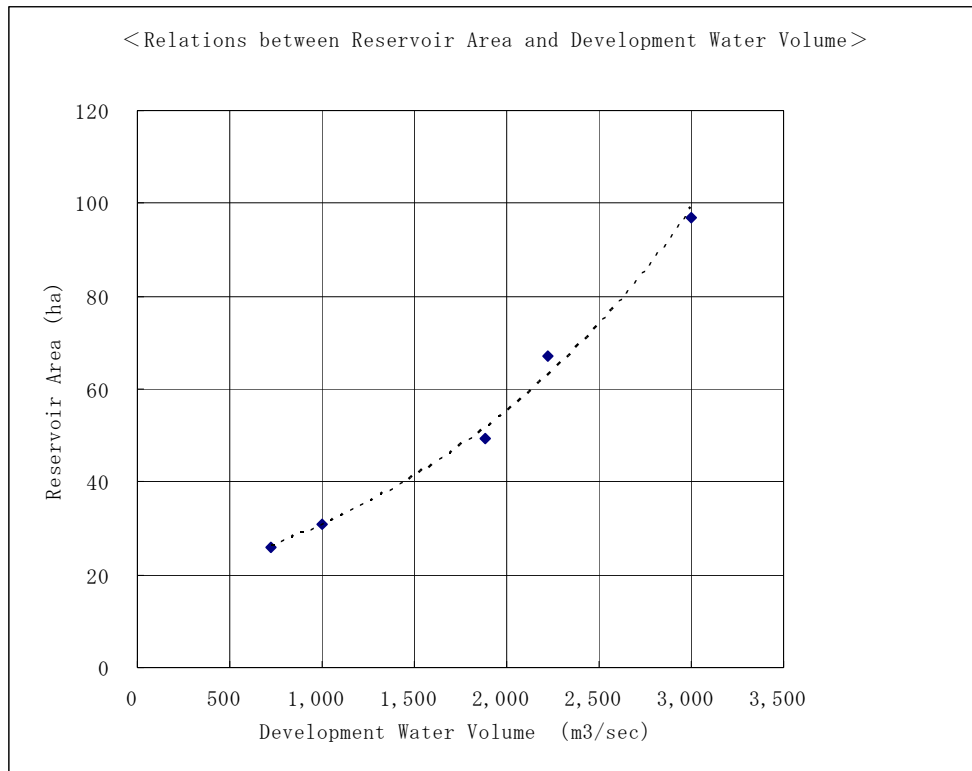
### (2) Relations between Development Water Volume and Storage Capacity

Annual Water Volume	Dam Height	Development Water Volume .	Storage Capacity	Reservoir Area	Project Cost	Project Cost /year	Unit Cost of Water (¥/1000 m3)
m <sup>3</sup> /year	H(m)	litre/sec	(Million m3)	1000 m <sup>2</sup>	Billion ¥	80year Extinguishment (¥)	
3153600	35	100.0	2.5	11.0	27	33750000.00	3,424.7
22,705,920	52	720.0	5.0	26.1	54	67,500,000	951.3
31,536,000	56	1,000.0	6.0	30.8	57	71,250,000	723.0
59,287,680	66	1,880.0	10.0	49.4	89	111,250,000	600.5
70,009,920	75	2,220.0	15.0	66.9	120	150,000,000	685.6
94,608,000	92	3,000.0	31.0	96.8	224	280,000,000	947.1

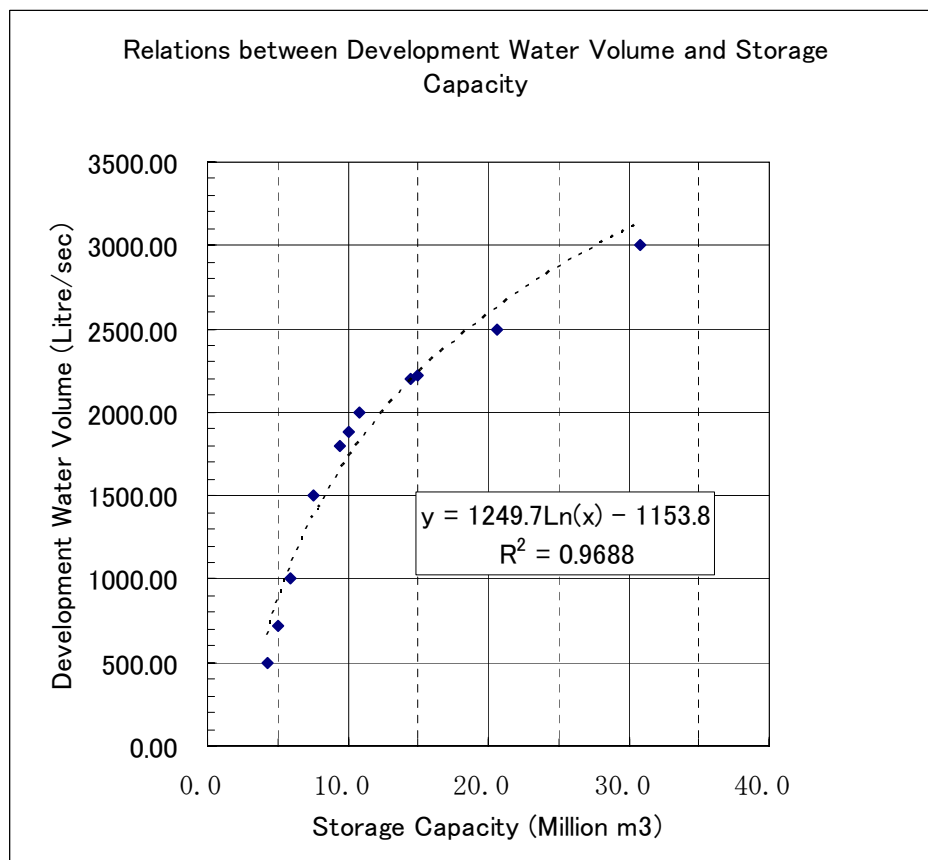
### (3) Relations between Project cost and Development Water Volume per Unit Water Volume



(4) Relations between Reservoir Area and Development water Volume

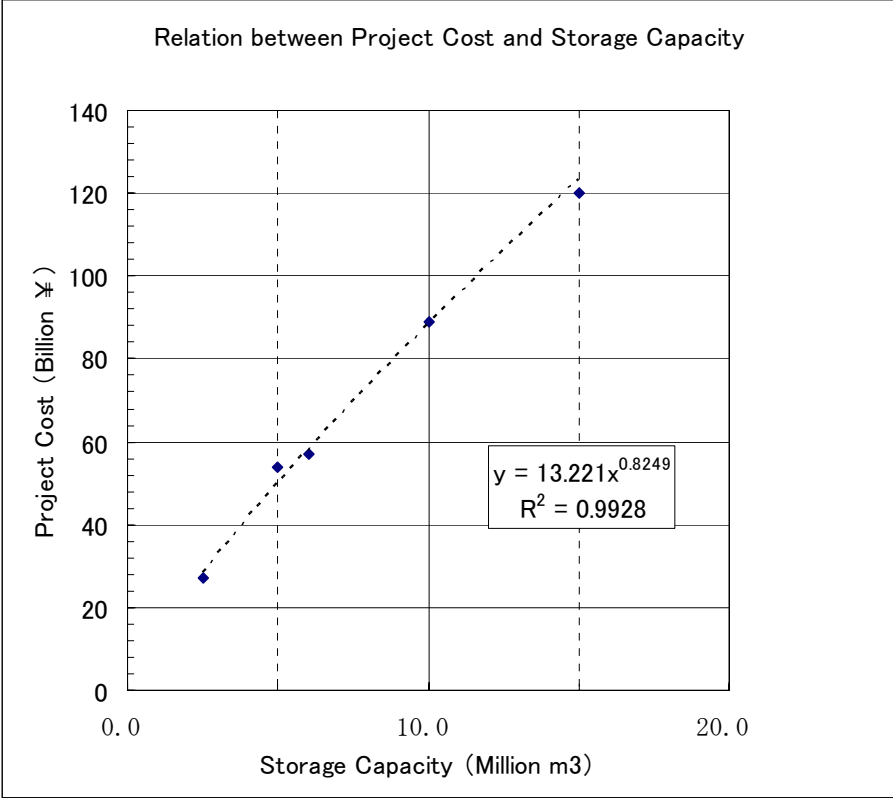


(5) Relation between Development Water volume and Storage capacity





(6) Relation between Project Cost and Storage capacity

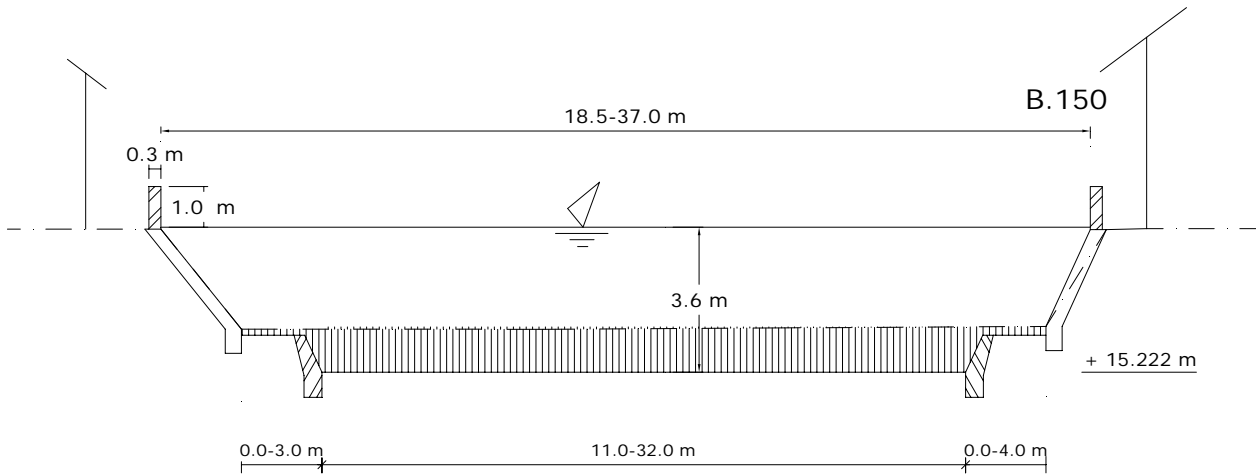


## **C3 Work Quantities of Excavated Material for Badung River and Mati River**

### C3.River Improvement for Badung River and Mati river

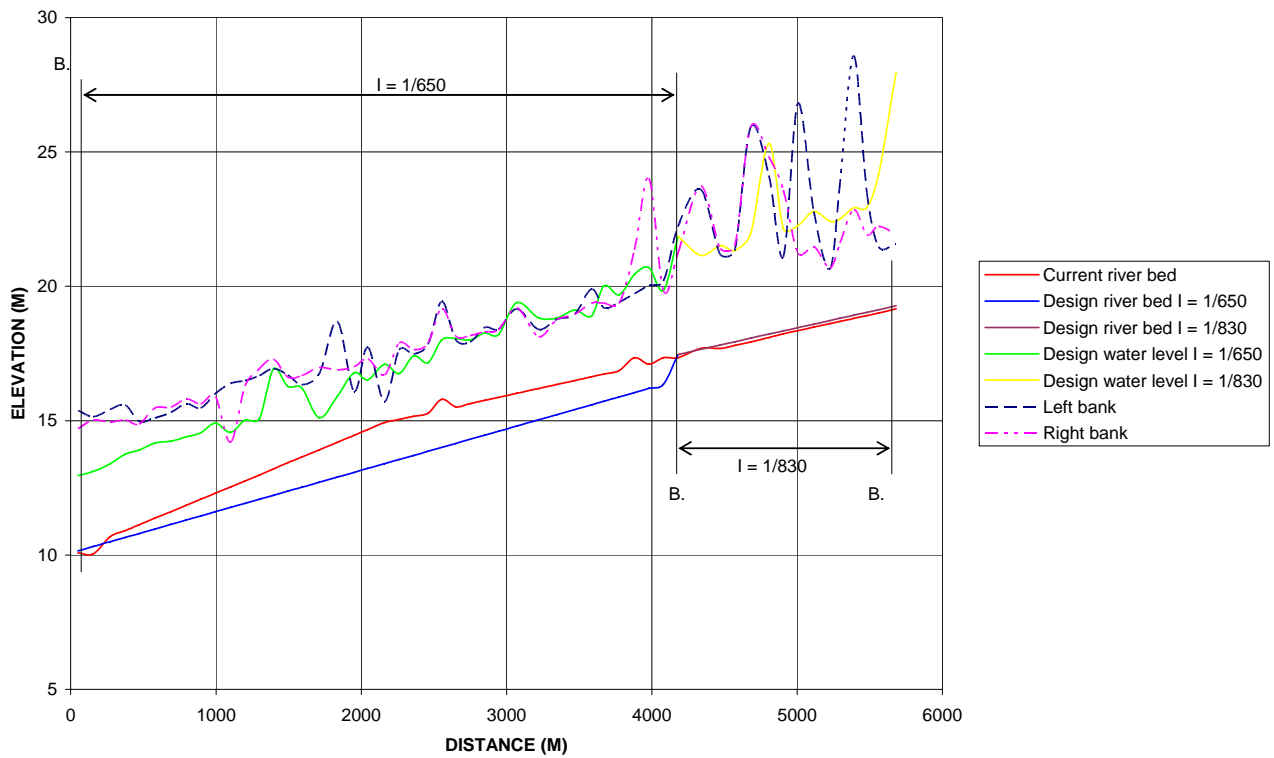
#### (1) Badung River

##### 1) River Improvement Standard Section.



##### 2) vertical slope

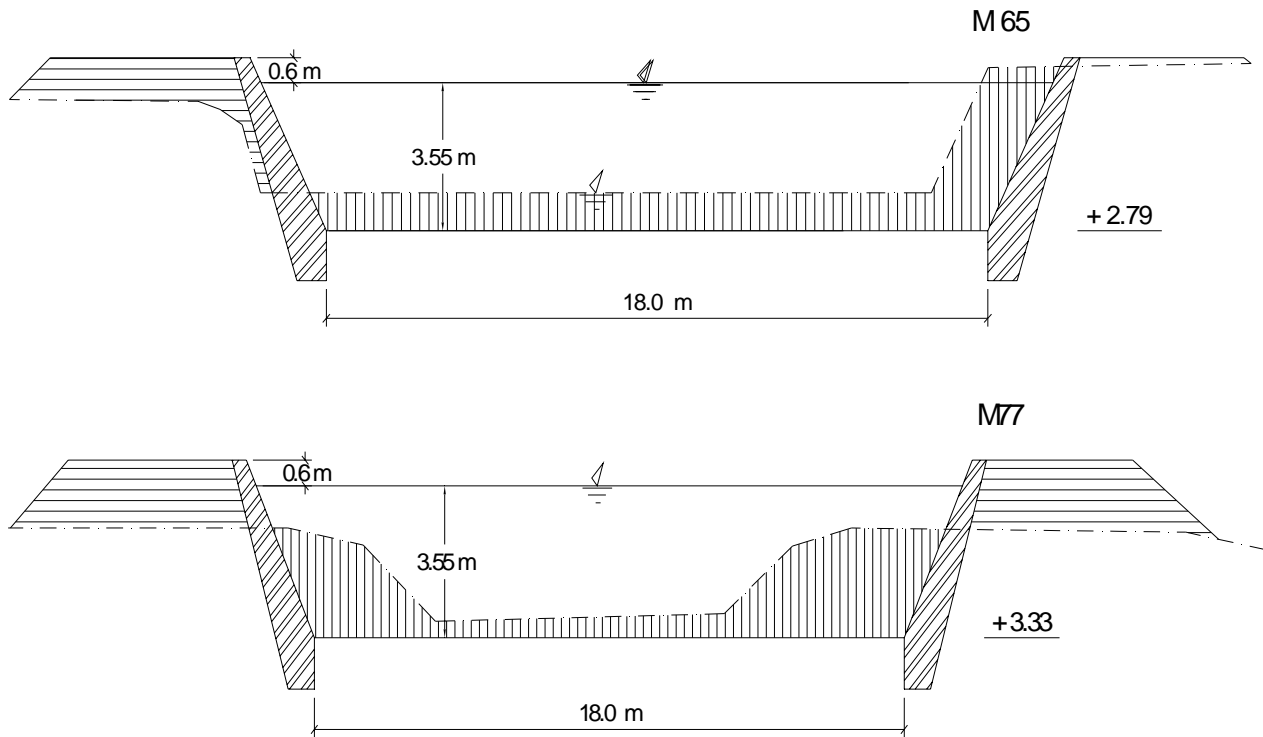
PROFILE OF BADUNG RIVER



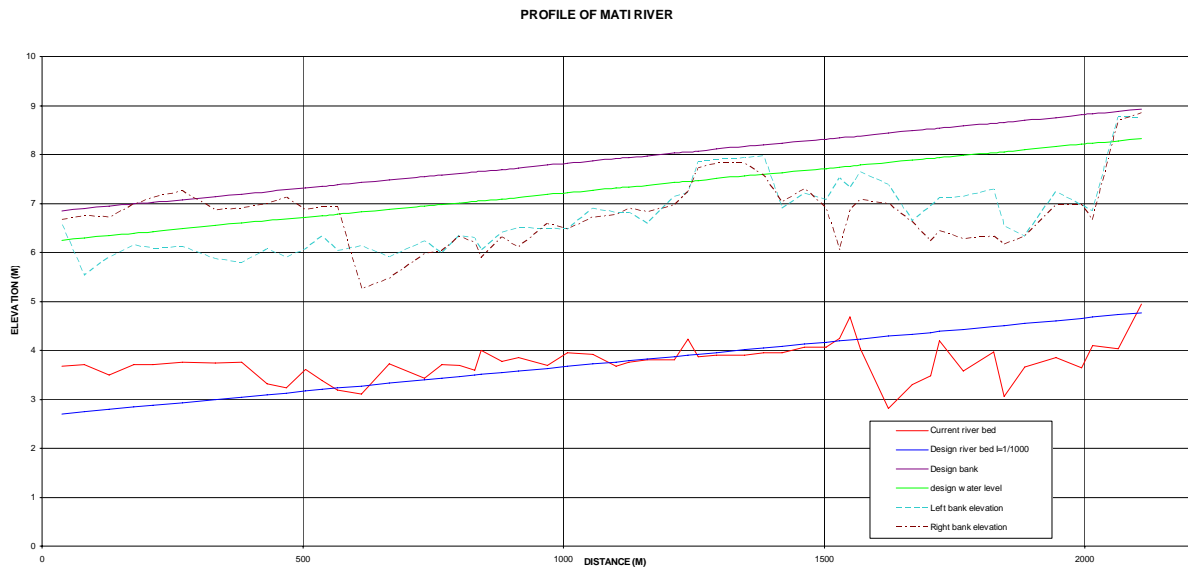


(2) Mati River

1) River Improvement Standard Section.



2) vertical slope





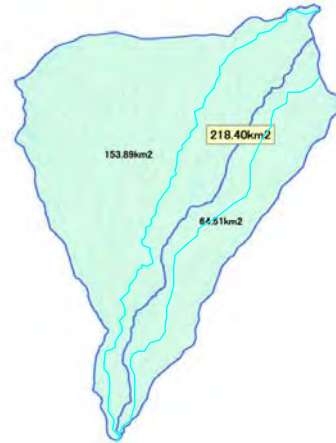
## **C4 Sabo-data**

## C4 Design for Check Dam

In consideration of the relationship between possible dam height and reservoir volume, design sediment capacity for Ayung dam shall be secured by dividing into capacity with 1,000,000 m<sup>3</sup> stored in reservoir and capacity with 3,600,000 m<sup>3</sup> stored or controlled by check dams constructed at upstream in Ayung River and Siap River. As of sediment inflow, proportion of suspended load and bed load is estimated as 1:3.6, suspended load with volume of 1,000,000 m<sup>3</sup>(equivalent to 22% of total sediment volume) which passing the check dams shall be accumulated in dam reservoir. Remaining bed load, equivalent to 78% of total sediment volume, shall be trapped and excavated periodically in check dams located both Ayung River and Siap.

### (1) Catchments Area

- Total Catchment Area → 218.4 km<sup>2</sup>
- Ayung river → 153.9 km<sup>2</sup>
- Siap river → 64.5 km<sup>2</sup>



### (2) Design Sediment Volume

Design sediment volume for check dams was calculated by estimating the storing volume of bed load for 1 year. Design sediment volume is shown in Table-C.1.

#### 【Ayung River】

$$\begin{aligned} & \cdot 417 \text{ m}^3/\text{km}^2/\text{year} \times 153.9 \text{ km}^2 \times 1 \text{ years} = 64,176.3 \text{ m}^3 \\ & \doteq 64,200 \text{ m}^3 \Rightarrow \times(78.3\%) \Rightarrow \mathbf{50,300 \text{ m}^3} \end{aligned}$$

#### 【Siap river】

$$\begin{aligned} & \cdot 417 \text{ m}^3/\text{km}^2/\text{year} \times 64.5 \text{ km}^2 \times 1 \text{ years} = 26,896.5 \text{ m}^3 \\ & \doteq 26,900 \text{ m}^3 \Rightarrow \times(78.3\%) \Rightarrow \mathbf{21,100 \text{ m}^3} \end{aligned}$$

**Table-C.1 Design Sediment Volume for Check Dams**

River	Area	Annual Sediment Inflow	Design Sediment Volume	Remarks
Ayung River	153.9 km <sup>2</sup>	64,200 m <sup>3</sup>	50,300 m <sup>3</sup>	equivalent to 78% of total sediment inflow volume
Siap river	64.5 km <sup>2</sup>	26,900 m <sup>3</sup>	21,100 m <sup>3</sup>	

Note) : Annual Sediment Inflow : Specific Inflow 417 m<sup>3</sup>/km<sup>2</sup>/year X area(Km<sup>2</sup>)

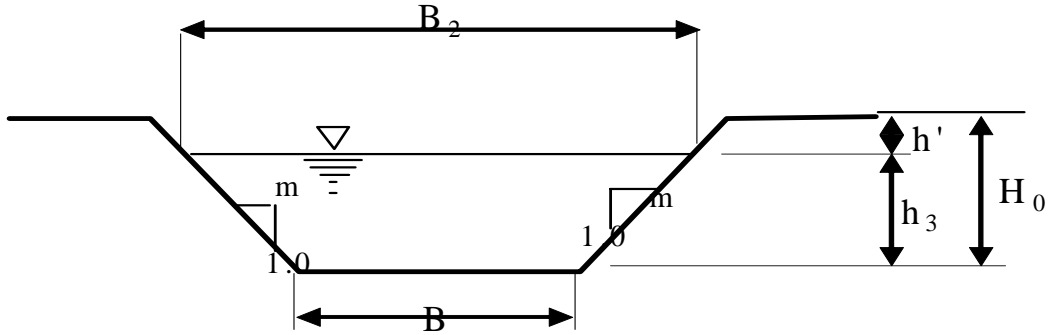
### (3) Waterway

Based on the probable discharge analysis, design discharge for waterway with return period of 25 years was calculated as 570 m<sup>3</sup>/s for check dam in Ayung River and 240 m<sup>3</sup>/s for check dam in Siap River. Depth of overflowing is calculated by formula as shown in below:



$$Q = (0.71h^3 + 1.77B_1) h^3 \quad (3.1)$$

Where,  $Q$  : Discharge ( $m^3/sec$ )       $C$  : Coefficient (0.60~0.66)  $C=0.6$   
 $g$  : Gravity ( $9.8m/sec^2$ )       $B_1$  : Base width (m)  
 $B_2$  : Water width (m)       $m_2$  : Slope Gradient ( $m_2=0.5$ )



**Figure-C.1 Calculation of Overflow Depth for Waterway**

Specifications of waterways are summarized as shown in Table-C.2.

**Table-C.2 Specifications of Waterways**

Dam	Design Discharge	Base Width	Overflow Depth
Ayung River	$570 m^3/s$	20 m	6.0 m
Siap River	$240 m^3/s$	10 m	5.2 m

**【 Calculation result 】**  
**(Ayung River)**

**Calculation of Overflow Section**

<b>Package</b>	M-5
<b>Facility</b>	KR-C1,C2,C3,C6,C7

remarks.	
	Data Input
	Calculation

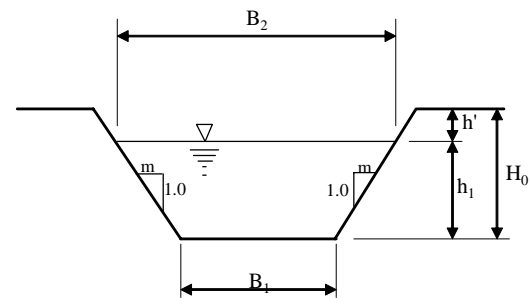
Flow Rate	: Q (m <sup>3</sup> /sec)	
Bottom Width	: B <sub>1</sub>	20.00 m
Discharge Coefficient	: C	0.60
Gravitational Acceleration	: g	9.8 m/sec <sup>2</sup>
Gradient of Side	: 1 : m	0.50
First Depth	: h <sub>0</sub>	5.00 m

Free Board	: h'	1.00 m
Calculation Step	: Δh	0.20 m
<b>Height of Overflow Section</b>	<b>: H<sub>0</sub></b>	<b>7.00 m</b>
<b>Overflow Depth</b>	<b>: h<sub>1</sub></b>	<b>6.00 m</b>
Discharge (Tr=50years)	: Q <sub>50</sub>	570 m <sup>3</sup> /sec
Increase	: α	0 %
Design Discharge	: Q <sub>D</sub> = α Q	570.0 m <sup>3</sup> /sec
<b>Discharge Check Q</b>	<b>: Q&gt;Q<sub>D</sub></b>	<b>646.84 m<sup>3</sup>/sec</b>

$$Q = \frac{2}{15} \times C \times (2g)^{1/2} \times (3B_1 + 2B_2) \times h_1^{3/2} \times Q > Q_p$$

h <sub>1</sub> (m)	B <sub>1</sub> (m)	B <sub>2</sub> (m)	Q (m <sup>3</sup> /sec)	Judgment
5.00	20.00	25.00	435.58	NO
5.20	20.00	25.20	463.65	NO
5.40	20.00	25.40	492.43	NO
5.60	20.00	25.60	521.92	NO
5.80	20.00	25.80	552.11	NO
<b>6.00</b>	<b>20.00</b>	<b>26.00</b>	<b>582.99</b>	<b>OK</b>
6.20	20.00	26.20	614.57	OK
6.40	20.00	26.40	646.84	OK
6.60	20.00	26.60	679.80	OK
6.80	20.00	26.80	713.44	OK
7.00	20.00	27.00	747.77	OK
7.20	20.00	27.20	782.79	OK
7.40	20.00	27.40	818.48	OK
7.60	20.00	27.60	854.85	OK

Design Discharge Q <sub>p</sub> (m <sup>3</sup> /sec)	Free Board (m)
Q <sub>p</sub> < 200	0.6
200 < Q <sub>p</sub> < 500	0.8
500 < Q <sub>p</sub>	1.0



$$Q = \frac{2}{15} \times C \times (2g)^{1/2} \times (3B_1 + 2B_2) \times h_1^{3/2}$$

(Siap river)

Calculation of Overflow Section

<b>Package</b>	M-5
<b>Facility</b>	KR-C1,C2,C3,C6,C7

remarks.

	Data Input
	Caluculation

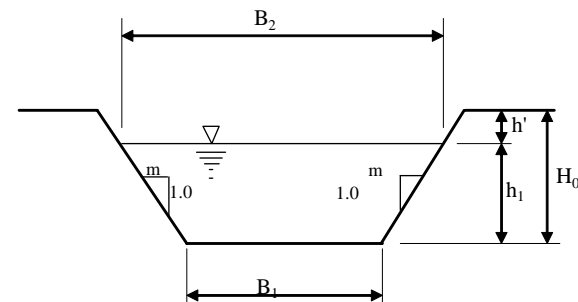
Flow Rate	: Q (m <sup>3</sup> /sec)	
Bottom Width	: B <sub>1</sub>	10.00 m
Discharge Coefficient	: C	0.60
Gravitational Acceleration	: g	9.8 m/sec <sup>2</sup>
Gradient of Side	: 1 : m	0.50
First Depth	: h <sub>0</sub>	4.40 m

Free Board	: h'	0.80 m
Calculation Step	: Δ h	0.20 m
<b>Height of Overflow Section : H<sub>0</sub></b>		<b>6.00 m</b>
<b>Overflow Depth : h<sub>1</sub></b>		<b>5.20 m</b>
Discharge (Tr=50years)	: Q <sub>50</sub>	240 m <sup>3</sup> /sec
Increase	: α	0 %
Design Discharge	: Q <sub>D</sub> = α Q	240.0 m <sup>3</sup> /sec
<b>Discharge Check Q : Q &gt; Q<sub>D</sub></b>		<b>304.75 m<sup>3</sup>/sec</b>

$$Q = \frac{2}{15} \times C \times (2g)^{1/2} \times B_1 + h \times m \times 2 \times (3B_1 + 2B_2) \times h_1^{3/2} \quad Q > Q_p$$

h <sub>1</sub> (m)	B <sub>1</sub> (m)	B <sub>2</sub> (m)	Q (m <sup>3</sup> /sec)	Judgment
4.40	10.00	14.40	192.21	NO
4.60	10.00	14.60	206.86	NO
4.80	10.00	14.80	221.99	NO
5.00	10.00	15.00	237.59	NO
<b>5.20</b>	<b>10.00</b>	<b>15.20</b>	<b>253.66</b>	<b>OK</b>
5.40	10.00	15.40	270.22	OK
5.60	10.00	15.60	287.24	OK
5.80	10.00	15.80	304.75	OK
6.00	10.00	16.00	322.73	OK
6.20	10.00	16.20	341.19	OK
6.40	10.00	16.40	360.12	OK
6.60	10.00	16.60	379.53	OK
6.80	10.00	16.80	399.43	OK
7.00	10.00	17.00	419.80	OK

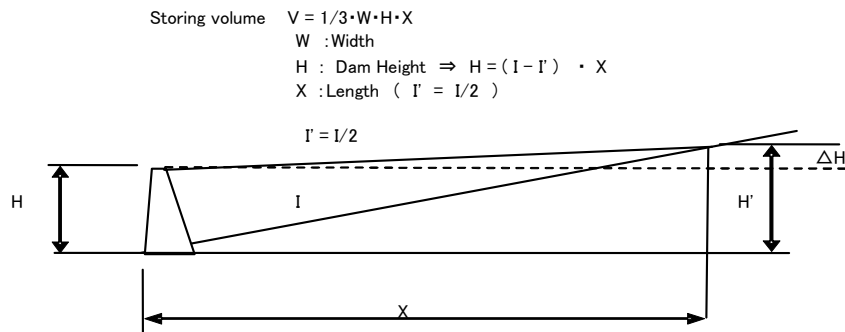
Design Discharge Q <sub>p</sub> (m <sup>3</sup> /sec)	Free Board (m)
Q <sub>p</sub> < 200	0.6
200 < Q <sub>p</sub> < 500	0.8
500 < Q <sub>p</sub>	1.0



$$Q = \frac{2}{15} \times C \times (2g)^{1/2} \times (3B_1 + 2B_2) \times h_1^{3/2}$$

#### (4) Dam Height

Location of dam sites was fixed by taking into account the water level 366m in elevation of reservoir. Storing volume by check dam was calculated by the estimation of 1/2 sediment gradient for river gradient



**Figure-C.2 Calculation for Storing Volume of Check Dam**

Specifications of check dam are summarized as shown in Table-C.3.

**Table-C.3 Specifications of Check Dams**

Items	Ayung River	Siap River
1. Name of River	Ayung	Siap
2. Catchments Area(km <sup>2</sup> )	159.3	64.5
3. Design Sediment Volume(m <sup>3</sup> )	50,300	21,100
4. Design Discharge(m <sup>3</sup> /s)	570	240
5. Waterway Base Length(m)	20	10
6. Over flow Width(m)	6.0	5.2
7. Dam Height(m)	13.0	7.0
8. Design Storing Sediment Length(m)	1,220	990
9. Sediment Volume (m <sup>3</sup> )	50,300	21,100

**【 Calculation result 】**

**(Ayung River)**

**1) Ayung River A=153.9 km<sup>2</sup>**

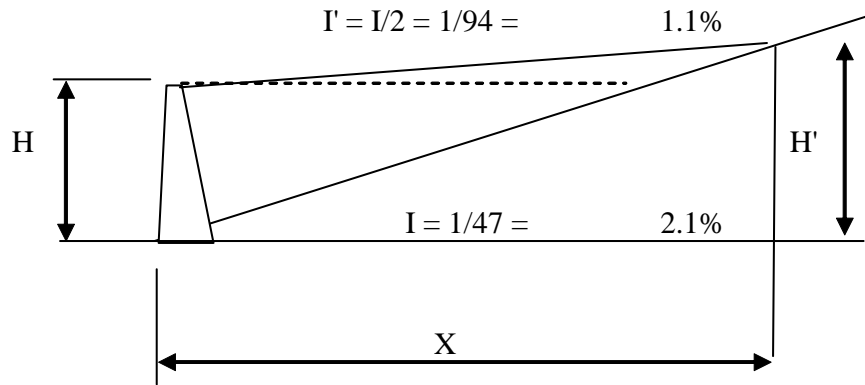
$$417 \text{ m}^3/\text{km}^2/\text{year} \times 153.9 \text{ km}^2 \times 1 \text{ years} = 64,176.3 \text{ m}^3 \doteq 64,200 \text{ m}^3 \Rightarrow \times(78.3\%) \Rightarrow 50,300 \text{ m}^3$$

$$417 \text{ m}^3/\text{km}^2/\text{year} \times 153.9 \text{ km}^2 \times 1 \text{ years} = 64,176.3 \text{ m}^3 \doteq 64,200 \text{ m}^3$$

$$H = (I - I') \cdot X = 1/47 \cdot X$$

$$X = 47 \times H$$

Main Ayung River (Left Branch) : Wide of River Bed W = 20 m



Wide of River Bed 20 m

Dam Height H (m)	Lenght of Sedimentation X (m)	Storage Capacity for Sedimentation V(m3)
1	47	313
2	94	1,253
3	141	2,820
4	188	5,013
5	235	7,833
6	282	11,280
7	329	15,353
8	376	20,053
9	423	25,380
10	470	31,333
11	517	37,913
12	564	45,120
13	611	52,953
14	658	61,413
15	705	70,500

**(Siap river)**

**2) Siap River (Right Branch of Ayung River) 64.5 km<sup>2</sup>**

•  $417 \text{ m}^3/\text{km}^2/\text{year} \times 64.5 \text{ km}^2 \times 1 \text{ years} = 26,896.5 \text{ m}^3 \approx 26,900 \text{ m}^3 \Rightarrow (78.3\%) \Rightarrow 21,100 \text{ m}^3$

$H' = H + \Delta H$                        $H = (I - I') \cdot X = 1/142 \cdot X$

$H' = X \cdot I$  ,  $\Delta H = X \cdot I'$                **$X = 142 \cdot H$**

$X \cdot I = H + X \cdot I'$

Storage Capacity for Sedimentation

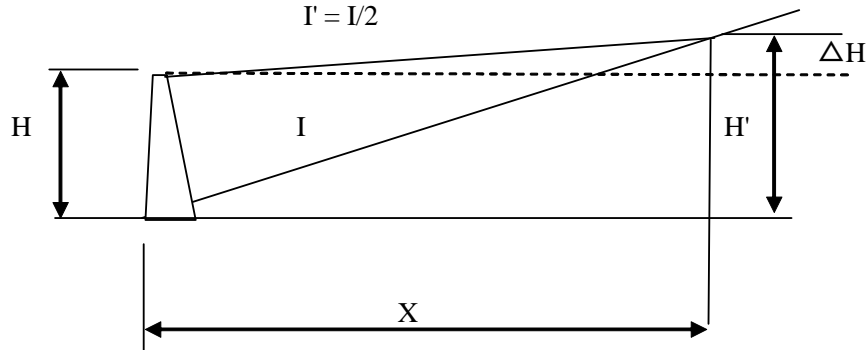
$V = 1/3 \cdot W \cdot H \cdot X$

Where,       $W$  : Wide of River Bed

$H$  : Sediment Trup Dam Height  $\Rightarrow H = (I - I') \cdot X$

$X$  : Lenght of Sedimentation (  $I' = I/2$  )

$I' = I/2$



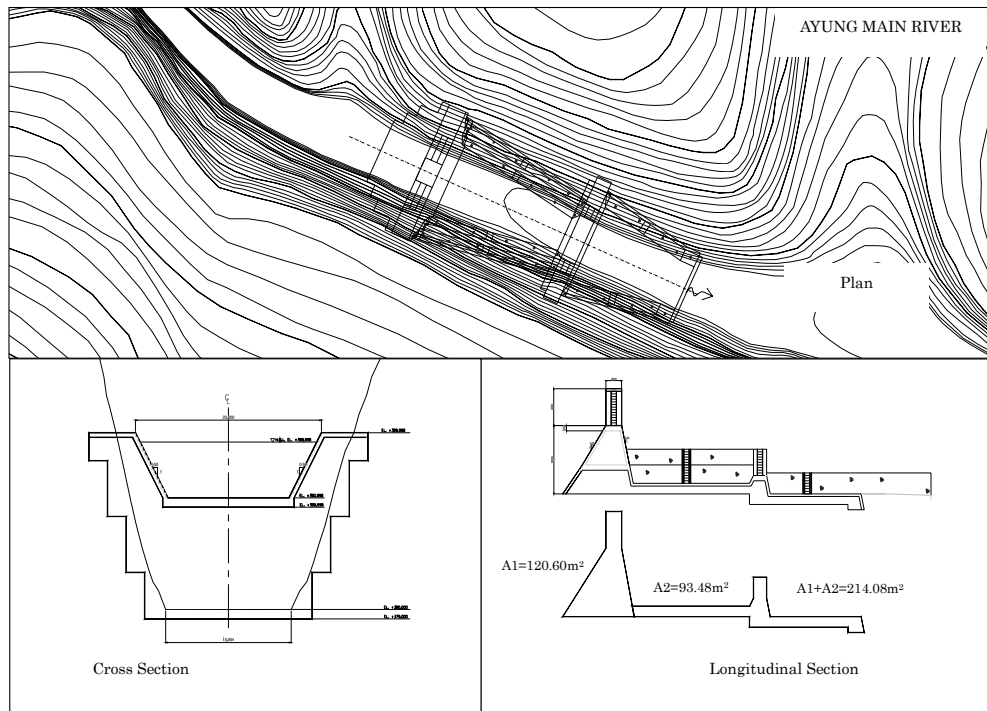
Wide of River Bed                      10 m

Right Branch of Ayung River : Wide of River Bed  $W = 10 \text{ m}$

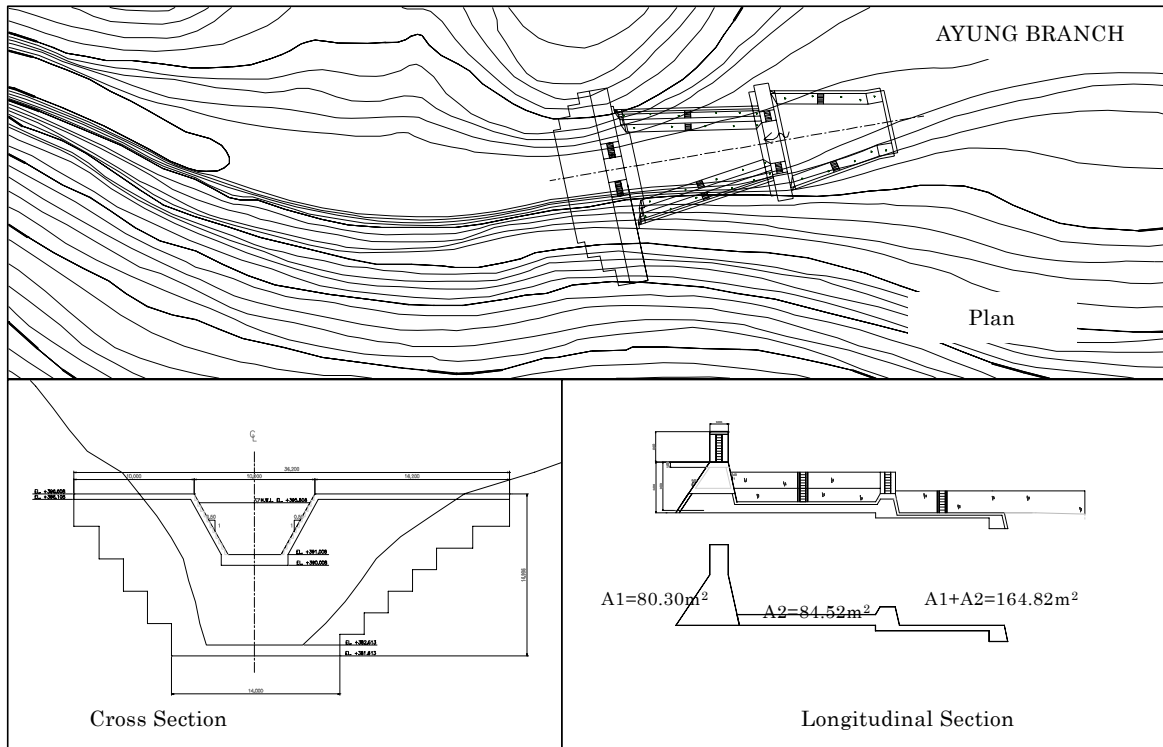
Dam Height	Lenght of Sedimentation	Storage Capacity for Sedimentation
H (m)	X (m)	V(m3)
1	142	473
2	284	1,893
3	426	4,260
4	568	7,573
5	710	11,833
6	852	17,040
7	994	23,193
8	1136	30,293
9	1278	38,340
10	1420	47,333
11	1562	57,273
12	1704	68,160
13	1846	79,993
14	1988	92,773
15	2130	106,500

**(5) Drawings**

Drawings of check dam are summarized as shown in Figure-C.3 and Figure-C.4.



**Figure-C.3 Check Dam in Ayung River**



**Figure-C.4 Check Dam in Siap River**

## **D. Daily Discharge Data**



# **D1 Buleleng Regency**

**D1-1 TK. Sabah**

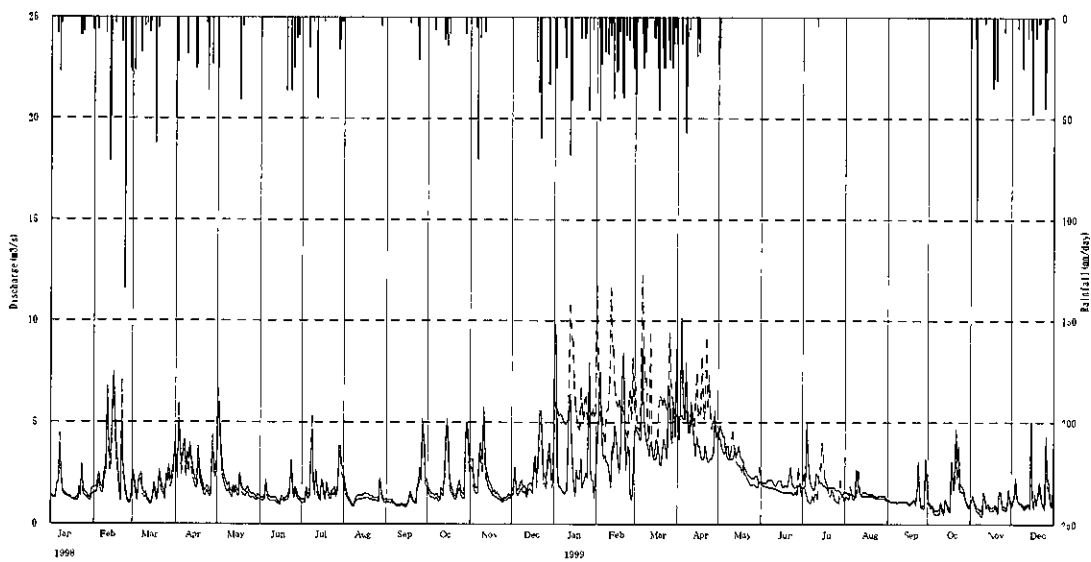
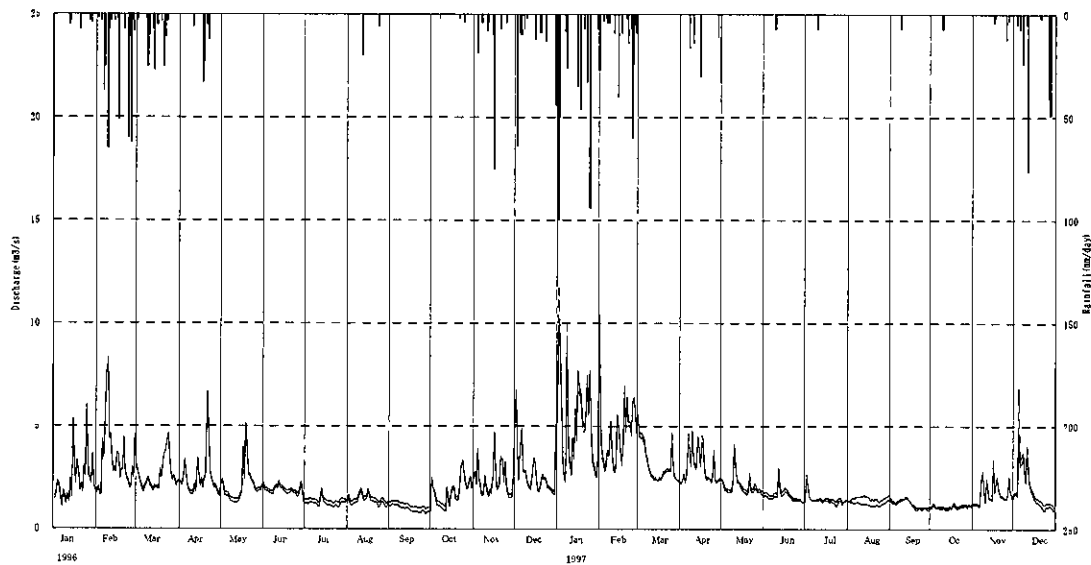
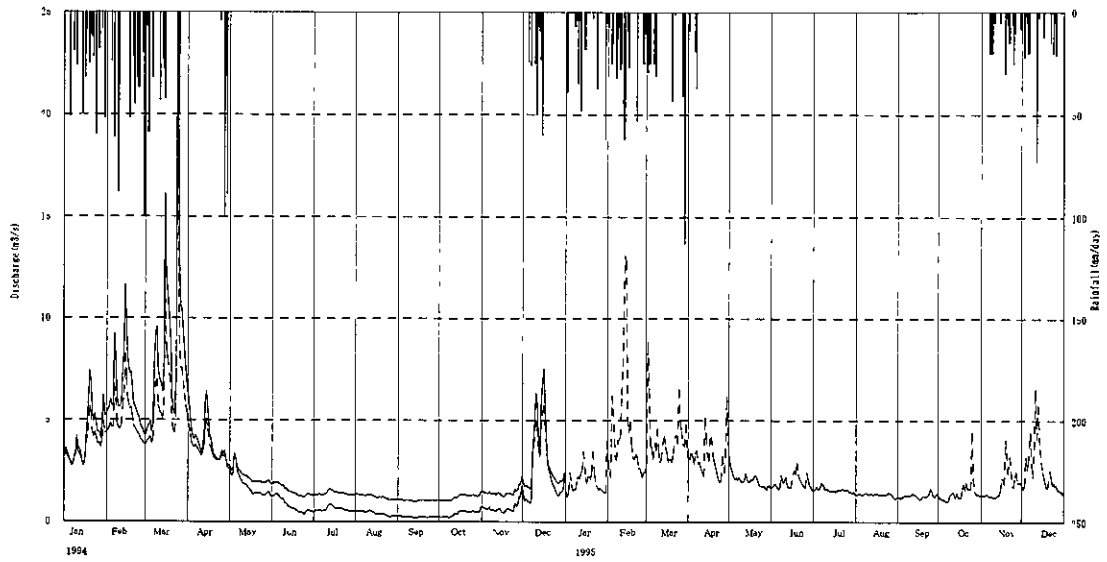


Figure-11 Daily Discharge Sabah

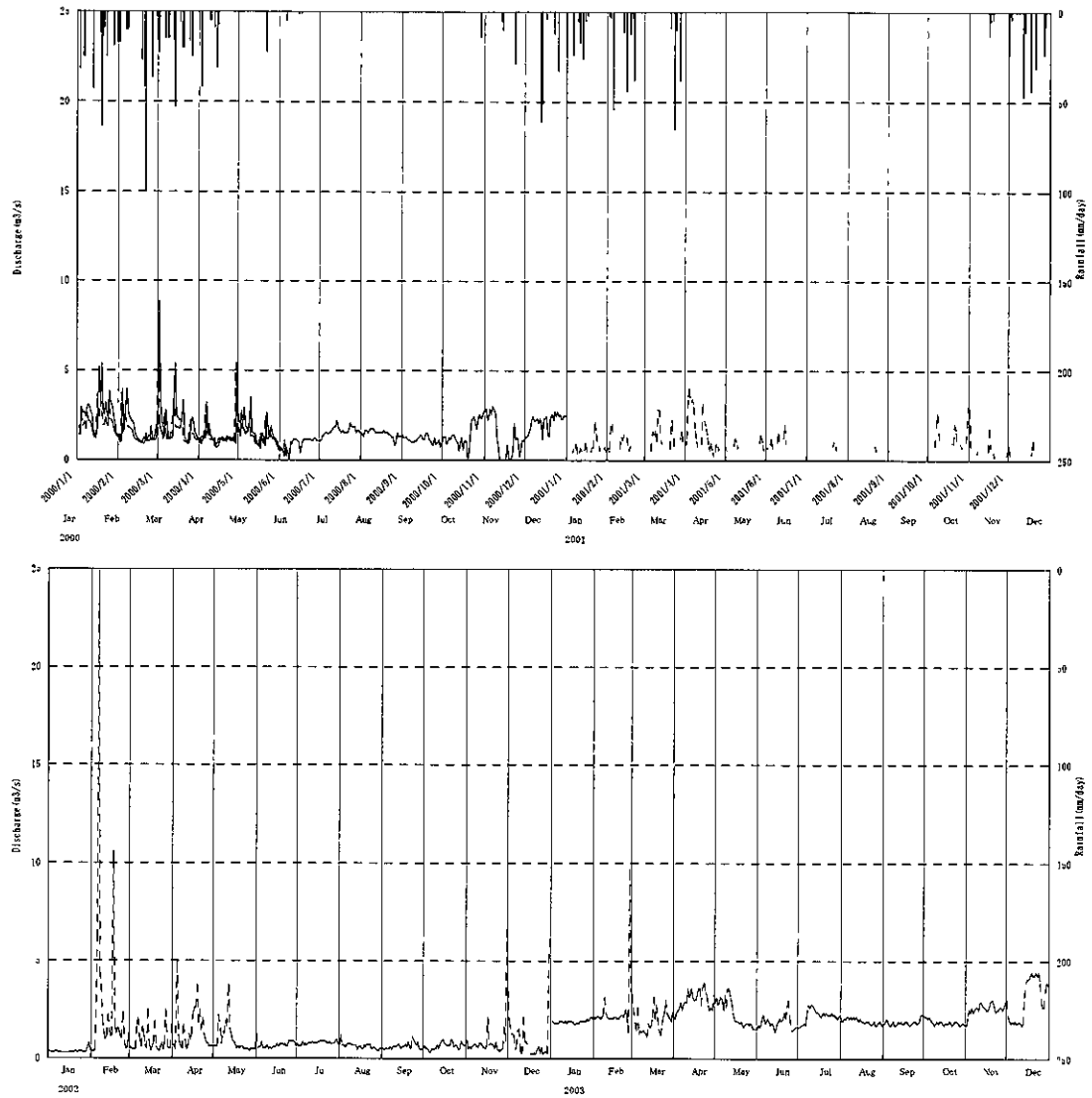


Figure-12 Daily Discharge Sabah

### 1. Results of Discharge Measurement at Tk. Sabah SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge	
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)	
1	(1977-1979)	16-Feb-77	1.06	6.99	0.58	4.05	
2		15-Feb-77	0.97	6.91	0.34	2.35	
3		21-Apr-77	0.87	7.39	0.20	1.48	
4		11-May-77	0.94	6.70	0.31	2.08	
5		10-Jun-77	1.01	8.48	0.51	4.32	
6		5-Jul-77	0.88	7.96	0.19	1.51	
7		25-Aug-77	0.82	7.53	0.13	0.98	
8		22-Sep-77	0.90	8.67	0.12	1.04	
9		11-Oct-77	0.85	7.72	0.12	0.93	
10		16-Nov-77	0.86	7.31	0.16	1.17	
11		16-Dec-77	0.90	6.91	0.24	1.66	
12		9-Jan-78	1.02	6.82	0.43	2.93	
13		14-Feb-78	0.99	5.66	0.44	2.49	
14		16-Mar-78	1.03	8.86	0.35	3.10	
15		11-Apr-78	1.08	7.14	0.57	4.07	
16		11-May-78	1.02	6.91	0.45	3.11	
17		8-Jun-78	1.02	6.56	1.02	6.69	
18		10-Jul-78	1.08	8.77	0.48	4.21	
19		8-Aug-78	0.99	7.69	0.23	1.77	
20		12-Sep-78	0.92	7.30	0.24	1.75	
21		17-Oct-78	0.90	9.93	0.16	1.59	
22		9-Nov-78	0.95	7.65	0.27	2.07	
23		12-Dec-78	0.97	7.33	0.36	2.64	
24		17-Jan-79	1.03	7.16	0.46	3.29	
25		13-Feb-79	0.97	6.44	0.35	2.25	
26		13-Mar-79	1.23	11.18	0.64	7.16	
27		17-Apr-79	1.02	8.51	0.35	2.98	
28		29-May-79	1.11	9.50	0.53	5.04	
29		13-Jun-79	1.01	7.83	0.36	2.82	
30		17-Jul-79	0.88	4.68	0.39	1.83	
31		8-Aug-79	0.90	4.81	0.34	1.64	
32		16-Oct-79	0.94	5.60	0.22	1.23	
33		13-Nov-79	0.96	7.21	0.27	1.95	
34		11-Dec-79	0.93	8.28	0.19	1.57	
35	(1980-1982)	15-Jan-80	1.02	7.67	0.32	2.45	
36		14-Feb-80	0.97	9.38	0.24	2.25	
37		11-Mar-80	1.14	8.98	0.58	5.21	
38		17-Apr-80	1.10	8.95	0.45	4.03	
39		22-May-80	0.96	5.94	0.33	1.96	
40		24-Jun-80	0.93	5.67	0.29	1.64	
41		15-Jul-80	0.94	5.44	0.31	1.69	
42		27-Aug-80	0.91	5.20	0.24	1.25	
43		24-Sep-80	0.92	5.99	0.18	1.08	
44		23-Oct-80	0.90	6.08	0.18	1.09	
45		27-Nov-80	0.96	7.38	0.27	1.99	
46		16-Dec-80	0.92	5.65	0.28	1.58	
47		20-Jan-81	1.04	5.76	0.78	4.49	
48		24-Feb-81	0.97	4.82	0.58	2.80	
49			22-Apr-81	1.03	7.48	0.47	3.52
50			20-May-81	0.99	6.78	0.38	2.58

No	Period	Date of Measurement	Stage Height H (m)	Flow Area		Velocity		Discharge	
				A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)			
51		16-Jun-81	0.95	6.30	0.33	2.08			
52		28-Jul-81	0.93	7.63	0.24	1.83			
53		26-Aug-81	0.90	6.20	0.25	1.55			
54		22-Sep-81	0.88	6.72	0.20	1.34			
55		13Oct81	0.87	6.98	0.20	1.40			
56		4-Nov-81	0.90	6.72	0.22	1.48			
57		8-Dec-81	1.00	6.80	0.46	3.13			
58		30-Jan-82	1.35	7.12	0.81	5.77			
59		16-Mar-82	1.42	1.00	-	0.00			
60		25-May-82	1.19	5.55	0.52	2.89			
61		15-Jun-82	1.15	5.54	0.38	2.11			
62		27-Jul-82	1.11	6.34	0.21	1.33			
63		24-Aug-82	1.12	5.92	0.25	1.48			
64		21-Sep-82	1.11	5.77	0.24	1.38			
65		27-Oct-82	1.09	5.94	0.18	1.07			
66		23-Nov-82	1.11	4.85	0.31	1.50			
67		22-Dec-82	1.15	5.78	0.34	1.97			
68	<b>(1983-1986)</b>	19-Jan-83	1.23	7.01	0.47	3.29			
69		8-Feb-83	1.06	6.17	0.39	2.41			
70		25-Jul-83	1.10	6.18	0.24	1.48			
71		26-Aug-83	1.08	5.04	0.31	1.56			
72		24-Oct-83	1.09	5.36	0.34	1.82			
73		13-Dec-83	1.24	5.58	0.79	4.41			
74		27-Jan-84	1.14	6.14	0.37	2.27			
75		6-May-85	1.19	7.60	0.41	3.12			
76		20-Jan-86	1.22	7.88	0.47	3.70			
77		25-Jun-86	1.17	8.12	0.28	2.27			
78	<b>(1990-1992)</b>	8-May-90	1.80	4.84	0.52	2.52			
79		26-Jun-90	1.29	4.78	0.48	2.29			
80		18-Jul-90	1.22	4.08	0.43	1.75			
81		22-Aug-90	1.19	4.04	0.38	1.54			
82		25-Sep-90	1.14	3.67	0.30	1.10			
83		12-Dec-90	1.84	13.49	1.55	20.91			
84		16-May-91	0.90	6.45	0.64	4.13			
85		25-Jun-91	0.71	4.26	0.47	2.00			
86		13-Aug-91	0.70	4.46	0.45	2.01			
87		16-Sep-91	0.64	3.64	0.37	1.35			
88		25-Oct-91	0.67	3.94	0.35	1.38			
89		4-Dec-91	0.84	5.20	0.46	2.39			
90		15-Jan-92	0.82	5.81	0.43	2.50			
91		20-Feb-92	0.96	7.20	0.60	4.32			
92		18-Jun-92	0.79	6.10	0.31	1.89			
93		21-Jul-92	0.78	5.98	0.29	1.73			
94		19-Aug-92	0.70	5.28	0.25	1.32			
95		13-Oct-92	0.79	7.20	0.26	1.87			
96		29-Dec-92	0.78	6.10	0.78	4.76			
97	<b>(1993-1994)</b>	9-Jun-93	0.86	5.19	0.36	1.87			
98		15-Jul-93	0.84	5.37	0.31	1.66			
99		25-Aug-93	0.98	7.51	0.20	1.50			
100		21-Sep-93	1.01	7.73	0.18	1.39			
101		27-Oct-93	0.95	6.12	0.22	1.35			
102		10-Dec-93	1.01	6.14	0.48	2.95			

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
103		19-May-94	0.94	6.46	0.31	2.00
104		12-Jul-94	0.90	7.58	0.23	1.74
105		13-Sep-94	1.23	6.40	0.18	1.15
106		18-Oct-94	1.27	5.28	0.26	1.37
107		16-Nov-94	1.25	4.31	0.29	1.25
108		12-Dec-94	1.51	8.52	0.44	3.75
109	(1995-1997)	16-Feb-95	1.10	8.81	0.40	3.52
110		28-Aug-95	0.86	5.55	0.21	1.17
111		13-Feb-96	1.03	8.40	0.31	2.60
112		8-May-96	0.93	6.55	0.24	1.57
113		29-Jul-96	0.88	5.19	0.27	1.40
114		16-Sep-96	0.85	5.10	0.21	1.07
115		7-Jan-97	0.95	6.34	0.30	1.90
116		27-May-97	0.93	6.28	0.28	1.76
117		23-Jun-97	0.92	7.05	0.22	1.54
118		16-Sep-97	1.13	4.98	0.38	1.89
		Hmax=	1.84			Qmax=20.910
		Hmin=	0.64			Qmin=0.00

**D1-2 TK. Mendaum**



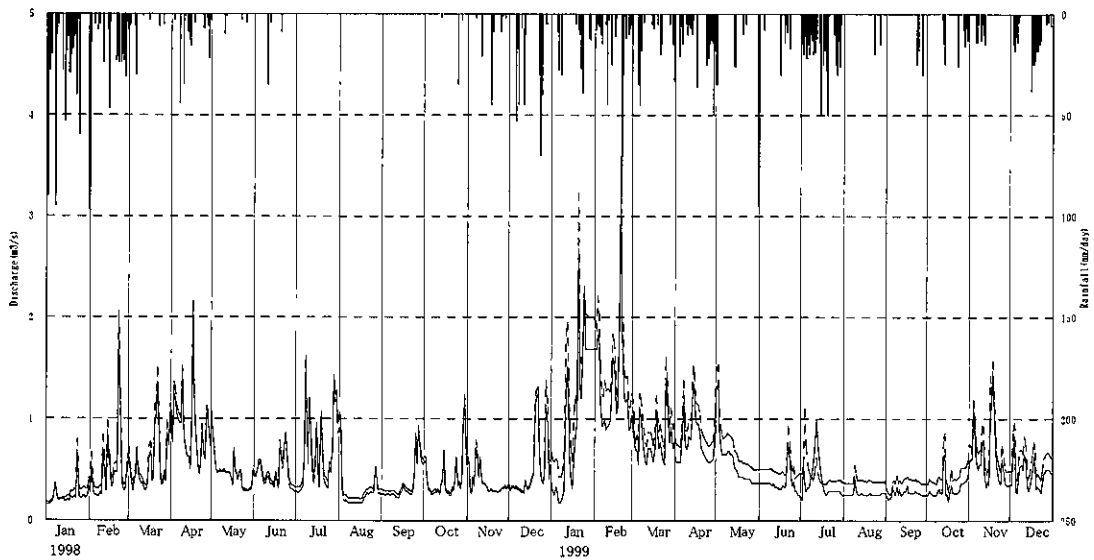
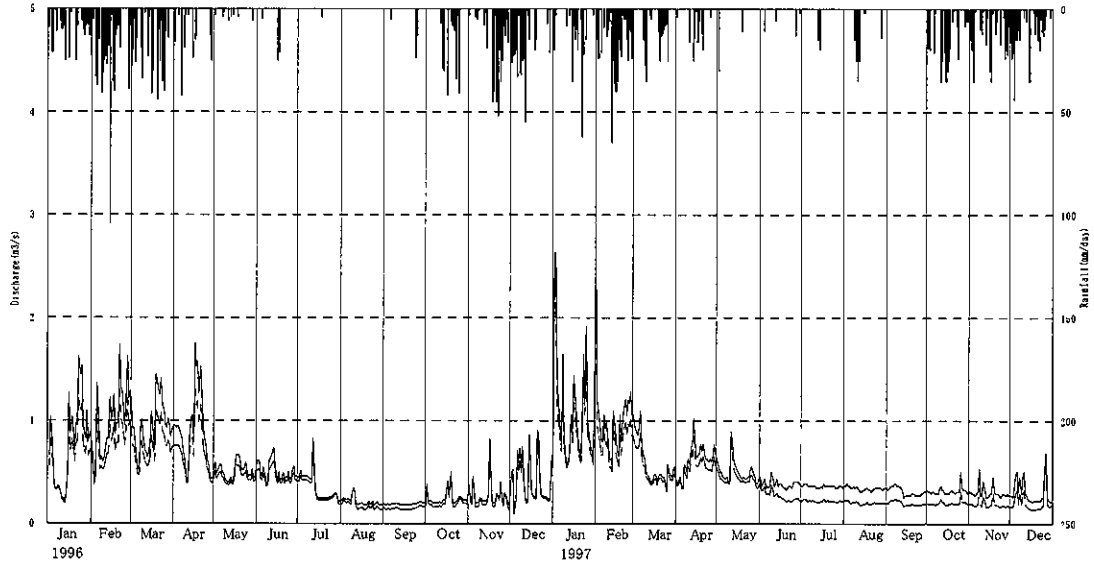
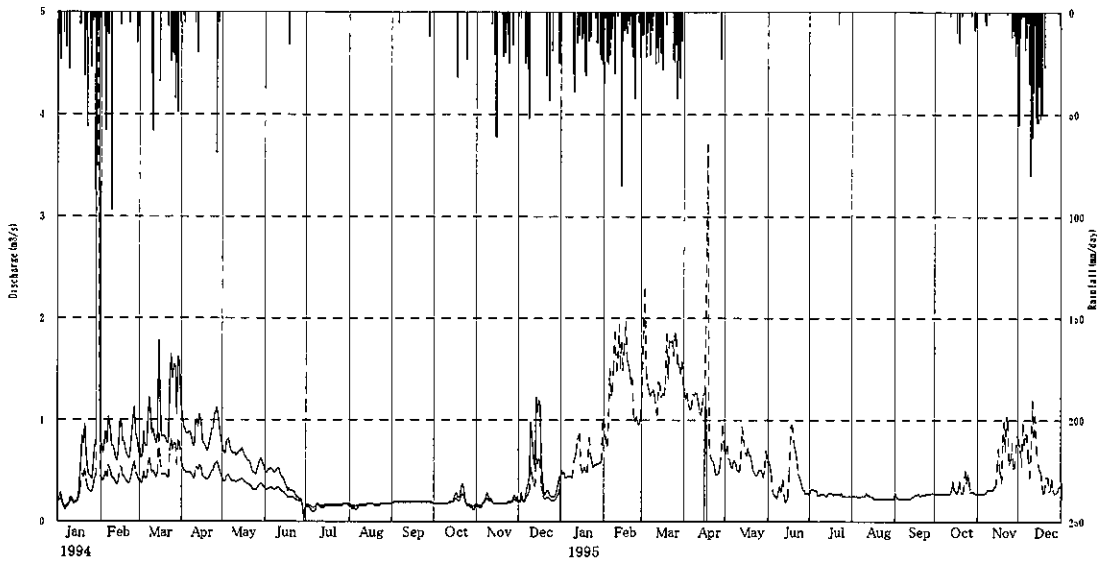


Figure-21 Daily Discharge Mendaum

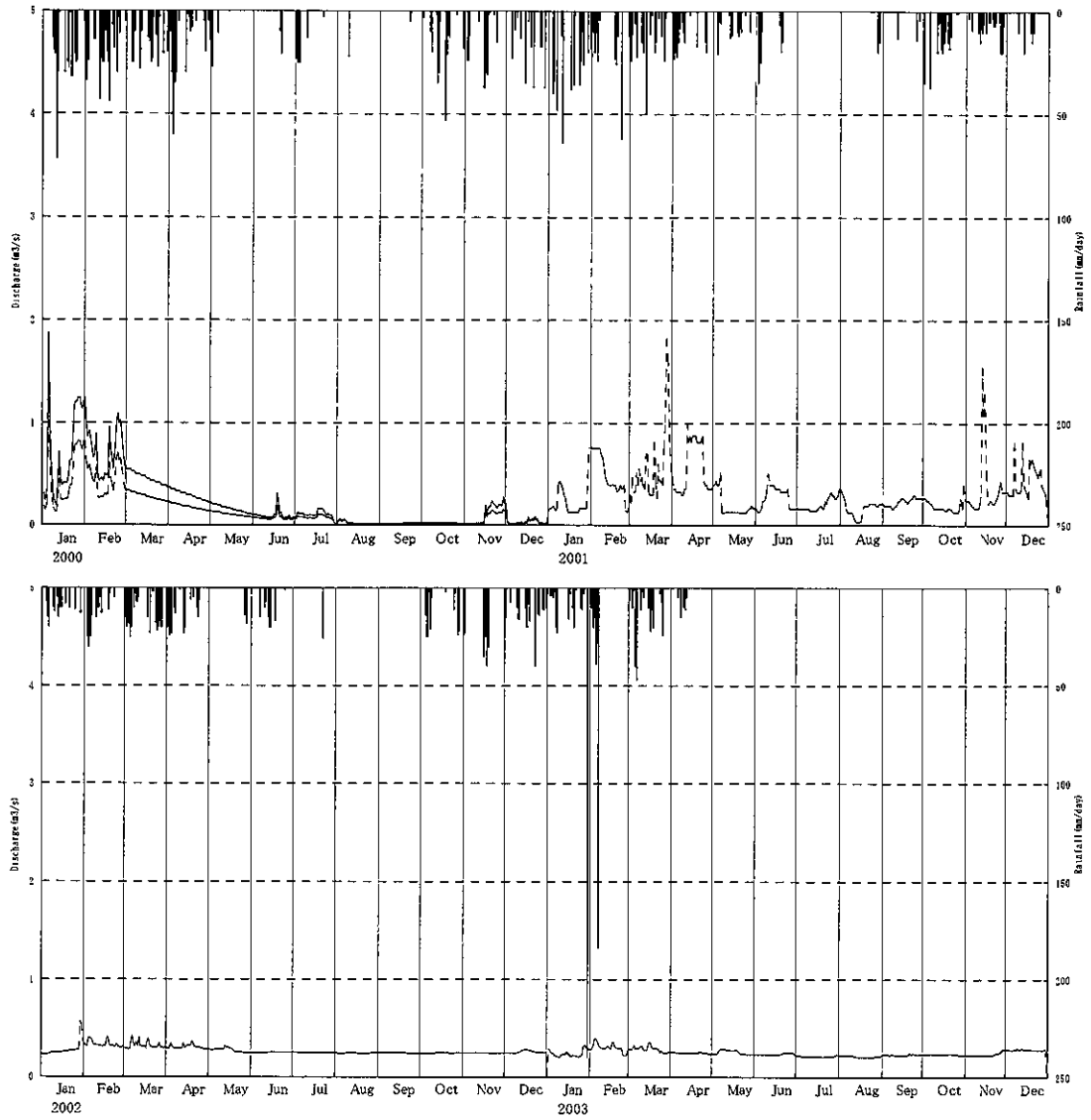


Figure-2.2 Daily Discharge Mendaum

## 2. Results of Discharge Measurement at Tk. Medaum SGS

No.	Period	Date of Measurement	Stage Height H (m)	Flow Area		Velocity		Discharge	
				A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)			
1	<b>(1981-1986)</b>	22-Apr-81	0.74	2.56	0.29	0.74			
2		21-May-81	0.67	2.29	0.21	0.48			
3		16-Jun-81	0.65	2.17	0.17	0.37			
4		28-Jul-81	0.66	1.97	0.26	0.51			
5		26-Aug-81	0.60	1.6	0.16	0.26			
6		26-Sep-81	0.66	2.26	0.2	0.45			
7		13-Oct-81	0.73	2.54	0.32	0.81			
8		4-Oct-81	0.76	2.54	0.32	0.81			
9		8-Dec-81	0.78	3.31	0.38	1.26			
10		20-Jan-82	0.91	3.78	0.52	1.97			
11		25-May-82	0.67	2.22	0.2	0.44			
12		15-Jun-82	0.55	2.1	0.08	0.17			
13		28-Jul-82	0.57	2.26	0.1	0.23			
14		24-Aug-82	0.55	2	0.09	0.18			
15		21-Sep-82	0.54	1.44	0.11	0.16			
16		27-Oct-82	0.55	1.54	0.08	0.12			
17		23-Nov-82	0.53	1.44	0.08	0.12			
18		22-Dec-82	0.53	1.68	0.07	0.12			
19		19-Jan-83	0.75	2.14	0.21	0.45			
20		8-Feb-83	0.75	2.56	0.17	0.44			
21		25-Jul-83	0.66	1.7	0.1	0.17			
22		27-Jan-84	0.74	1.53	0.21	0.32			
23		20-Jan-86	0.85	3.22	0.33	1.06			
24		27-Aug-86	0.83	3.12	0.27	0.84			
25	<b>(1990-1993)</b>	8-May-90	0.77	1.58	0.3	0.47			
26		20-Jun-90	0.81	1.79	0.39	0.70			
27		18-Jul-90	0.89	2.3	0.44	1.01			
28		22-Aug-90	0.71	1.15	0.23	0.26			
29		25-Sep-90	0.70	0.99	0.19	0.19			
30		14-Dec-90	0.84	2.03	0.39	0.79			
31		6-Feb-91	0.88	2.49	0.45	1.12			
32		16-May-91	0.86	2.24	0.46	1.03			
33		25-Jun-91	0.64	1.57	0.17	0.27			
34		13-Aug-91	0.61	1.11	0.22	0.24			
35		16-Sep-91	0.58	0.94	0.19	0.18			
36		25-Oct-91	0.58	1.08	0.17	0.18			
37		15-Jan-92	0.71	1.77	0.26	0.46			
38		20-Feb-92	0.88	3.12	0.39	1.22			
39		18-Jun-92	0.61	1.28	0.22	0.28			
40		21-Jul-92	0.65	1.33	0.23	0.31			
41		19-Aug-92	0.56	1	0.18	0.18			
42		31-Oct-92	0.56	1.06	0.19	0.20			
43	9-Jun-93	0.65	1.74	0.15	0.26				
44	15-Jul-93	0.63	1.31	0.16	0.21				
45	21-Sep-93	0.59	1.35	0.11	0.15				
46	22-Oct-93	0.61	0.62	0.22	0.14				
47	30-Nov-93	0.60	0.91	0.11	0.10				
48	10-Dec-93	0.80	2.4	0.31	0.74				
49	<b>(1994-1997)</b>	19-May-94	0.72	1.78	0.21	0.37			
50		12-Jul-94	0.62	0.5	0.32	0.16			

No	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
51		13-Sep-94	0.60	0.62	0.3	0.19
52		24-Oct-94	0.63	0.72	0.23	0.17
53		12-Dec-94	0.80	2.04	0.33	0.67
54		16-Feb-95	0.96	2.65	0.57	1.51
55		28-Aug-95	0.62	0.73	0.28	0.20
56		13-Feb-96	0.85	2.48	0.3	0.74
57		8-May-96	0.45	0.83	0.19	0.16
58		29-Jul-96	0.60	1.12	0.17	0.19
59		16-Sep-96	0.62	0.99	0.18	0.18
60		7-Jan-97	0.81	2.69	0.21	0.56
61		27-May-97	0.75	2.76	0.14	0.39
62		23-Jun-97	0.72	1.3	0.17	0.22
63	(After 2000)	18-Oct-00	0.42			0.17
64		7-Apr-01	0.50			0.41
65		23-Oct-01	0.40			0.07
		$H_{max} =$	0.96		$Q_{max} =$	1.97
		$H_{min} =$	0.40		$Q_{min} =$	0.07

**D1-3 TK. Buleleng**

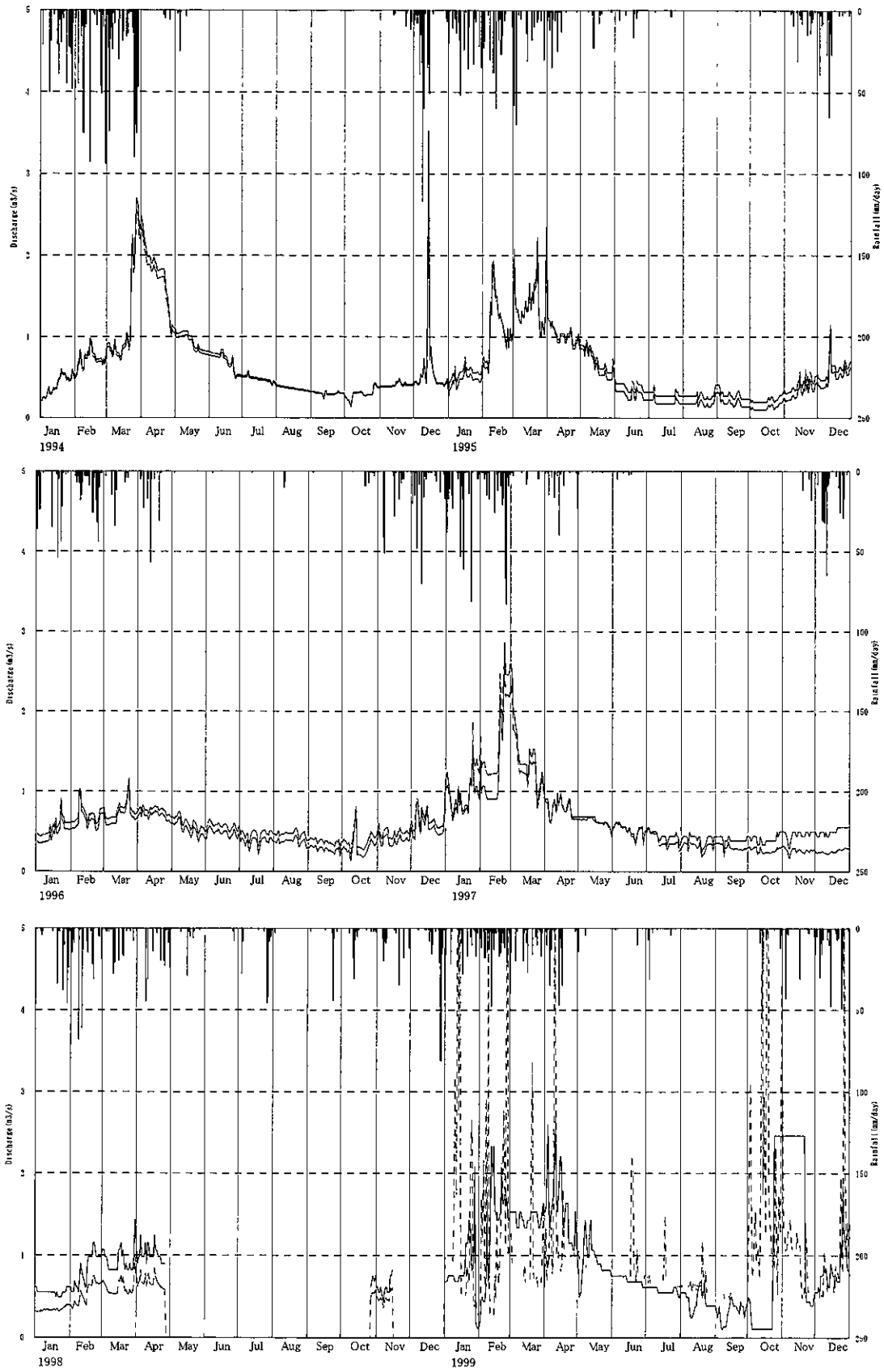


Figure-3 1 Daily Discharge Buleleng

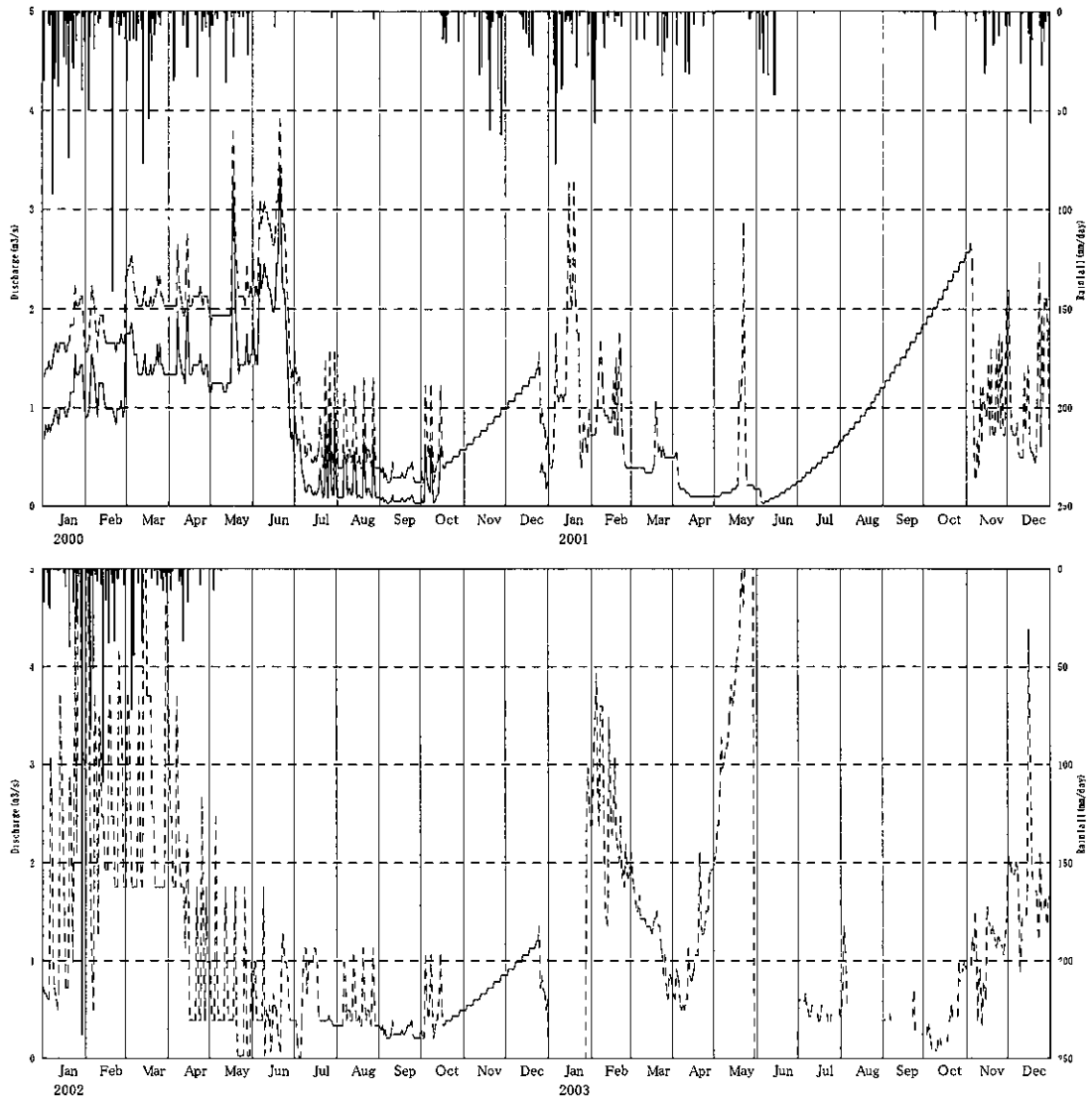


Figure-32 Daily Discharge Buleleng

### 3. Results of Discharge Measurement at Tk. Buleleng SGS

No	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	<b>(1978-1979)</b>	20-Apr-78	0.42	3.17	0.52	1.65
2		10-May-78	0.37	2.77	0.43	1.19
3		7-Jun-78	0.35	2.60	0.40	1.04
4		12-Jul-78	0.35	2.73	0.39	1.06
5		7-Aug-78	0.32	2.40	0.38	0.91
6		11-Sep-78	0.31	2.24	0.32	0.72
7		16-Oct-78	0.29	2.01	0.29	0.58
8		8-Nov-78	0.33	2.37	0.25	0.59
9		12-Dec-78	0.35	2.51	0.32	0.80
10		16-Jan-79	0.35	2.57	0.33	0.85
11		13-Feb-79	0.40	3.00	0.46	1.38
12		12-Mar-79	0.48	3.75	0.53	1.99
13		16-Apr-79	0.39	2.86	0.48	1.37
14		28-May-79	0.36	2.54	0.44	1.12
15		12-Jun-79	0.35	2.50	0.45	1.13
16		18-Jul-79	0.31	1.99	0.38	0.76
17		7-Aug-79	0.30	1.97	0.36	0.71
18		15-Oct-79	0.27	1.81	0.28	0.51
19		12-Nov-79	0.31	1.91	0.24	0.46
20		12-Dec-79	0.31	1.76	0.24	0.42
21	<b>(1980-1986)</b>	14-Jan-80	0.32	2.52	0.26	0.66
22		13-Feb-80	0.34	2.04	0.32	0.65
23		10-Mar-80	0.33	2.48	0.30	0.74
24		16-Apr-80	0.31	2.33	0.36	0.84
25		21-May-80	0.32	2.30	0.34	0.78
26		19-Jun-80	0.29	1.37	0.37	0.51
27		23-Jun-80	0.29	2.10	0.30	0.63
28		14-Jul-80	0.28	2.00	0.29	0.58
29		26-Aug-80	0.27	1.80	0.25	0.45
30		25-Sep-80	0.27	1.87	0.22	0.41
31		22-Oct-80	0.27	1.90	0.21	0.40
32		28-Nov-80	0.31	2.32	0.18	0.42
33		15-Dec-80	0.30	2.28	0.18	0.41
34		19-Jan-81	0.43	3.21	0.49	1.57
35		25-Feb-81	0.36	2.68	0.36	0.96
36		21-Apr-81	0.35	2.55	0.39	0.99
37		21-May-81	0.32	2.39	0.35	0.84
38		17-Jun-81	0.30	2.19	0.30	0.66
39		29-Jul-81	0.28	2.14	0.28	0.60
40		25-Aug-81	0.28	2.04	0.23	0.47
41		23-Sep-81	0.32	2.30	0.18	0.41
42		12-Oct-81	0.27	2.02	0.21	0.42
43		2-Nov-81	0.31	2.18	0.19	0.41
44		7-Dec-81	0.32	2.42	0.20	0.48
45		18-Jan-82	0.40	3.01	0.43	1.29
46		24-May-82	0.32	2.37	0.31	0.73
47		14-Jun-82	0.30	2.30	0.28	0.64
48		23-Aug-82	0.25	1.98	0.24	0.48
49		20-Sep-82	0.25	2.01	0.20	0.40
50		26-Oct-82	0.29	2.24	0.15	0.34



No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
51		22-Nov-82	0.29	2.12	0.14	0.30
52		20-Dec-82	0.29	2.21	0.12	0.27
53		20-Jan-83	0.36	3.11	0.31	0.96
54		7-Feb-83	0.35	3.19	0.26	0.83
55		25-Aug-83	0.26	1.93	0.21	0.41
56		17-Oct-83	0.26	2.34	0.15	0.35
57		8-Feb-84	0.34	2.50	0.37	0.93
58		23-Apr-84	0.38	2.29	0.40	0.92
59		16-Jul-84	0.38	2.42	0.24	0.58
60		24-Oct-84	0.26	2.38	0.16	0.38
61		27-May-85	0.31	2.97	0.25	0.74
62		14-Jul-86	0.28	2.34	0.22	0.51
63	<b>(1990-1997)</b>	14-May-90	0.41	1.17	0.73	0.85
64		19-Jun-90	0.34	1.50	0.64	0.96
65		19-Jul-90	0.31	1.34	0.54	0.72
66		21-Aug-90	0.29	1.45	0.43	0.62
67		26-Sep-90	0.28	1.27	0.38	0.48
68		29-Oct-90	0.30	1.26	0.29	0.37
69		6-Feb-91	0.33	1.81	0.31	0.56
70		16-May-91	0.34	2.41	0.46	1.11
71		24-Jun-91	0.28	2.30	0.37	0.85
72		12-Aug-91	0.27	1.86	0.26	0.48
73		17-Sep-91	0.28	1.70	0.22	0.37
74		24-Oct-91	0.26	1.78	0.19	0.34
75		13-Jan-92	0.31	3.05	0.17	0.52
76		20-Feb-92	0.36	3.16	0.33	1.04
77		17-Jun-92	0.29	3.12	0.25	0.78
78		20-Jul-92	0.30	2.47	0.21	0.52
79		20-Aug-92	0.28	3.22	0.16	0.52
80		12-Oct-92	0.27	2.33	0.15	0.35
81		9-Nov-92	0.29	2.31	0.11	0.25
82		8-Jun-93	0.25	2.59	0.24	0.62
83		14-Jul-93	0.29	2.14	0.26	0.56
84		20-Sep-93	0.26	2.35	0.13	0.31
85		27-Oct-03	0.29	2.16	0.14	0.30
86		30-Nov-93	0.28	2.04	0.14	0.29
87		9-Dec-93	0.30	2.08	0.12	0.25
88		18-May-94	0.32	1.86	0.44	0.82
89		11-Jul-94	0.29	1.29	0.37	0.48
90		15-Sep-94	0.28	1.22	0.24	0.29
91		19-Dec-94	0.32	2.13	0.24	0.51
92		23-Feb-95	0.34	2.45	0.38	0.93
93		25-Oct-95	0.29	2.10	0.13	0.27
94		8-Apr-96	0.33	2.40	0.31	0.85
95		28-May-96	0.30	2.17	0.26	0.56
96		2-Jul-96	0.27	2.56	0.19	0.49
97		29-Aug-96	0.26	2.30	0.14	0.32
98		21-Jan-97	0.34	2.84	0.28	0.80
99		19-Jun-97	0.29	1.37	0.37	0.51
100	<b>(After 2000)</b>	3-Apr-00	0.44			1.96
101		28-Jun-00	0.32			1.78
102		6-Apr-01	0.20			0.05

No	Period	Date of Measurement	Stage Height H (m)	Flow Area A (m <sup>2</sup> )	Velocity V (m/sec)	Discharge Q (m <sup>3</sup> /sec)
		$H_{\max} =$	0.48		$Q_{\max} =$	1.99
		$H_{\min} =$	0.20		$Q_{\min} =$	0.05

**D1-4 TK. Daya Sawan**

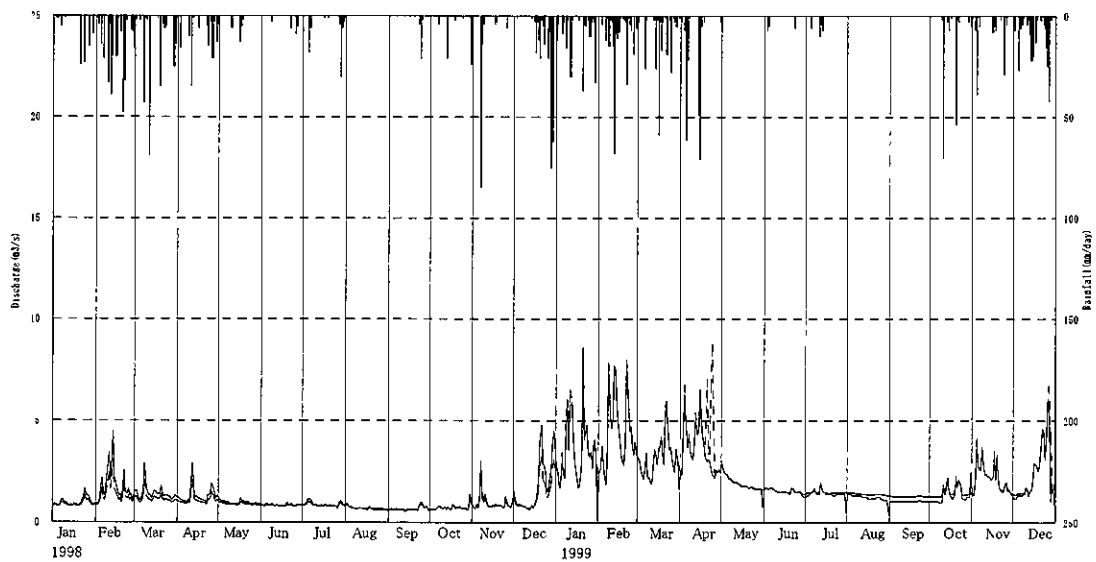
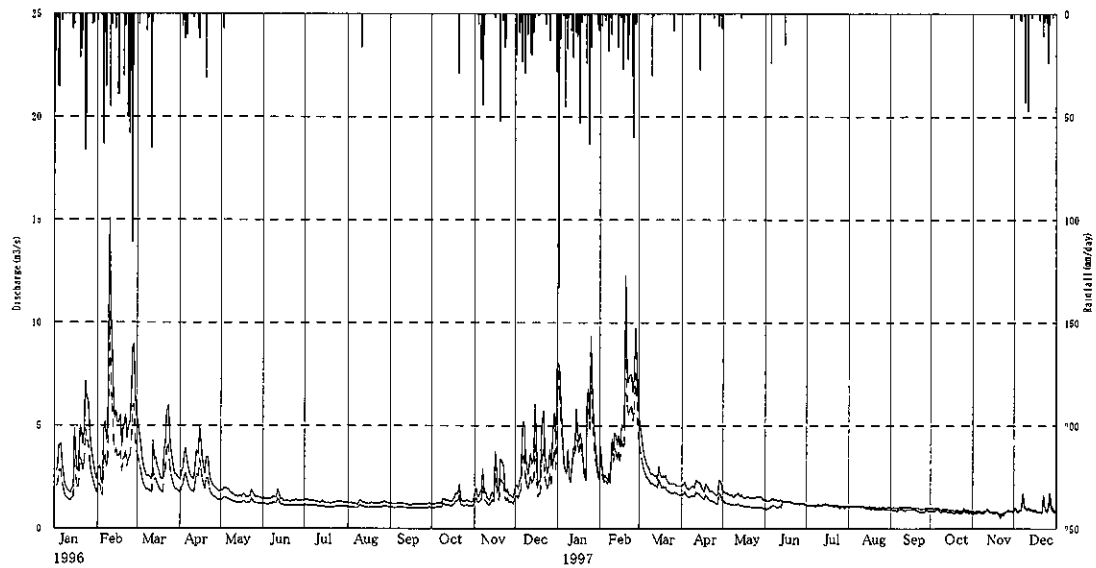
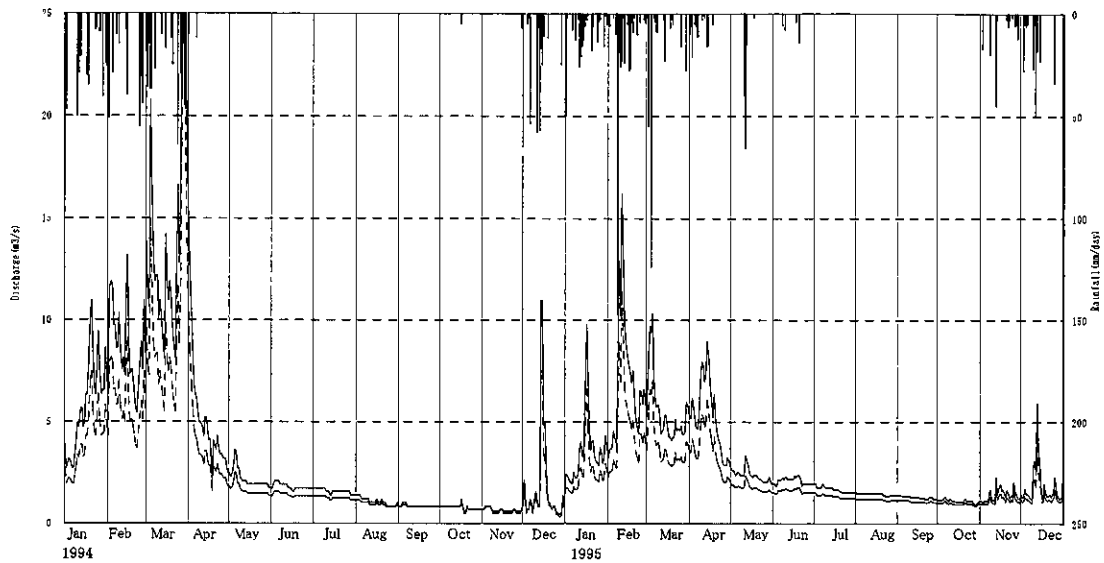


Figure-41 Daily Discharge DayaSowan

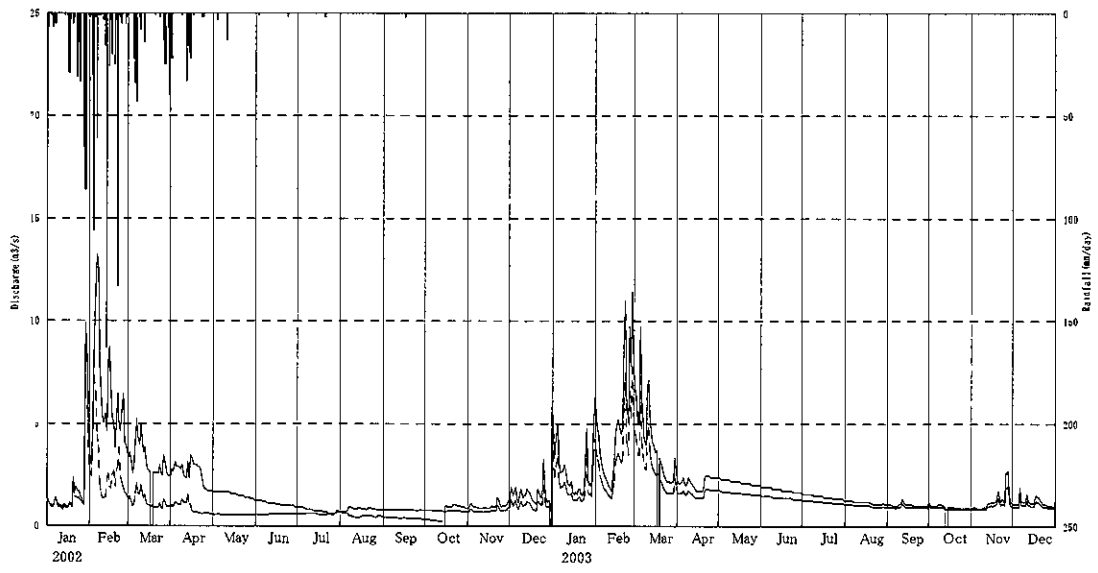
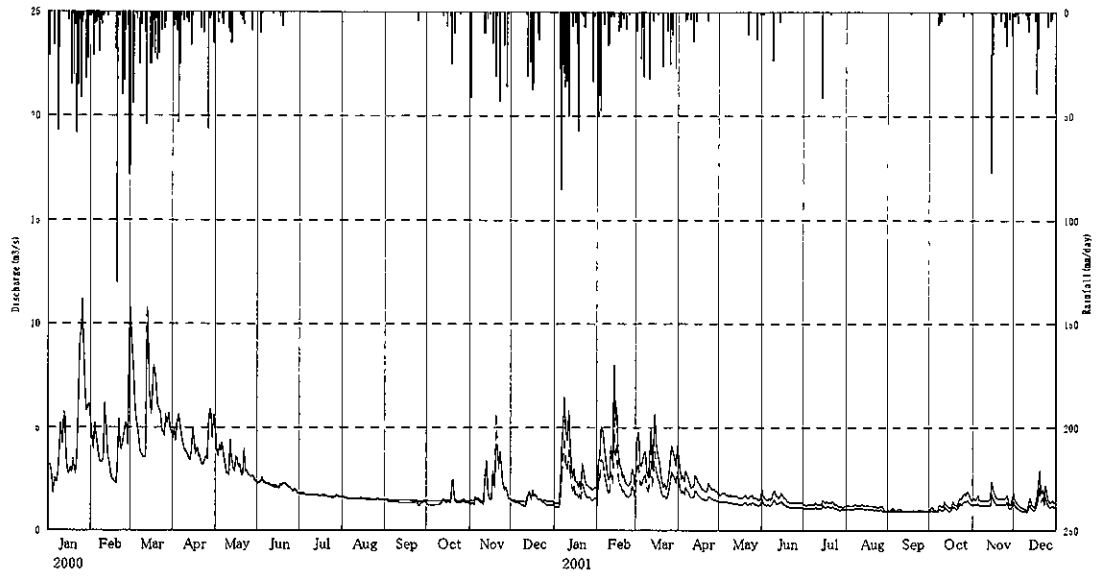


Figure-4.2 Daily Discharge DayaSowan

#### 4. Results of Discharge Measurement at Tk. Daya Sawan SGS

No	Period	Date of Measurement	Stage Height H (m)	Flow Area	Velocity	Discharge
				A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1976-1979)	15-Jun-76	0.57	4.36	0.29	1.26
2		12-Oct-76	0.56	4.53	0.26	1.18
3		11-Nov-76	0.55	4.15	0.27	1.12
4		28-Dec-76	0.55	4.95	0.24	1.19
5		27-Jan-77	0.57	4.62	0.30	1.39
6		16-Feb-77	0.78	6.89	0.49	3.38
7		15-Mar-77	0.78	9.79	0.42	4.11
8		21-Apr-77	0.60	5.70	0.32	1.82
9		11-May-77	0.66	5.89	0.36	2.12
10		9-Jun-77	0.56	4.29	0.34	1.46
11		4-Jul-77	0.54	3.71	0.37	1.37
12		25-Aug-77	0.55	3.75	0.37	1.39
13		21-Sep-77	0.50	3.17	0.33	1.05
14		10-Oct-77	0.50	3.12	0.33	1.03
15		16-Nov-77	0.49	3.06	0.31	0.95
16		5-Dec-77	0.51	3.82	0.30	1.15
17		9-Jan-78	0.54	7.40	0.27	1.27
18		13-Feb-78	0.81	7.99	0.04	0.32
19		13-Mar-78	1.06	11.71	0.81	9.49
20		10-Apr-78	0.85	9.49	0.46	4.37
21		10-May-78	0.69	7.13	0.35	2.50
22		7-Jun-78	0.67	6.57	0.36	2.37
23		12-Jul-78	0.73	7.78	0.38	2.96
24		7-Aug-78	0.59	5.99	0.26	1.56
25		13-Sep-78	0.56	3.77	0.44	1.66
26		19-Oct-78	0.54	5.49	0.22	1.21
27		9-Nov-78	0.53	3.11	0.43	1.34
28		13-Dec-78	0.58	4.43	0.40	1.77
29		26-Jan-79	0.86	9.55	0.47	4.49
30		12-Feb-79	0.74	7.84	0.39	3.06
31		12-Mar-79	0.83	7.31	0.57	4.17
32		16-Apr-79	0.65	5.52	0.40	2.21
33		28-May-79	0.62	3.33	0.34	1.13
34		12-Jun-79	0.60	5.02	0.34	1.71
35		19-Jul-79	0.57	4.83	0.31	1.50
36		9-Aug-79	0.58	4.95	0.33	1.63
37		15-Oct-79	0.51	4.11	0.27	1.11
38		12-Nov-79	0.51	4.19	0.26	1.09
39		10-Dec-79	0.56	4.35	0.34	1.48
40	(1980-1986)	14-Jan-80	0.88	9.38	0.54	5.07
41		13-Feb-80	0.77	8.06	0.37	2.98
42		10-Mar-80	0.89	9.39	0.50	4.70
43		18-Apr-80	0.80	7.69	0.43	3.31
44		21-May-80	0.69	6.56	0.32	2.10
45		23-Jun-80	0.59	4.81	0.27	1.30
46		14-Jul-80	0.58	4.75	0.27	1.28
47		26-Aug-80	0.54	4.54	0.23	1.04
48		25-Sep-80	0.53	4.46	0.24	1.07
49		22-Oct-80	0.55	4.58	0.24	1.10
50		26-Nov-80	0.52	4.36	0.23	1.00

No.	Period	Date of Measurement	Stage Height H (m)	Flow Area	Velocity	Discharge
				A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
51		17-Dec-80	0.53	4.62	0.23	1.06
52		23-Feb-81	0.56	8.21	0.37	3.04
53		23-Apr-81	0.48	6.66	0.30	2.00
54		19-May-81	0.51	5.84	0.41	2.39
55		15-Jun-81	0.43	5.83	0.27	1.57
56		27-Jul-81	0.42	6.62	0.24	1.59
57		26-Aug-81	0.40	6.08	0.22	1.34
58		21-Sep-81	0.38	5.91	0.21	1.24
59		14-Oct-81	0.38	5.98	0.19	1.14
60		3-Nov-81	0.38	6.07	0.20	1.21
61		9-Dec-81	0.43	6.34	0.25	1.59
62		19-Jan-82	0.79	11.06	0.57	6.30
63		17-Mar-82	0.70	9.83	0.48	4.72
64		26-May-82	0.47	6.46	0.26	1.68
65		16-Jun-82	0.45	6.32	0.26	1.64
66		28-Jul-82	0.42	4.60	0.32	1.47
67		24-Aug-82	0.41	4.44	0.29	1.29
68		21-Sep-82	0.39	5.03	0.24	1.21
69		26-Oct-82	0.38	4.47	0.23	1.03
70		23-Nov-82	0.38	4.55	0.25	1.14
71		15-Oct-79	0.51	4.11	0.27	1.11
72		12-Nov-79	0.51	4.19	0.26	1.09
73		10-Dec-79	0.56	4.35	0.34	1.48
74		14-Jan-80	0.88	9.38	0.54	5.07
75		13-Feb-80	0.77	8.06	0.37	2.98
76		10-Mar-80	0.89	9.39	0.50	4.70
77		18-Apr-80	0.80	7.69	0.43	3.31
78		21-May-80	0.69	6.56	0.32	2.10
79		23-Jun-80	0.59	4.81	0.27	1.30
80		14-Jul-80	0.58	4.75	0.27	1.28
81		26-Aug-80	0.54	4.54	0.23	1.04
82		25-Sep-80	0.53	4.46	0.24	1.07
83		22-Oct-80	0.55	4.58	0.24	1.10
84		26-Nov-80	0.52	4.36	0.23	1.00
85		17-Dec-80	0.53	4.62	0.23	1.06
86		23-Feb-81	0.56	8.21	0.37	3.04
87		23-Apr-81	0.48	6.66	0.30	2.00
88		19-May-81	0.51	5.84	0.41	2.39
89		15-Jun-81	0.43	5.83	0.27	1.57
90		27-Jul-81	0.42	6.62	0.24	1.59
91		26-Aug-81	0.40	6.08	0.22	1.34
92		21-Sep-81	0.38	5.91	0.21	1.24
93		14-Oct-81	0.38	5.98	0.19	1.14
94		3-Nov-81	0.38	6.07	0.20	1.21
95		9-Dec-81	0.43	6.34	0.25	1.59
96		19-Jan-82	0.79	11.06	0.57	6.30
97		17-Mar-82	0.70	9.83	0.48	4.72
98		26-May-82	0.47	6.46	0.26	1.68
99		16-Jun-82	0.45	6.32	0.26	1.64
100		28-Jul-82	0.42	4.60	0.32	1.47
101		24-Aug-82	0.41	4.44	0.29	1.29
102		21-Sep-82	0.39	5.03	0.24	1.21

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge	
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)	
103		26-Oct-82	0.38	4.47	0.23	1.03	
104		23-Nov-82	0.38	4.55	0.25	1.14	
105		21-Dec-82	0.41	5.46	0.23	1.26	
106		18-Jan-83	0.71	7.30	0.70	5.11	
107		19-Mar-83	0.70	8.13	0.55	4.47	
108		26-Jul-83	0.42	4.30	0.30	1.29	
109		24-Oct-83	0.39	3.27	0.31	1.01	
110		21-Dec-83	0.39	4.67	0.26	1.21	
111		7-Feb-84	0.73	9.87	0.51	5.03	
112		28-May-84	0.47	5.02	0.38	1.91	
113		21-Sep-84	0.41	4.52	0.30	1.36	
114		6-May-85	0.48	4.56	0.40	1.82	
115		11-Feb-86	0.58	5.32	0.42	2.23	
116		28-Jul-86	0.44	3.73	0.32	1.19	
117	(1990-1992)	14-May-90	0.72	7.37	0.35	2.58	
118		19-Jun-90	0.64	5.61	0.35	1.96	
119		10-Jul-80	0.59	5.35	0.33	1.77	
120		23-Aug-90	0.55	5.18	0.31	1.61	
121		25-Sep-90	0.51	4.09	0.31	1.27	
122		10-Jan-91	0.90	9.55	0.58	5.52	
123		16-May-91	0.62	5.67	0.40	2.27	
124		24-Jun-91	0.55	4.67	0.40	1.87	
125		12-Aug-91	0.56	4.84	0.30	1.45	
126		17-Sep-91	0.50	4.11	0.29	1.19	
127		24-Oct-91	0.51	4.12	0.27	1.11	
128		13-Jan-92	0.76	8.24	0.31	2.55	
129		17-Jun-92	0.59	7.11	0.21	1.49	
130		20-Jul-92	0.56	6.34	0.22	1.39	
131		20-Aug-92	0.53	6.01	0.19	1.14	
132		12-Oct-92	0.51	5.65	0.19	1.07	
133		9-Nov-92	0.50	5.50	0.18	0.99	
134	(1993-1997)	25-May-93	0.57	6.24	0.29	1.81	
135		8-Jun-93	0.55	5.85	0.23	1.35	
136		14-Jul-93	0.53	6.04	0.23	1.39	
137		20-Sep-93	0.50	5.63	0.19	1.07	
138		21-Oct-93	0.51	5.77	0.19	1.10	
139		9-Dec-93	0.67	7.00	0.34	2.38	
140		19-May-94	0.48	5.00	0.29	1.45	
141		11-Jul-94	0.46	4.77	0.25	1.19	
142		28-Sep-94	0.42	4.02	0.20	0.80	
143		12-Dec-94	0.57	6.36	0.37	2.35	
144		23-Feb-95	0.66	7.07	0.44	3.11	
145		30-Aug-95	0.44	4.94	0.23	1.14	
146		8-Apr-96	0.51	5.85	0.32	1.87	
147		11-Jun-96	0.45	5.07	0.24	1.22	
148		14-Aug-96	0.41	5.09	0.21	1.07	
149		6-Jan-97	0.62	5.46	0.49	2.68	
150		26-May-97	0.50	5.60	0.19	1.06	
151	(After 2000)	5-Jul-01	0.47			0.91	
152		23-Oct-01	0.36			0.56	
			H <sub>max</sub> =	0.90		Q <sub>max</sub> =	5.52



No.	Period	Date of Measurement	Stage Height H (m)	Flow Area A (m <sup>2</sup> )	Velocity V (m/sec)	Discharge Q (m <sup>3</sup> /sec)
		$H_{min} =$	0.36		$Q_{min} =$	0.56

## **D2 Karangasem Regency**

**D2-1 TK. Nyuiling**

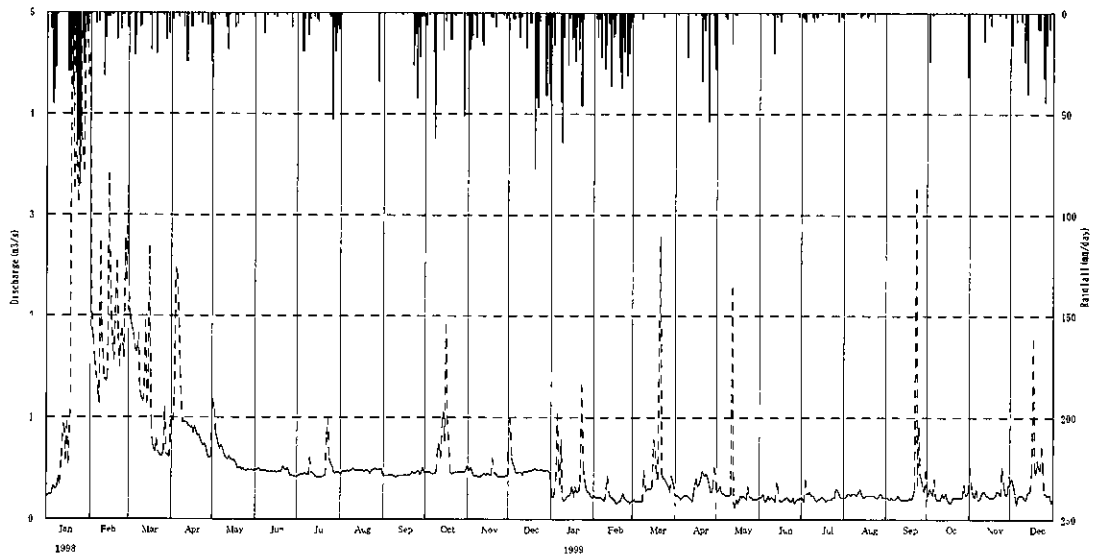
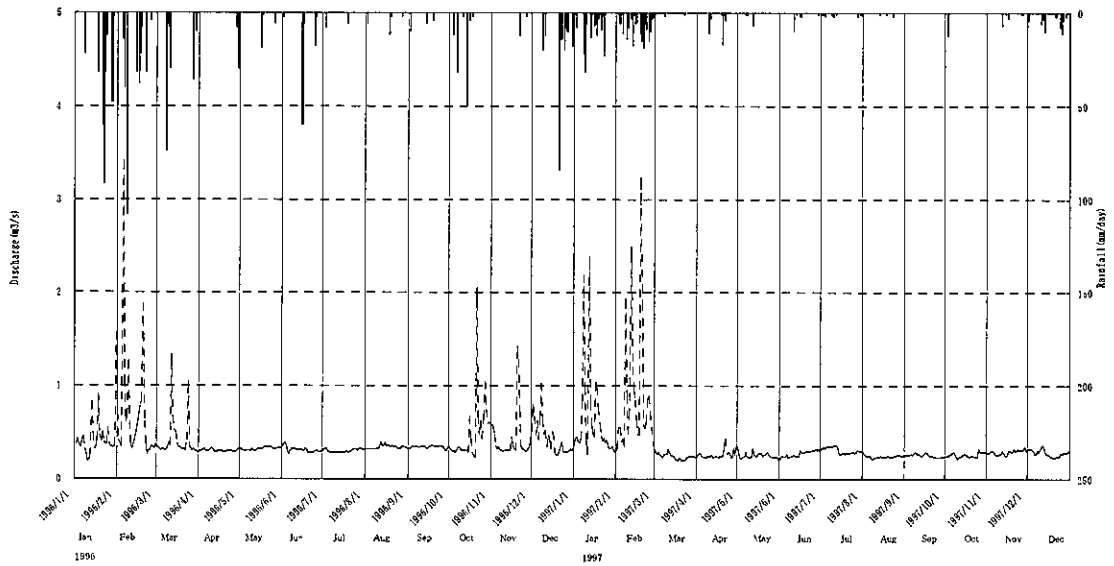
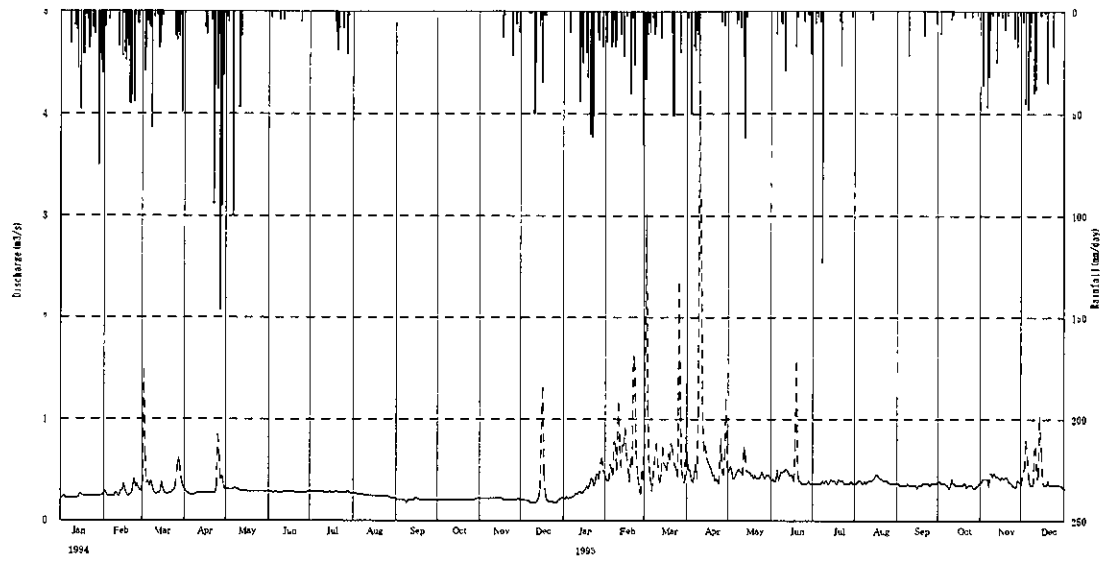


Figure-11 Daily Discharge Nyuling

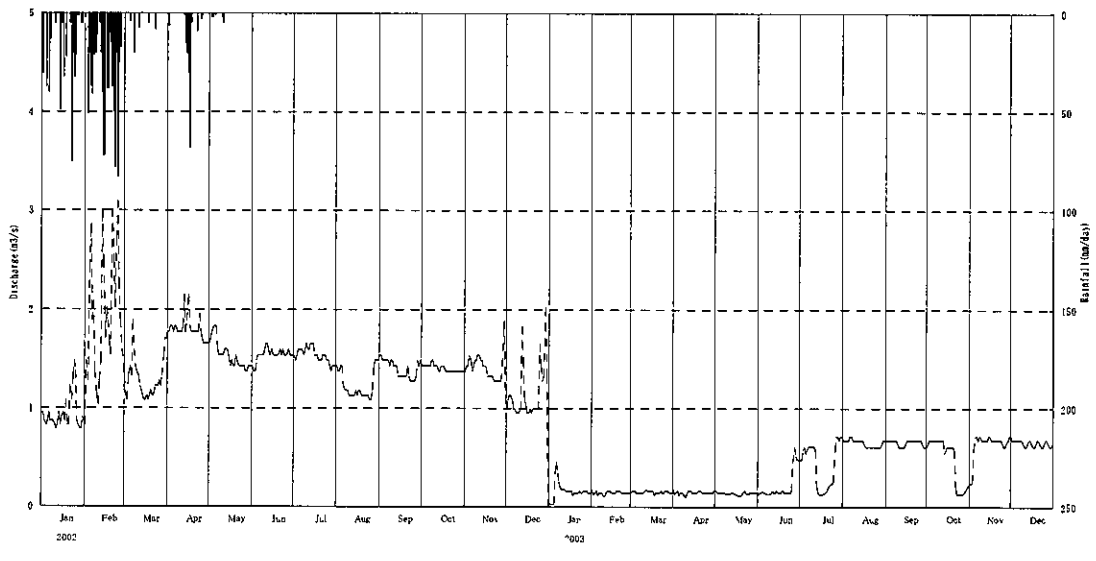
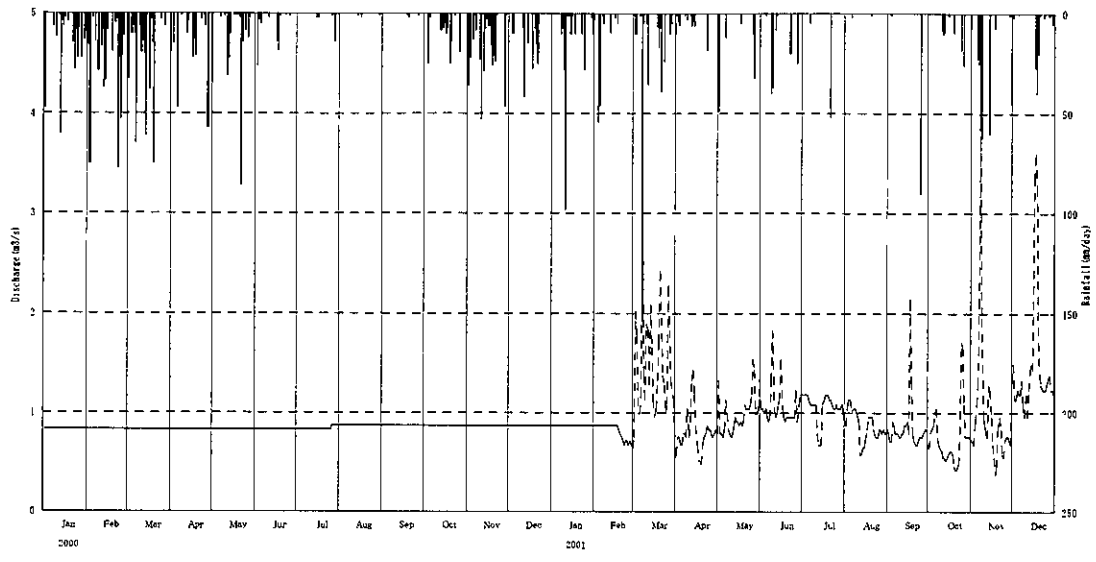


Figure-1 2 Daily Discharge Nyuling

### 1. Results of Discharge Measurement at Tk. Nyuling SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1977-1980)	15-Feb-77	0.45	1.55	0.23	0.36
2		24-Feb-77	0.44	1.54	0.25	0.39
3		14-Mar-77	0.53	2.36	0.37	0.87
4		20-Apr-77	0.48	2.03	0.46	0.93
5		16-May-77	0.44	1.8	0.4	0.72
6		6-Jun-77	0.38	1.54	0.28	0.43
7		11-Jul-77	0.33	1.39	0.24	0.33
8		15-Aug-77	0.37	1.55	0.18	0.28
9		14-Sep-77	0.32	1.58	0.17	0.27
10		8-Oct-77	0.30	0.97	0.19	0.18
11		15-Nov-77	0.30	0.69	0.33	0.23
12		13-Dec-77	0.30	0.63	0.32	0.20
13		3-Jan-78	0.32	1.08	0.17	0.18
14		6-Feb-78	0.45	1.59	0.4	0.64
15		6-Mar-78	0.40	1.42	0.2	0.28
16		5-Apr-78	0.48	1.51	0.37	0.56
17		8-May-78	0.48	1.93	0.32	0.62
18		22-Jun-78	0.66	3.2	0.34	1.09
19		7-Jul-78	0.64	2.83	0.31	0.88
20		4-Aug-78	0.59	2	0.38	0.76
21		7-Sep-78	0.57	2.4	0.27	0.65
22		11-Oct-78	0.54	2.21	0.22	0.49
23		6-Nov-78	0.59	1.97	0.34	0.67
24		7-Dec-78	0.66	2.42	0.41	0.99
25		3-Jan-79	0.85	3.29	0.82	2.70
26		6-Feb-79	0.67	2.48	0.51	1.26
27		24-Mar-79	0.61	2.51	0.38	0.95
28		6-Apr-79	0.60	2.3	0.39	0.90
29		10-May-79	0.61	2.43	0.29	0.70
30		5-Jun-79	0.67	2.8	0.35	0.98
31		11-Jul-79	0.49	1.35	0.21	0.28
32		13-Aug-79	0.56	1.64	0.29	0.48
33		5-Oct-79	0.50	0.59	0.61	0.36
34		5-Nov-79	0.46	0.68	0.44	0.30
35		7-Dec-79	0.46	0.65	0.38	0.25
36		7-Jan-80	0.48	0.7	0.52	0.36
37		5-Feb-80	0.60	1.72	0.39	0.67
38		6-Mar-80	0.54	0.93	0.34	0.32
39		7-Apr-80	0.56	1.13	0.33	0.37
40		8-May-80	0.58	2.37	0.31	0.73
41		9-Jun-80	0.58	1.78	0.19	0.34
42		10-Jul-80	0.42	1.58	0.14	0.22
43		9-Sep-80	0.40	1.07	0.25	0.27
44		9-Oct-80	0.37	0.89	0.22	0.20
45		10-Nov-80	0.52	1.83	0.12	0.22
46		4-Dec-80	0.52	1.77	0.13	0.23
47	(1981-1985)	5-Jan-81	0.57	1.37	0.18	0.25
48		11-Feb-81	0.91	2.32	0.59	1.37
49		27-Apr-81	0.90	2.72	0.31	0.84
50		12-May-81	0.85	2.01	0.26	0.52

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
51		23-Jun-81	0.80	1.94	0.2	0.39
52		20-Jul-81	0.84	1.9	0.19	0.36
53		8-Sep-81	0.82	1.68	0.17	0.29
54		6-Oct-81	0.77	1.49	0.17	0.25
55		4-Nov-81	0.78	1.57	0.15	0.24
56		8-Dec-81	0.82	1.87	0.25	0.47
57		12-Jan-82	0.83	1.89	0.22	0.41
58		15-Feb-82	0.89	2.21	0.35	0.77
59		17-May-82	0.84	1.88	0.23	0.43
60		17-Sep-82	0.77	1.5	0.16	0.24
61		25-Oct-82	0.75	1.45	0.14	0.20
62		29-Dec-82	0.74	1.31	0.13	0.17
63		11-Mar-83	0.81	1.96	0.27	0.53
64		7-Jul-83	0.74	1.61	0.22	0.35
65		19-Oct-83	0.77	1.86	0.3	0.56
66		21-Feb-84	0.90	2.88	0.63	1.81
67		21-May-84	0.78	2.5	0.29	0.73
68		6-Nov-84	0.69	1.32	0.15	0.20
69		9-May-85	0.70	1.43	0.27	0.39
70		12-Sep-85	0.65	1.25	0.22	0.28
71		16-Dec-85	0.65	1.6	0.2	0.32
72	(1990-1992)	7-May-90	0.66	1.46	0.14	0.20
73		9-Jun-90	0.68	1.74	0.15	0.26
74		12-Jul-90	0.68	1.36	0.17	0.23
75		9-Aug-90	0.66	1.32	0.17	0.22
76		10-Sep-90	0.65	1.38	0.15	0.21
77		15-Oct-90	0.63	1.31	0.14	0.18
78		21-Nov-90	0.65	1.17	0.14	0.16
79		31-Dec-90	0.66	1.17	0.15	0.18
80		20-Jun-91	0.68	0.69	0.25	0.17
81		15-Aug-91	0.66	1.26	0.14	0.18
82		13-May-92	0.75	1.27	0.29	0.37
83		8-Jun-92	0.70	1.29	0.26	0.34
84		7-Jun-92	0.70	0.85	0.24	0.20
85		10-Aug-92	0.70	1.25	0.18	0.23
86		11-Nov-92	0.72	1.09	0.25	0.27
87	(1993-1997)	17-Jun-93	0.45	1.18	0.26	0.31
88		8-Jul-93	0.43	0.47	0.54	0.25
89		13-Sep-93	0.41	1.07	0.18	0.19
90		23-Nov-93	0.41	1.16	0.22	0.26
91		2-Dec-93	0.41	1.16	0.18	0.21
92		9-May-94	0.51	1.53	0.36	0.55
93		23-Jul-94	0.44	1.41	0.2	0.28
94		31-Aug-94	0.44	1.18	0.15	0.18
95		1-Oct-94	0.44	1.25	0.16	0.20
96		14-Nov-94	0.42	1.06	0.19	0.20
97		26-Dec-94	0.47	2.03	0.09	0.18
98		7-Jul-95	0.55	2.54	0.26	0.66
99		3-Oct-95	0.41	2.13	0.16	0.34
100		1-Feb-96	0.52	1.8	0.35	0.63
101		7-May-96	0.41	1.52	0.19	0.29
102		10-Jul-96	0.40	1.71	0.17	0.29

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
103		6-Nov-96	0.42	1.99	0.19	0.38
104		30-Jan-97	0.40	1.77	0.17	0.30
105		5-Jun-97	0.42	1.38	0.16	0.22
106	(2000)	27-Jan-00	0.79			0.51
107		30-Aug-00	0.74			0.41
108		7-Jun-00	0.58			0.18
		H <sub>max</sub> =	0.91		Q <sub>max</sub> =	2.70
		H <sub>min</sub> =	0.30		Q <sub>min</sub> =	0.16



## **D3 Gianyar Regency**

**D3-1 TK. Petanu**

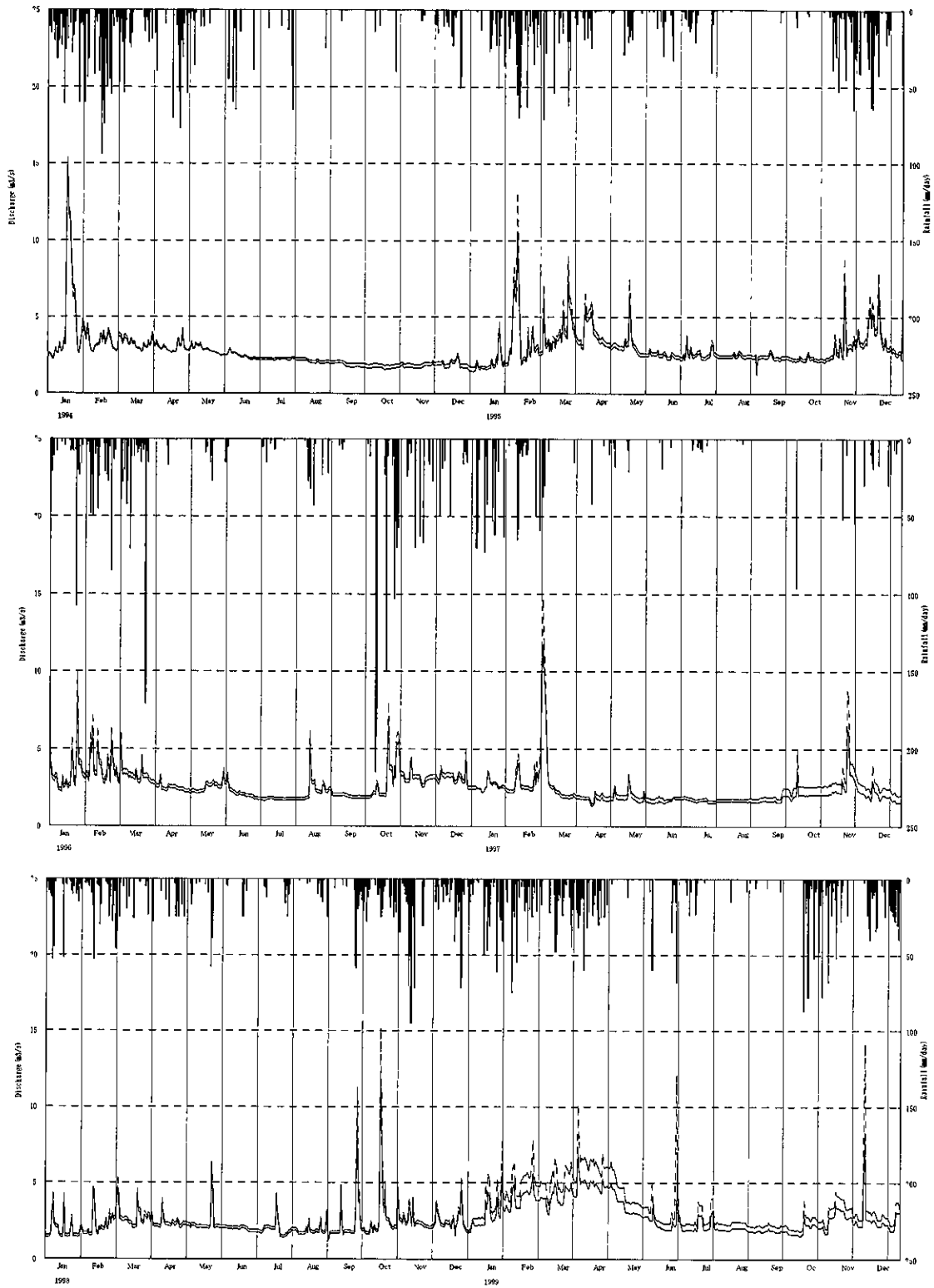


Figure-1 1 Daily Discharge Petanu

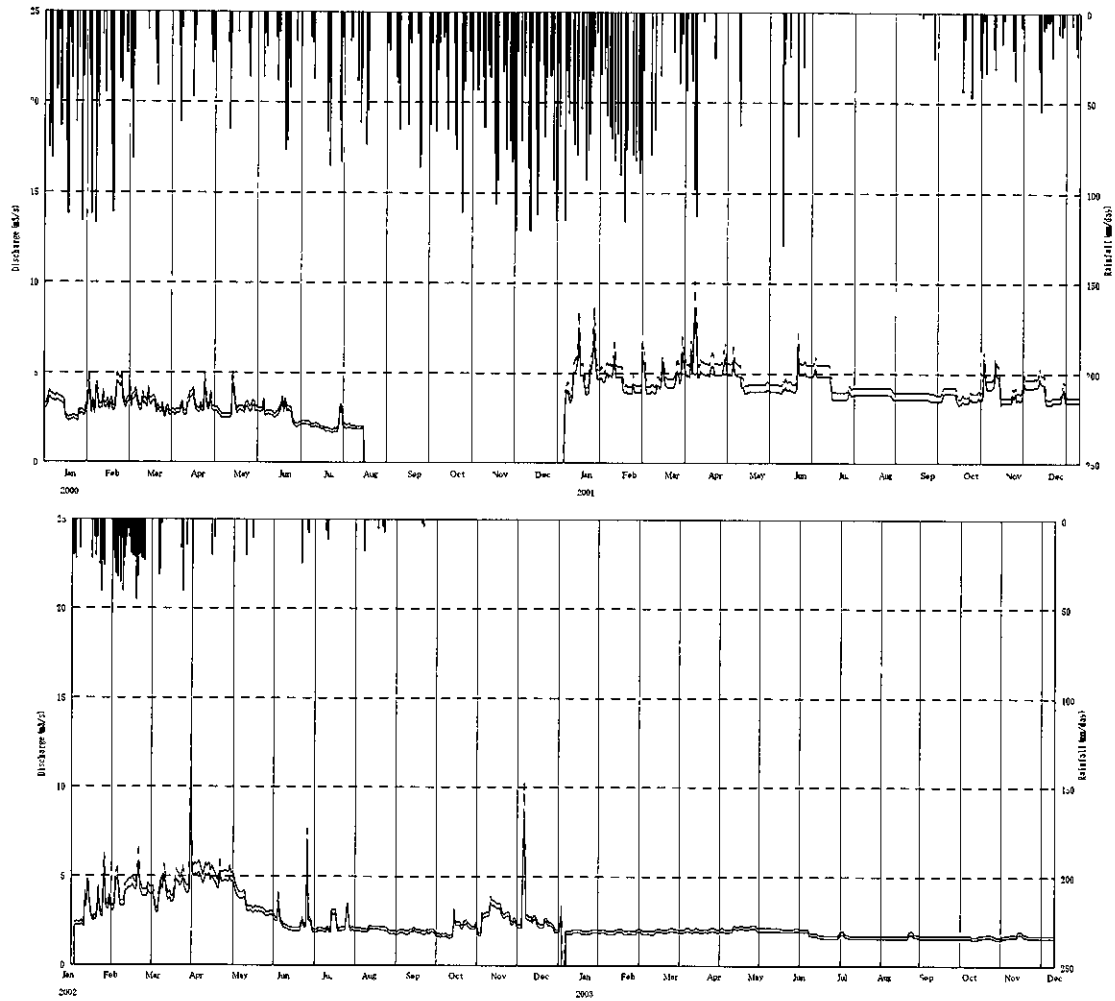


Figure-12 Daily Discharge Petanu

### 1. Results of Discharge Measurement at Tk. Petanu SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1978-1980)	8-Apr-78	0.57	3.72	0.85	3.16
2		6-May-78	0.56	4.63	0.53	2.45
3		21-Jun-78	0.72	6.96	0.78	5.43
4		20-Jul-78	0.44	3.78	0.70	2.65
5		16-Aug-78	0.50	4.13	0.74	3.06
6		6-Sep-78	0.51	5.00	0.76	3.80
7		25-Oct-78	0.39	5.00	0.71	3.55
8		14-Nov-78	0.35	4.72	0.78	3.68
9		26-Dec-78	0.34	4.42	0.71	3.14
10		15-Jan-79	0.69	7.79	0.85	6.62
11		15-Feb-79	0.30	4.23	0.76	3.21
12		23-Mar-79	0.25	4.28	0.71	3.04
13		6-Apr-79	0.03	4.03	0.73	2.98
14		12-May-79	0.52	6.73	0.72	4.85
15		7-Jun-79	0.44	5.85	0.76	4.45
16		13-Jul-79	0.28	3.52	0.89	3.13
17		28-Aug-79	0.23	3.83	0.85	3.26
18		20-Oct-79	0.25	3.94	0.78	3.07
19		7-Nov-79	0.29	4.47	0.74	3.31
20		8-Dec-79	0.56	7.35	0.77	5.66
21		9-Jan-80	0.43	7.72	0.71	5.48
22		6-Feb-80	0.35	4.56	0.74	3.37
23		28-Mar-80	0.44	4.71	0.70	3.30
24		10-Apr-80	0.27	3.95	0.77	3.04
25		28-May-80	0.17	4.37	0.65	2.84
26		20-Jun-80	0.15	4.46	0.60	2.68
27		29-Jul-80	0.20	3.72	0.36	1.34
28		18-Sep-80	0.18	3.71	0.68	2.52
29		1-Oct-80	0.14	3.37	0.58	1.95
30		21-Nov-80	0.20	3.97	0.71	2.82
31	(1981-1986)	7-Jan-81	0.30	5.71	0.61	3.48
32		14-Feb-81	0.18	4.06	0.65	2.64
33		20-Apr-81	0.20	3.80	0.67	2.55
34		21-May-81	0.20	3.62	0.74	2.68
35		22-Jun-81	0.13	3.07	0.66	2.03
36		9-Jul-81	0.12	3.30	0.68	2.24
37		19-Aug-81	0.12	3.40	0.66	2.24
38		5-Sep-81	0.09	3.00	0.59	1.77
39		9-Oct-81	0.38	5.00	0.79	3.95
40		24-Dec-81	0.20	3.68	0.76	2.80
41		23-Jan-82	0.34	5.68	0.74	4.20
42		17-Feb-82	0.25	5.23	0.73	3.82
43		21-Apr-82	0.12	3.99	0.67	2.67
44		5-May-82	0.19	4.58	0.76	3.48
45		11-Oct-82	0.02	2.78	0.35	0.97
46		10-Jan-83	0.02	3.36	0.66	2.22
47		9-May-83	0.13	6.70	0.43	2.88
48		23-May-85	0.70	4.20	0.62	2.60
49		12-Feb-86	0.88	6.29	0.70	4.40
50		26-Aug-86	1.02	7.30	0.45	3.29
51		12-May-90	0.96	5.21	0.70	3.65

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge	
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)	
52	(1990-1991)	14-Jun-90	0.96	4.52	0.65	2.94	
53		10-Jul-90	0.95	3.43	0.74	2.54	
54		19-Sep-90	0.96	3.79	0.66	2.50	
55		27-Oct-90	0.98	4.36	0.58	2.53	
56		19-Nov-90	0.75	2.87	0.75	2.15	
57		12-Jan-91	1.02	4.88	0.54	2.64	
58		27-May-91	0.88	5.00	0.66	3.30	
59		13-Jun-91	0.88	3.43	0.74	2.54	
60		27-Aug-91	0.00	3.31	0.66	2.18	
61		26-Sep-91	0.86	3.54	0.66	2.34	
62		14-Oct-91	0.76	5.01	0.61	3.06	
63		(1992-1993)	6-Jan-92	0.96	3.14	0.85	2.67
64			27-May-92	0.72	3.38	0.72	2.43
65			24-Jun-92	0.70	3.18	0.74	2.35
66	8-Jul-92		0.64	3.65	0.65	2.37	
67	18-Aug-92		0.76	3.51	0.76	2.67	
68	27-Oct-92		0.70	3.83	0.63	2.41	
69	23-Jun-93		0.74	3.89	0.71	2.76	
70	7-Jul-93		0.72	3.22	0.78	2.51	
71	24-Aug-93		0.66	2.95	0.74	2.18	
72	28-Sep-93		0.62	2.60	0.71	1.85	
73	20-Oct-93		0.63	4.10	0.67	2.75	
74	28-Dec-93		0.66	3.89	0.65	2.53	
75	(1994-1997)		14-May-94	0.78	4.89	0.63	3.08
76			25-Jul-94	0.66	3.51	0.70	2.46
77		30-Aug-94	0.62	2.28	0.90	2.05	
78		5-Oct-94	0.56	2.17	0.90	1.95	
79		9-Jan-95	0.54	2.49	0.68	1.69	
80		8-Aug-95	0.66	4.12	0.67	2.76	
81		24-Jan-96	0.62	2.45	0.77	1.89	
82		4-Apr-96	0.74	4.61	0.65	3.00	
83		26-Aug-96	0.71	3.15	0.42	1.32	
84		28-Jan-97	0.88	3.88	0.62	2.41	
85		9-Jun-97	0.60	2.27	0.70	1.59	
86		20-Aug-97	0.54			1.71	
87		30-Sep-97	0.65			2.64	
88		(1998-2000)	26-Jan-98	0.50			1.87
89	14-Sep-99		0.54			1.71	
90	28-Sep-99		0.60			1.58	
91	6-Mar-00		0.84			2.91	
92	29-Aug-00		0.54			5.83	
		H <sub>max</sub> =	1.02		Q <sub>max</sub> =	6.62	
		H <sub>min</sub> =	0.00		Q <sub>min</sub> =	0.97	

## **D4 Tabanan Regency**

**D4-1 TK. Yeh Otan**



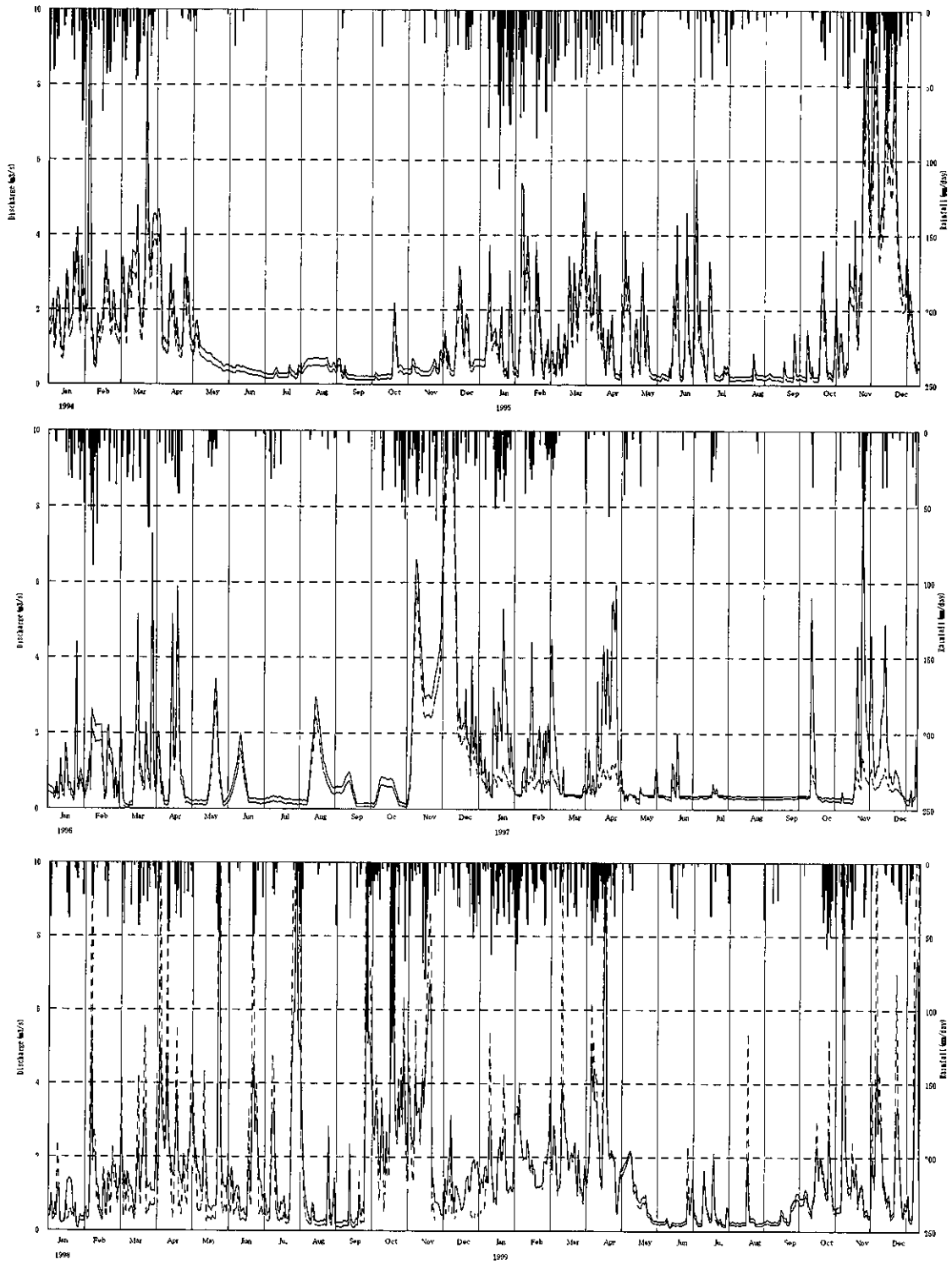


Figure-11 Daily Discharge Yeh Otan

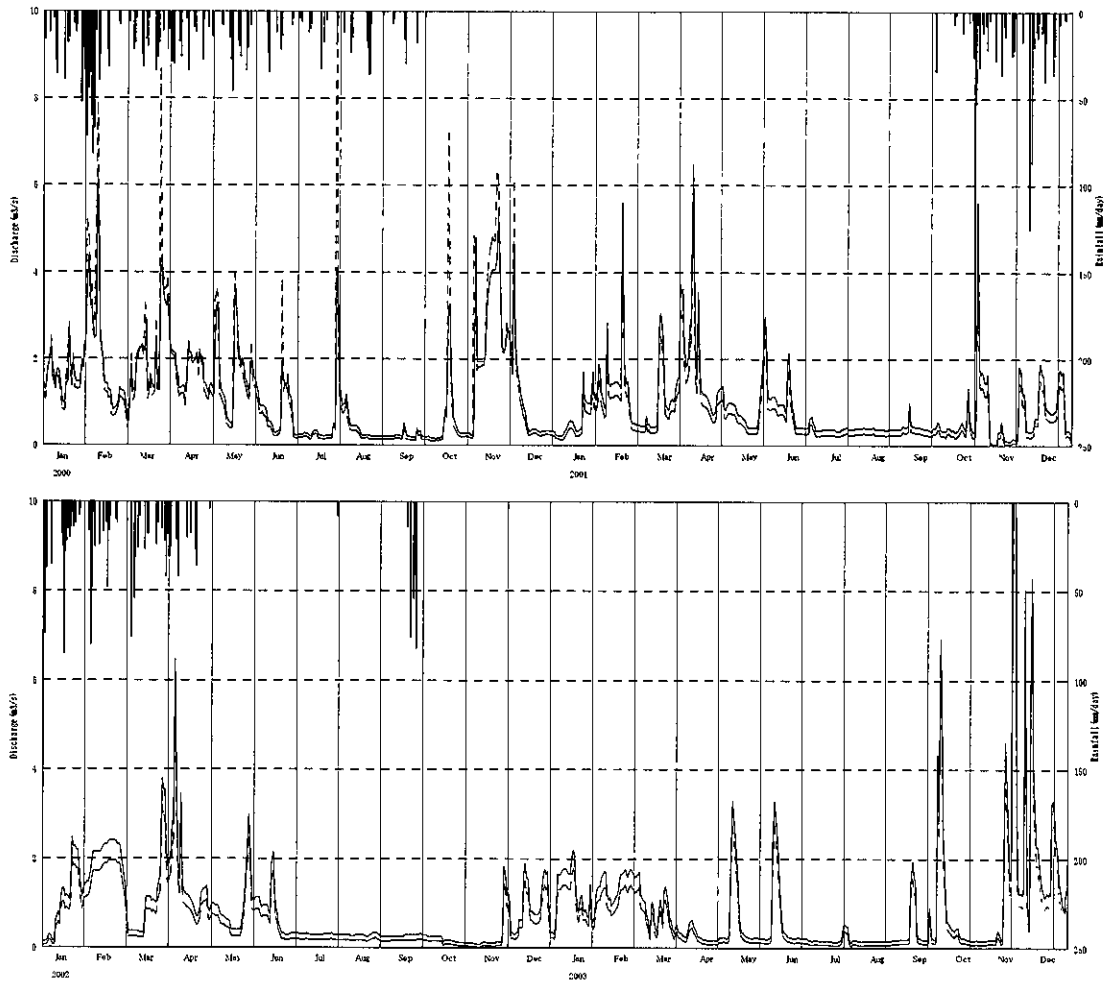


Figure-12 Daily Discharge Yeh Otan

### 1. Results of Discharge Measurement at Tk. Yeh Otan SGS

No.		Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1990-1991)	29-May-90	0.58	4.17	0.24	1.00
2		25-Jul-90	0.38	3.87	0.1	0.39
3		29-Sep-90	0.34	1.58	0.13	0.21
4		9-Oct-90	0.30	1.04	0.26	0.27
5		14-Nov-90	0.37	0.68	0.31	0.21
6		20-Dec-90	0.54	3.75	0.22	0.83
7		26-Jan-91	0.60	4.17	0.29	1.21
8		29-May-91	0.40	1.36	0.19	0.26
9		29-Jun-91	0.37	1.66	0.13	0.22
10		22-Aug-91	0.40	1.85	0.23	0.43
11		5-Sep-91	0.44	1.98	0.25	0.50
12		2-Dec-91	0.71	4.6	0.55	2.53
13	(1992-1993)	23-Jan-92	0.57	3.22	0.24	0.77
14		19-May-92	0.31	1.15	0.14	0.16
15		22-Jun-92	0.33	0.98	0.12	0.12
16		9-Jul-92	0.48	2.95	0.2	0.59
17		22-Aug-92	0.29	1.09	0.09	0.10
18		4-Nov-92	0.40	1.3	0.14	0.18
19		31-May-93	0.58	3.2	0.28	0.90
20		17-Jun-93	0.39	1.16	0.15	0.17
21		6-Jul-93	0.36	1.44	0.15	0.22
22		27-Sep-93	0.32	1.33	0.1	0.13
23		22-Nov-93	0.39	2.51	0.09	0.23
24		20-Dec-93	0.41	1.58	0.14	0.22
25	(1994-1995)	3-May-94	0.69	2.51	0.48	1.20
26		4-Jul-94	0.40	1.18	0.12	0.14
27		29-Aug-94	0.44	1.92	0.12	0.23
28		18-Oct-94	0.65	2.56	0.4	1.02
29		9-Oct-95	0.67	2.88	0.27	0.78
30		14-Dec-95	0.41	0.56	0.16	0.09
31		17-Jan-96	0.96	4.52	0.76	3.44
32	(1996-1999)	17-Jan-96	0.79	2.26	0.37	0.84
33		12-Jun-96	0.46	1.14	0.15	0.17
34		13-Aug-96	0.73	2.53	0.43	1.09
35		19-Nov-96	0.66	3.62	0.59	2.14
36		21-Jan-97	0.67	1.31	0.61	0.80
37		18-Jun-97	0.37	0.52	0.15	0.08
38		5-Aug-97	0.36			0.12
39		19-Sep-97	0.37			0.09
40			0.76			2.34
41		14-Jan-98	0.30			0.19
42		22-Sep-99	0.35			0.12
43		7-Oct-99	0.48			0.45
44		17-Mar-00	0.68			0.79
45		5-Sep-00	0.28			0.20
46		1-Nov-01	0.86			0.61
		H <sub>max</sub> =	0.96		Q <sub>max</sub> =	3.44
		H <sub>min</sub> =	0.28		Q <sub>min</sub> =	0.08

**D4-2 TK. Balian**

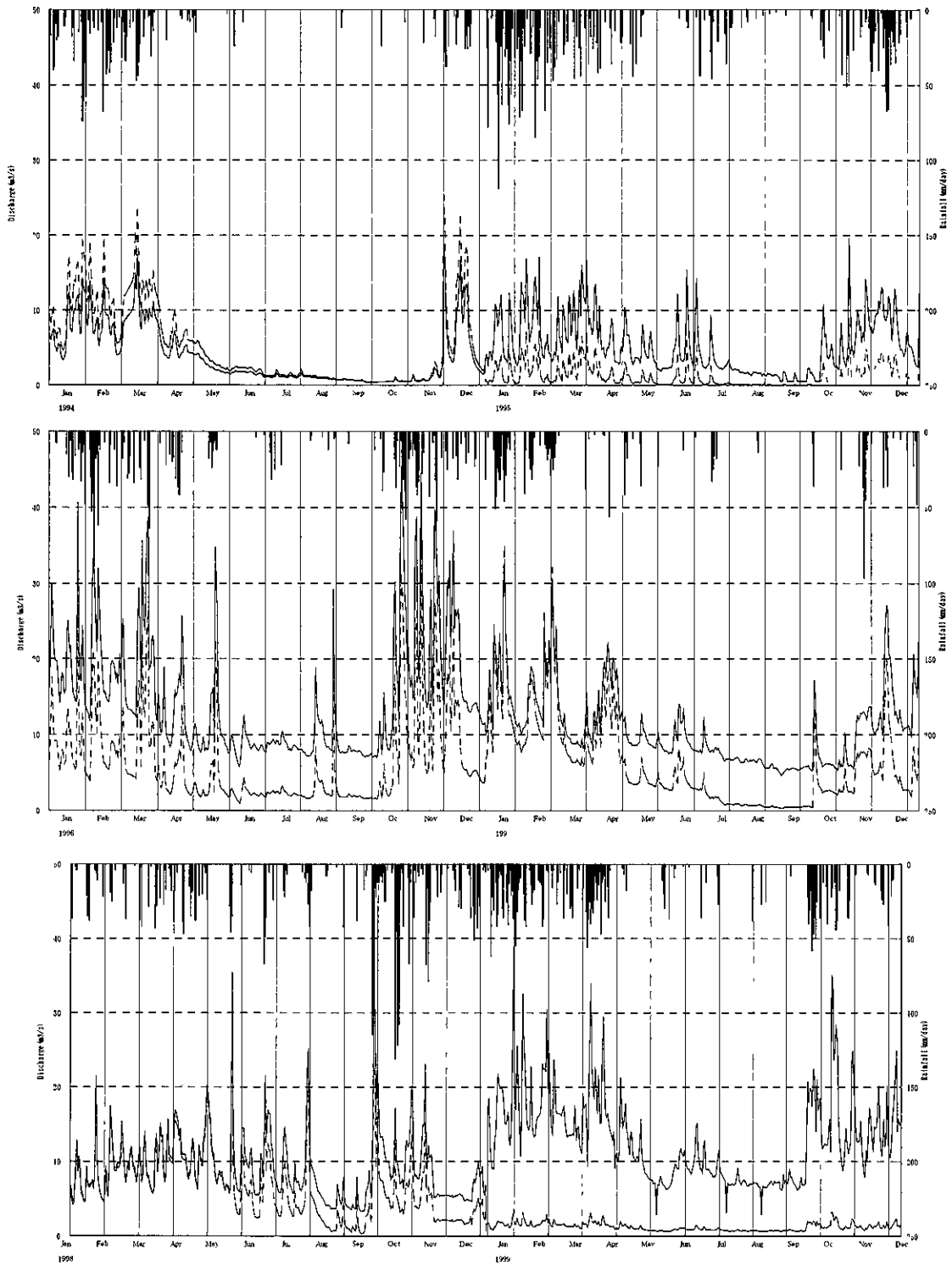


Figure-2 1 Daily Discharge Balian

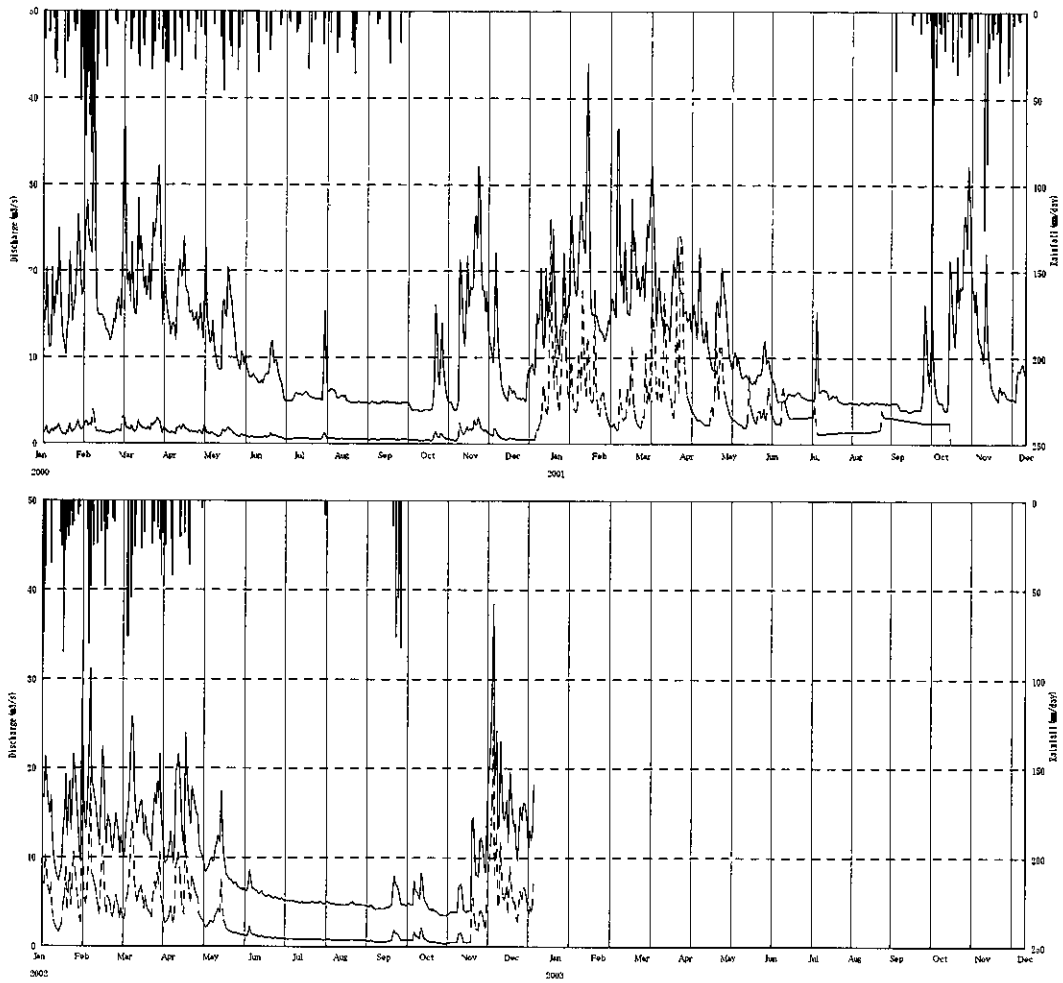


Figure-2 2 Daily Discharge Balian

D4-2-2

## 2. Results of Discharge Measurement at Tk. Balian SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1976-1979)	13-Sep-76	0.36	11.16	0.09	1.00
2		11-Oct-76	0.39	11.48	0.1	1.15
3		10-Nov-76	0.43	12.42	0.12	1.49
4		27-Dec-76	0.43	11.99	0.08	0.96
5		25-Feb-77	0.72	19.45	0.39	7.59
6		23-Mar-77	0.72	19.79	0.39	7.72
7		19-Apr-77	0.52	14.24	0.17	2.42
8		10-May-77	0.96	33.17	0.54	17.91
9		13-Jun-77	0.47	12.92	0.31	4.01
10		7-Jul-77	0.47	12.99	0.15	1.95
11		22-Aug-77	0.37	10.71	0.07	0.75
12		13-Sep-77	0.33	10.3	0.06	0.62
13		7-Oct-77	0.35	10.06	0.07	0.70
14		23-Nov-77	0.35	9.82	0.09	0.88
15		21-Dec-77	0.47	13.17	0.15	1.98
16		17-Jan-78	0.73	22.28	0.3	6.68
17		9-Feb-78	0.73	21.86	0.31	6.78
18		20-Mar-78	0.88	26.48	0.51	13.50
19		3-Apr-78	0.79	24.45	0.35	8.56
20		17-May-78	0.91	31.18	0.51	15.90
21		26-Jun-78	0.76	23.82	0.29	6.91
22		17-Jul-78	0.63	23.32	0.18	4.20
23		14-Aug-78	0.56	18.14	0.14	2.68
24		19-Sep-78	0.84	30.14	0.33	9.95
25		9-Oct-78	0.59	21.16	0.16	3.39
26		22-Nov-78	0.87	32.97	0.37	12.20
27		11-Dec-78	0.92	35.69	0.43	15.35
28		22-Jan-79	0.77	26.05	0.31	8.08
29		20-Feb-79	0.71	25.76	0.23	5.92
30		19-Mar-79	0.73	26.58	0.24	6.38
31		9-Apr-79	0.74	27.62	0.23	6.35
32	15-May-79	1.79	29.58	0.27	7.99	
33	28-Jun-79	1.02	34.68	0.54	18.73	
34	23-Jul-79	0.44	11.06	0.16	1.77	
35	20-Aug-79	0.50	11.25	0.18	2.03	
36	9-Oct-79	0.39	9.47	0.1	0.95	
37	26-Nov-79	0.58	22.53	0.13	2.93	
38	18-Dec-79	0.90	33.06	0.48	15.87	
39	(1980-1986)	22-Jan-80	0.82	26.46	0.33	8.73
40		18-Feb-80	0.66	21.66	0.11	2.38
41		25-Mar-80	0.59	21.79	0.13	2.83
42		22-Apr-80	0.48	28.85	0.4	11.54
43		23-Jun-80	0.46	9.74	1.17	11.40
44		21-Jul-80	0.45	1.33	1.07	1.42
45		20-Aug-80	0.38	10.99	0.08	0.88
46		25-Sep-80	0.36	9.89	0.06	0.59
47		20-Oct-80	0.41	11.78	0.06	0.71
48		8-Dec-80	0.99	39.48	0.46	18.16
49		18-Feb-81	0.66	26.51	0.18	4.77
50		13-Apr-81	0.77	27.6	0.28	7.73
51		12-May-81	1.01	40.46	0.54	21.85

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
52		9-Jun-81	0.51	18.72	0.13	2.43
53		14-Jul-81	0.70	24.88	0.24	5.97
54		26-Aug-81	0.47	12.76	0.14	1.79
55		15-Sep-81	0.55	21.72	0.12	2.61
56		31-Oct-81	0.72	28.46	0.25	7.12
57		19-Feb-82	0.62	21.97	0.19	4.17
58		22-Jun-82	0.40	12.17	0.1	1.22
59		23-Oct-82	0.25	9.44	0.04	0.38
60		30-Nov-82	0.30	9.9	0.08	0.79
61		12-Jan-83	0.63	25.18	0.22	5.54
62		6-Aug-85	0.41	16.31	0.09	1.47
63		13-Jan-86	0.81	26.83	0.57	15.29
64		10-Jul-86	0.64	21.56	0.28	6.04
65	(1990-1992)	29-May-90	0.65	24.37	0.5	12.19
66		27-Jun-90	0.38	11.92	0.24	2.86
67		31-Jul-90	0.70	28.48	0.45	12.82
68		29-Sep-90	0.19	5.49	0.15	0.82
69		12-Oct-90	0.18	7.58	0.14	1.06
70		22-Nov-90	0.33	13.19	0.18	2.37
71		24-Jan-91	0.84	57.53	0.57	32.79
72		8-May-91	0.35	11.33	0.34	3.85
73		12-Jun-91	0.20	9.96	0.16	1.59
74		26-Aug-91	0.18	3.67	0.36	1.32
75		20-Sep-91	0.18	9.47	0.1	0.95
76		10-Oct-91	0.10	6.34	0.09	0.57
77		20-Jan-92	0.40	21.8	0.58	12.64
78		21-May-92	0.14	10.38	0.37	3.84
79		22-Jun-92	0.10	7.4	0.22	1.63
80		27-Jul-92	0.11	7.38	0.17	1.25
81		25-Aug-92	0.05	6.72	0.17	1.14
82		26-Oct-92	0.42	25.59	0.48	12.28
83		5-Nov-92	0.38	26.45	0.46	12.17
84	(1993-1996)	17-May-93	0.10	12.82	0.21	2.69
85		14-Jun-93	-0.05	10.52	0.3	3.16
86		22-Jul-93	-0.12	5.68	0.15	0.85
87		19-Oct-93	0.02	10.86	0.35	3.80
88		25-Nov-93	0.33	24.9	0.5	12.45
89		13-Dec-93	0.13	14.23	0.36	5.12
90		9-May-94	-0.22	11.56	0.36	4.16
91		27-Jul-94	-0.24	7.09	0.16	1.13
92		27-Aug-94	-0.26	5.52	0.14	0.77
93		6-Oct-94	-0.34	4.4	0.09	0.40
94		18-Jan-95	0.00	17.39	0.31	5.39
95		19-Oct-95	0.22	20.82	0.47	9.79
96		17-Jan-96	0.32	19.99	0.54	10.79
97		25-Jun-96	-0.10	9.03	0.22	1.99
98		13-Aug-96	0.10	9.88	0.42	4.15
99	(1997)	24-Jan-97	0.31	27.6	0.59	16.28
100		16-Jun-97	0.61	15.18	0.41	6.22
101			0.63			6.37
102			0.79			18.32
103			0.61			6.22



No.	Period	Date of Measurement	Stage Height H (m)	Flow Area A (m <sup>2</sup> )	Velocity V (m/sec)	Discahrge Q (m <sup>3</sup> /sec)
		$H_{\max} =$	1.79		$Q_{\max} =$	32.79
		$H_{\min} =$	-0.34		$Q_{\min} =$	0.38

## **D5 Jembrana Regency**

**D5-1 TK. Yeh Satang**

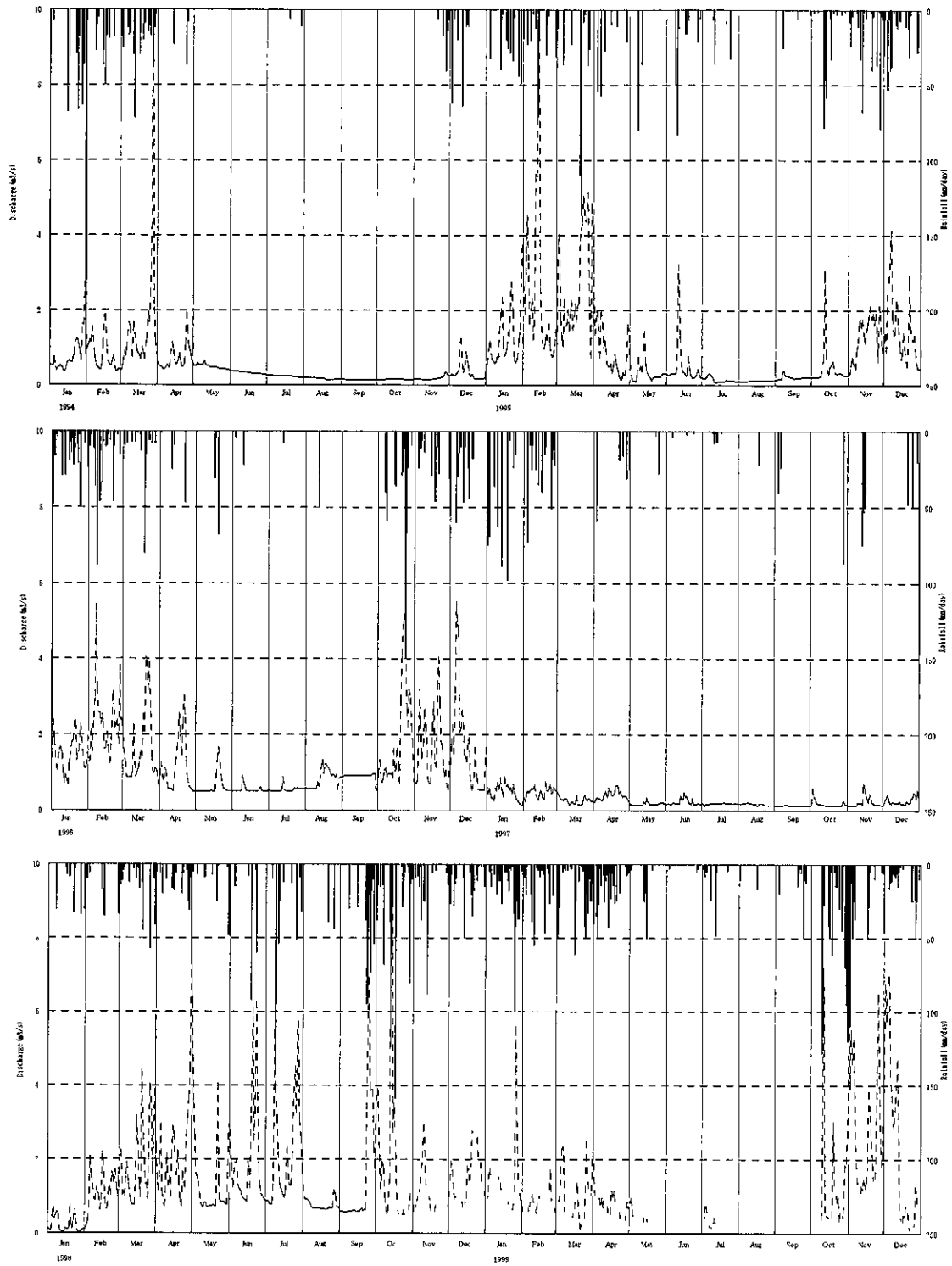


Figure-1 1 Daily Discharge Yeh Satang

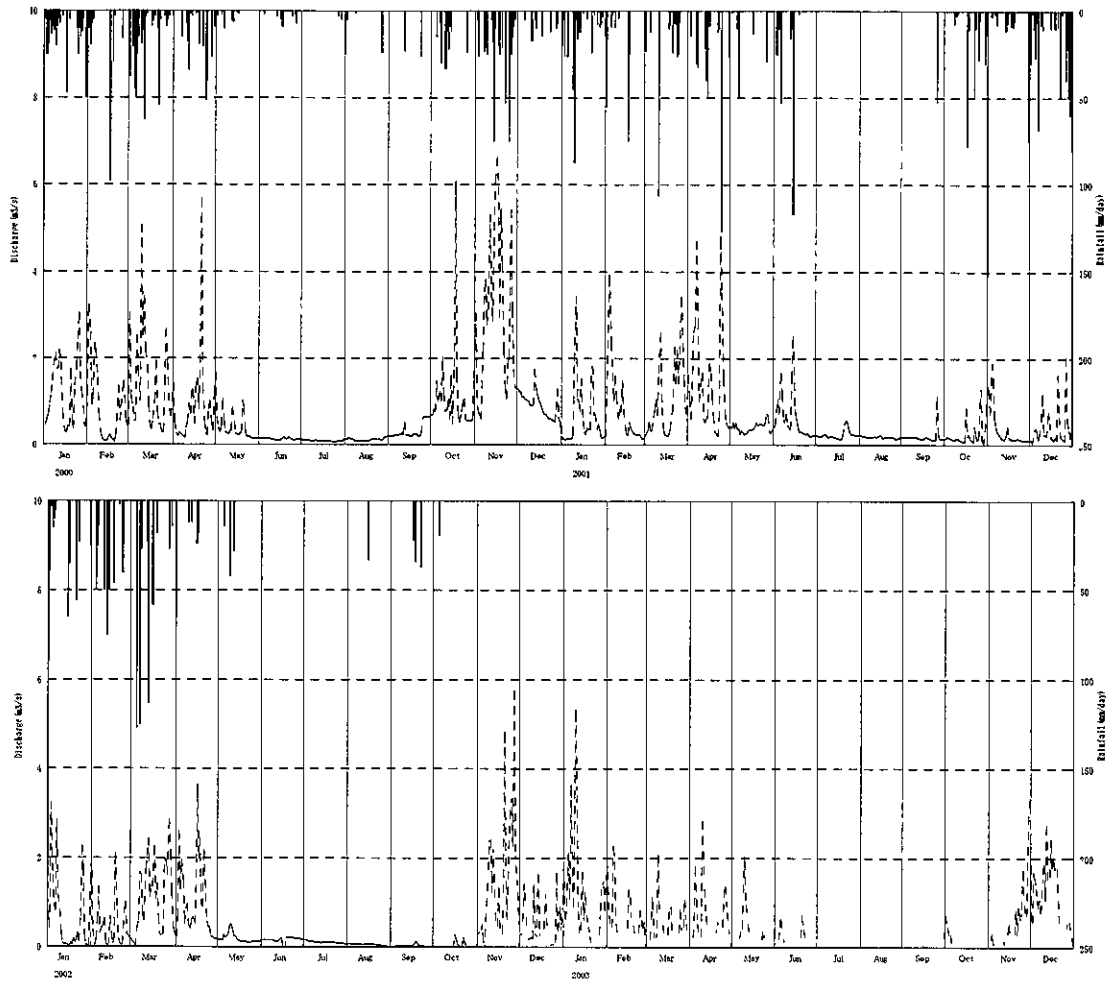


Figure-12 Daily Discharge Yeh Satang

### 1. Results of Discharge Measurement at Tk. Yeh Satang SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1981-1984)	21-Oct-81	0.64	0.74	0.35	0.26
2		24-Nov-81	0.78	4.03	0.49	1.97
3		15-Dec-81	1.06	14.41	0.27	3.89
4		25-Jan-82	0.78	5.94	0.23	1.37
5		16-Mar-82	0.78	6.35	0.29	1.84
6		10-May-82	0.57	0.40	0.35	0.14
7		21-Jun-82	0.55	0.83	0.22	0.18
8		14-Jul-82	0.52	0.49	0.32	0.16
9		26-Aug-82	0.61	1.45	0.37	0.54
10		13-Sep-82	0.53	0.28	0.41	0.11
11		11-Oct-82	0.53	0.40	0.35	0.14
12		17-Nov-82	0.53	0.20	0.48	0.10
13		14-Dec-82	0.86	9.54	0.44	4.20
14		24-Jan-83	0.56	3.73	0.05	0.19
15		18-Jul-83	0.55	0.57	0.31	0.18
16		29-Aug-83	0.56	4.67	0.03	0.14
17		25-Nov-83	0.75	6.52	0.26	1.70
18		18-Feb-84	0.88	8.30	0.56	4.65
19	(1990-1991)	22-May-90	0.40	0.81	0.35	0.28
20		7-Jun-90	0.43	0.75	0.27	0.20
21		24-Jul-90	0.42	0.69	0.26	0.18
22		4-Sep-90	0.40	0.57	0.38	0.22
23		16-Oct-90	0.38	0.42	0.40	0.17
24		27-Nov-90	0.42	0.44	0.33	0.15
25		29-May-91	0.41	0.89	0.25	0.22
26		8-Aug-91	0.31	0.33	0.21	0.07
27		23-Sep-91	0.32	0.26	0.39	0.10
28		21-Oct-91	0.31	0.64	0.23	0.15
29		5-Nov-91	0.22	0.41	0.29	0.12
30		4-Dec-91	0.57	5.56	0.66	3.67
31	(1992-1993)	8-Jan-92	0.44	2.88	0.34	0.98
32		23-Jun-92	0.13	0.34	0.37	0.13
33		28-Jul-92	0.11	1.11	0.11	0.12
34		25-Aug-92	0.13	1.25	0.06	0.08
35		16-Nov-92	0.26	0.59	0.26	0.15
36		7-Dec-92	0.48	4.90	0.42	2.06
37		27-May-93	0.16	1.78	0.16	0.28
38		14-Jun-93	0.10	0.42	0.18	0.08
39		30-Sep-93	0.01	1.12	0.18	0.20
40		18-Oct-93	0.05	2.14	0.09	0.19
41		26-Nov-93	0.16	3.69	0.07	0.26
42		14-Dec-93	0.16	4.83	0.07	0.34
43	(1994-1997)	10-May-94	0.14	5.41	0.12	0.65
44		28-Jul-94	0.02	1.07	0.18	0.19
45		6-Sep-94	0.02	0.70	0.21	0.15
46		27-Dec-94	0.05	0.57	0.37	0.21
47		20-Feb-95	0.14	5.17	0.37	1.91
48		7-Aug-95	0.02	1.16	0.09	0.10
49		22-Jan-96	0.30	10.29	0.21	2.16
50		20-Jun-96	0.08	0.51	0.35	0.18
51		18-Jul-96	0.09	0.85	0.28	0.24

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
52		14-Jan-97	0.17	3.18	0.44	1.40
53		24-Jun-97	0.08	0.81	0.22	0.18
54	<b>(2000-2001)</b>	23-Aug-00	0.08	1		0.247
55		7-Nov-01	0.05	2		0.075
		$H_{\max} =$	1.06		$Q_{\max} =$	4.65
		$H_{\min} =$	0.01		$Q_{\min} =$	0.07

## **D5-2 TK. Biluk Poh**



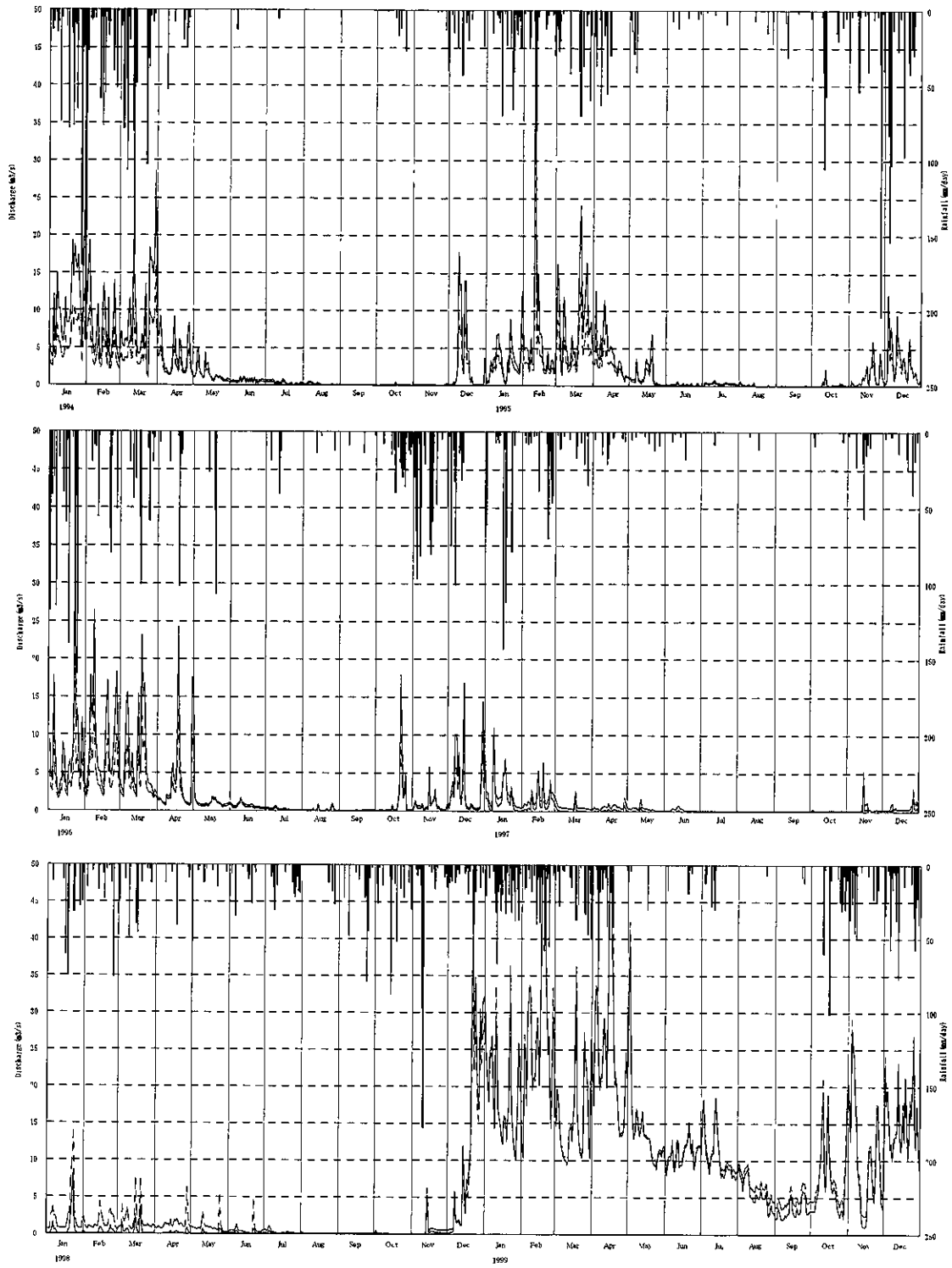


Figure-2 1 Daily Discharge Biluk Poh

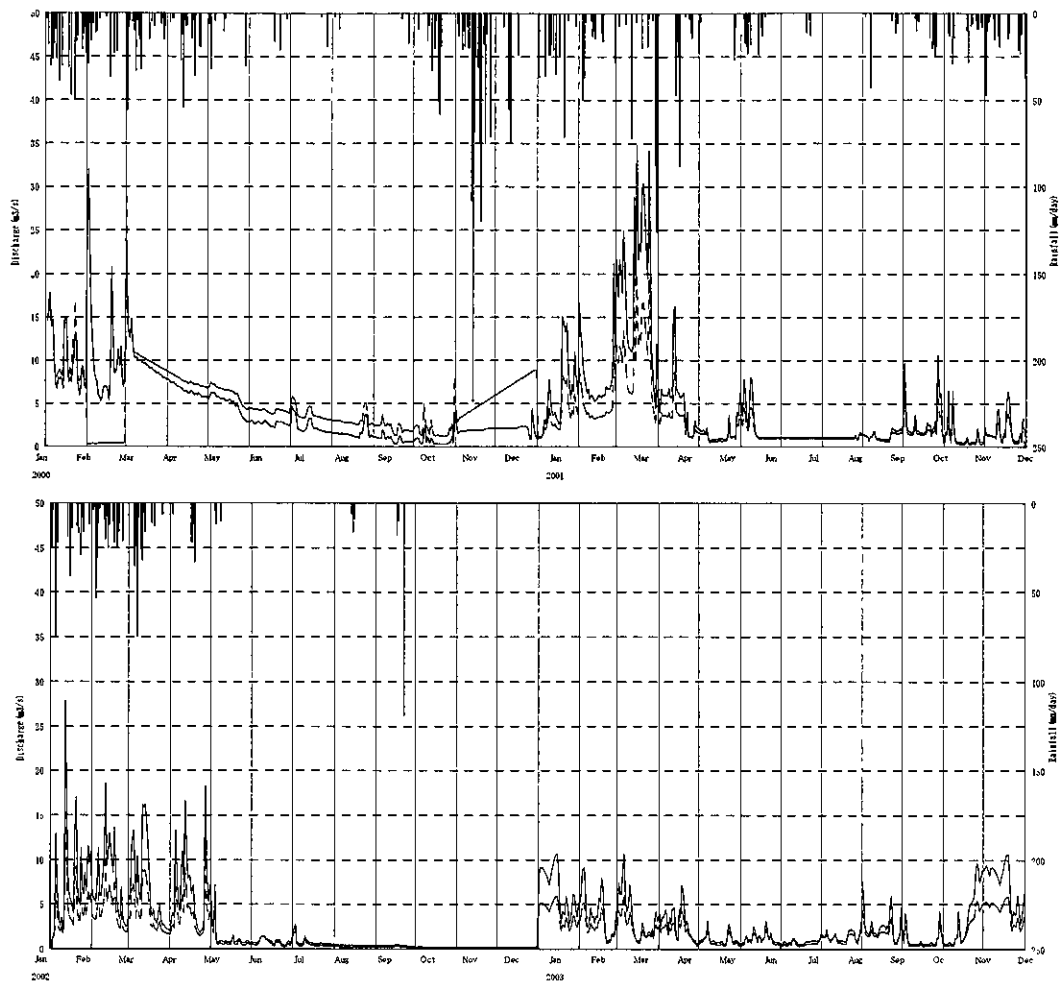


Figure-2.2 Daily Discharge Biluk Poh

## 2. Results of Discharge Measurement at Tk. Biluk Poh SGS

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1977-1980)	19-Oct-77	0.94	2.02	0.10	0.20
2		23-Nov-77	1.15	3.51	0.19	0.67
3		20-Dec-77	1.24	6.11	0.42	2.57
4		5-Jan-78	1.19	4.95	0.29	1.44
5		19-Apr-78	1.10	6.52	0.18	1.17
6		18-May-78	1.20	7.67	0.36	2.76
7		15-Jun-78	1.40	12.28	0.65	7.98
8		18-Jul-78	1.01	7.96	0.15	1.19
9		15-Aug-78	1.01	8.17	0.13	1.06
10		20-Sep-78	1.25	10.42	0.33	3.44
11		15-Oct-78	1.11	8.85	0.19	1.68
12		15-Nov-78	0.88	7.19	0.08	0.58
13		11-Dec-78	1.20	15.53	0.60	9.32
14		23-Jan-79	1.38	16.38	0.39	6.39
15		21-Feb-79	1.05	13.64	23.00	3.13
16		7-Mar-79	1.12	14.37	0.40	5.75
17		9-Apr-79	0.91	9.27	0.19	1.76
18		16-May-79	1.10	9.92	0.19	1.88
19		29-Jun-79	1.26	9.73	0.34	3.31
20		24-Jul-79	0.79	8.66	0.09	0.78
21		21-Aug-79	0.77	7.40	0.13	0.96
22		8-Oct-79	1.13	6.14	0.04	0.25
23		29-Nov-79	1.12	6.20	0.04	0.25
24		18-Dec-79	1.14	8.75	0.09	0.79
25		23-Jan-80	1.35	12.15	0.29	3.52
26		18-Feb-80	1.22	9.65	0.11	1.06
27		26-Mar-80	0.94	11.14	0.10	1.11
28		23-Apr-80	1.08	14.85	0.25	1.49
29		27-May-80	1.96	11.22	0.11	2.81
30		24-Jun-80	0.87	7.91	0.04	0.87
31		31-Jul-80	0.91	8.79	0.09	0.35
32		21-Aug-80	0.93	9.73	0.09	0.88
33		20-Oct-80	0.78	1.14	0.14	0.10
34		18-Nov-80	0.86	7.85	0.07	1.10
35		29-Dec-80	1.03	13.51	0.24	0.95
36	(1981-1986)	20-Jan-81	1.33	18.84	0.80	4.52
37		19-Feb-81	0.94	8.63	0.19	6.90
38		14-Apr-81	1.05	11.65	0.19	2.21
39		13-May-81	1.02	11.11	0.16	2.11
40		11-Jun-81	1.00	9.56	0.13	1.53
41		15-Jul-81	1.15	14.97	0.35	1.95
42		26-Aug-81	0.97	13.16	0.06	4.61
43		16-Sep-81	0.97	10.40	0.11	0.62
44		21-Oct-81	0.91	40.38	0.05	4.44
45		21-Nov-81	1.18	13.49	0.42	0.67
46		16-Dec-81	1.09	15.85	0.22	3.49
47		26-Jan-82	1.35	22.24	0.68	15.12
48		10-May-82	0.93	7.71	0.09	0.69
49		16-Nov-82	0.89	9.54	0.03	0.29
50		13-Dec-82	0.87	2.78	0.14	0.39
51		26-Jan-83	0.83	7.03	0.10	0.70

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
52		21-Mar-83	1.12	15.75	0.50	7.88
53		20-Jul-83	0.69	4.83	0.13	0.63
54		28-Oct-83	0.78	10.31	0.13	1.34
55		26-Mar-84	0.81	9.87	0.22	2.17
56		11-Jun-84	0.59	5.73	0.17	6.00
57		27-Aug-84	0.54	2.65	0.23	0.61
58		21-Nov-84	0.17	1.09	0.05	0.05
59		14-May-85	0.22	6.30	0.17	1.07
60		24-Jan-86	0.41	4.54	0.22	1.00
61		26-Jan-86	0.22	2.20	0.09	0.20
62		28-Aug-86	0.10	0.40	0.09	0.04
63	<b>(1990-1992)</b>	16-May-90	0.62	7.48	0.14	1.05
64		22-Jun-90	0.47	4.21	0.11	0.46
65		27-Jul-90	0.48	4.49	0.10	0.45
66		5-Sep-90	0.64	8.00	0.23	1.84
67		16-Oct-90	0.41	3.64	0.09	0.33
68		21-Dec-90	0.78	7.98	0.52	4.15
69		13-May-91	0.57	6.61	0.14	0.93
70		18-Jun-91	0.50	5.33	0.11	0.59
71		21-Aug-91	0.37	1.44	0.11	0.16
72		11-Sep-91	0.35	0.56	0.21	0.12
73		21-Oct-91	0.37	0.53	0.21	0.11
74		23-Nov-91	0.74	9.94	0.34	3.38
75		9-Jan-92	0.76	11.07	0.35	3.87
76		11-Feb-92	0.85	12.19	0.47	5.73
77		4-Jun-92	0.64	9.45	0.21	1.98
78		7-Jul-92	0.47	7.75	0.06	0.47
79		12-Aug-92	0.33	4.38	0.04	0.18
80		21-Oct-92	0.51	7.32	0.16	1.17
81	<b>(1993-1995)</b>	18-May-93	0.55	7.76	0.11	0.85
82		22-Jun-93	0.39	7.30	0.03	0.22
83		27-Jul-93	0.44	6.93	0.06	0.42
84		15-Sep-93	0.27	0.25	0.14	0.04
85		8-Nov-93	0.35	3.07	0.09	0.28
86		7-Dec-93	0.74	13.54	0.27	3.66
87		26-May-94	0.48	7.00	0.09	0.63
88		20-Jul-94	0.23	4.86	0.03	0.15
89		29-Sep-94	0.21	0.25	0.22	0.06
90		22-Nov-94	0.20	0.24	0.15	0.04
91		15-Jan-95	0.68	12.73	0.37	4.71
92		24-Aug-95	0.07	0.07	0.18	0.01
93		15-Jan-96	0.81	16.98	0.52	8.83
94		22-May-96	0.45	9.90	0.15	1.49
95		18-Sep-96	0.11	0.46	0.13	0.06
96	<b>(1996-1999)</b>	13-Jan-97	0.70	12.96	0.36	4.67
97		26-Jun-97	0.28			0.28
98		29-Jul-97	0.11			0.04
99		25-Aug-97	0.12			0.45
100		23-Sep-97	0.13			0.45
101		19-Nov-97	0.41			1.32
102		26-Jan-98	0.46			2.20
103		8-Sep-98	0.27			0.20

No.	Period	Date of Measurement	Stage Height H (m)	Flow Area A (m <sup>2</sup> )	Velocity V (m/sec)	Discharge Q (m <sup>3</sup> /sec)
104		9-Dec-98	0.54			1.06
105		10-Dec-98	0.40			0.84
106		11-Dec-98	0.37			0.80
107		26-Feb-99	0.63			3.31
		$H_{max} =$	1.96		$Q_{max} =$	15.12
		$H_{min} =$	0.07		$Q_{min} =$	0.01

## **D5-3 TK. Jogading**

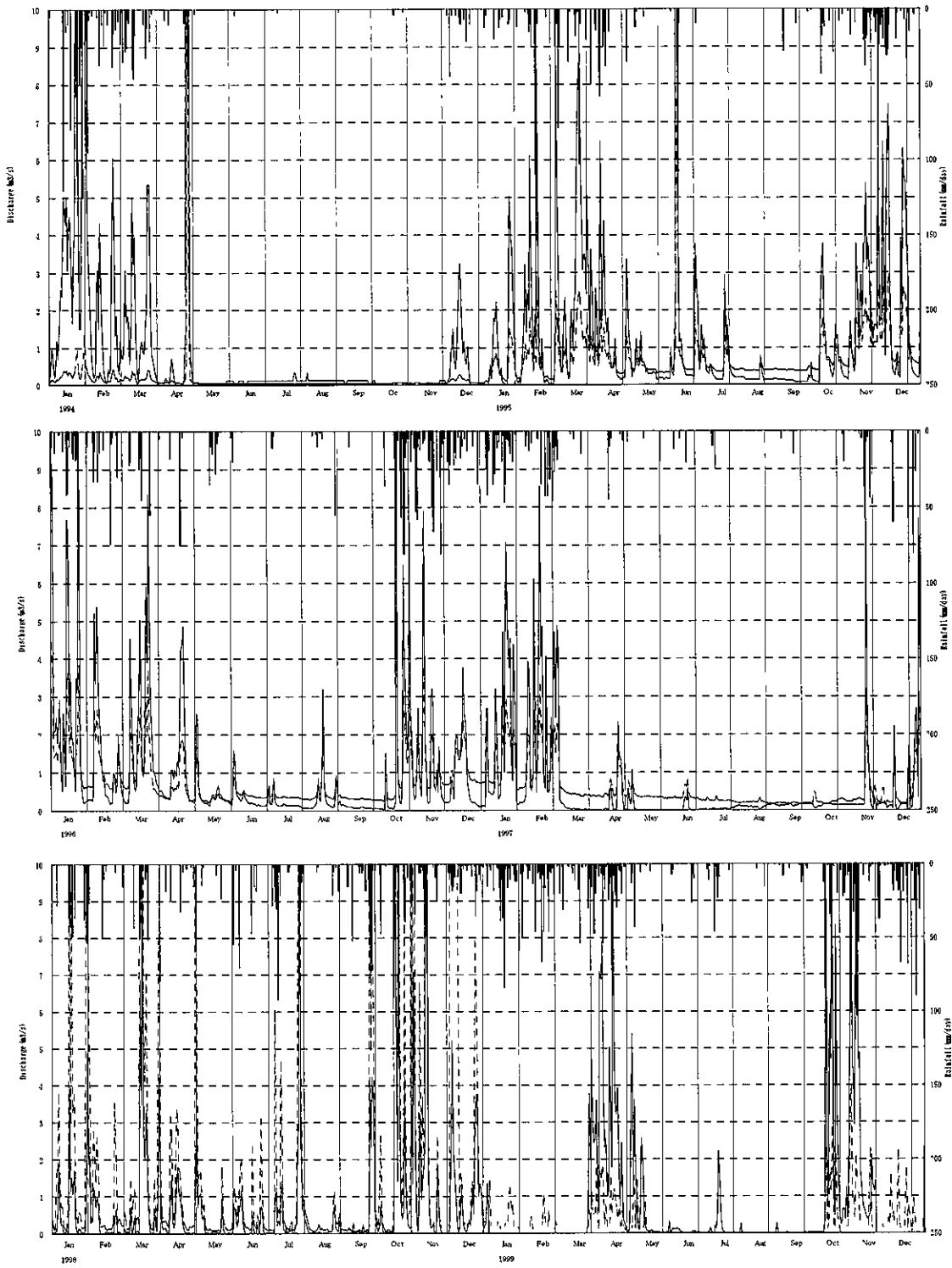


Figure-3 1 Daily Discharge Jogading

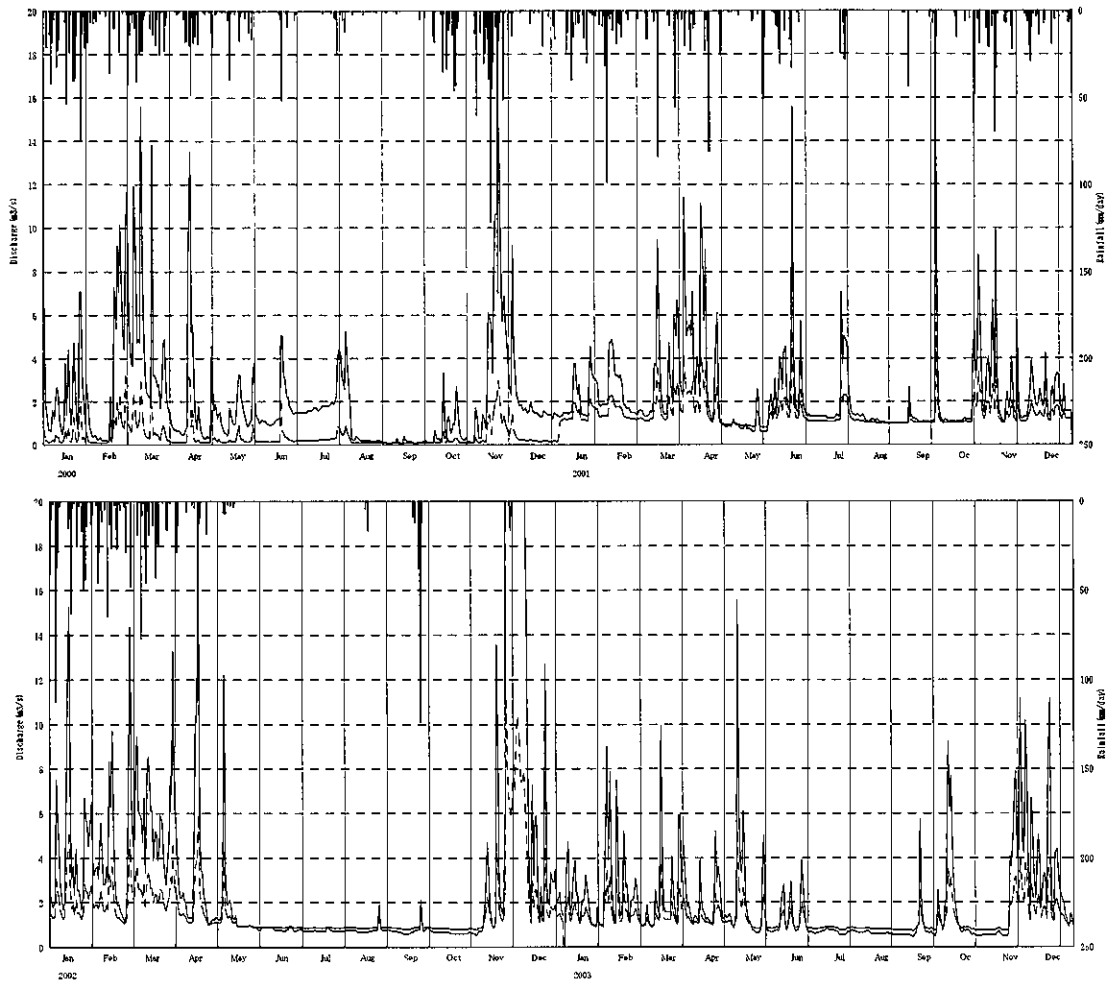


Figure-3.2 Daily Discharge Jogading



### 3. Results of Discharge Measurement at Tk. Jogading SGS

No	Period	Date of Measurement	Stage Height H (m)	Flow Area	Velocity	Discharge
				A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
1	(1981-1986)	22-Oct-81	1.07	0.40	0.20	0.08
2		24-Nov-81	1.39	3.79	0.52	1.97
3		16-Dec-81	1.30	2.96	0.55	1.63
4		27-Jan-82	1.21	3.25	0.50	1.63
5		11-May-82	0.89	0.60	0.10	0.06
6		23-Jun-82	0.87	0.40	0.10	0.04
7		12-Jul-82	0.86	0.49	0.07	0.03
8		26-Aug-82	0.92	0.58	0.28	0.16
9		12-Oct-82	0.93	1.34	0.11	0.15
10		16-Nov-82	0.86	0.20	0.17	0.03
11		14-Dec-82	0.90	0.21	0.27	0.06
12		25-Jan-83	0.87	0.60	0.20	0.12
13		15-Feb-83	0.90	1.48	0.13	0.19
14		20-Jul-83	0.80	0.62	0.16	0.10
15		20-Feb-84	0.93	0.88	0.29	0.26
16		10-Jul-84	0.81	0.54	0.16	0.09
17		17-Dec-84	1.28	5.15	0.79	4.07
18		9-Jul-85	0.88	0.69	0.10	0.07
19		24-Jan-86	0.89	0.60	0.19	0.11
20		19-Aug-86	0.83	0.36	0.09	0.03
21	(1990-1991)	17-May-90	0.68	1.51	0.09	0.14
22		23-Jun-90	0.67	2.25	0.05	0.11
23		27-Jul-90	0.60	0.22	0.22	0.05
24		5-Sep-90	0.72	2.71	0.17	0.46
25		17-Oct-90	0.61	1.56	0.09	0.14
26		27-Nov-90	0.58	1.05	0.06	0.06
27		29-Dec-90	0.70	3.58	0.13	0.47
28		18-Jan-91	0.74	3.70	0.26	0.96
29		13-May-91	0.63	1.77	0.10	0.18
30		17-Jun-91	0.49	1.30	0.03	0.04
31		19-Aug-91	0.51	0.23	0.05	0.01
32		12-Sep-91	0.54	1.91	0.07	0.13
33		21-Oct-91	0.55	0.99	0.13	0.13
34	(1992-1994)	9-Jan-92	0.56	0.97	0.15	0.15
35		11-Feb-92	0.88	6.78	0.28	1.90
36		5-Jun-92	0.73	2.93	0.36	1.05
37		8-Jul-92	0.50	1.07	3.03	3.24
38		13-Aug-92	0.48	0.16	0.13	0.02
39		28-May-93	0.69	0.75	0.06	0.05
40		23-Jun-93	0.84	2.79	0.16	0.45
41		28-Jul-93	0.69	1.15	0.04	0.05
42		15-Sep-93	0.66	0.48	0.12	0.06
43		9-Nov-93	1.09	4.15	0.55	2.28
44		7-Dec-93	1.06	3.89	0.49	1.91
45		27-May-94	0.75	0.28	0.16	0.04
46		21-Jul-94	0.70	0.30	0.13	0.04
47		12-Sep-94	0.66	0.34	0.06	0.02
48		19-Oct-94	0.69	0.68	0.09	0.06
49	(1995-2000)	13-Feb-95	1.19	8.25	0.45	3.71
50		17-Oct-95	0.91	2.75	0.27	0.74
51		8-Jan-96	0.93	3.33	0.30	1.00

No.	Period	Date of Measurement	Stage Height	Flow Area	Velocity	Discharge
			H (m)	A (m <sup>2</sup> )	V (m/sec)	Q (m <sup>3</sup> /sec)
52		20-May-96	0.87	2.22	0.17	0.38
53		9-Jul-96	0.79	0.96	0.04	0.04
54		8-Jan-97	1.00	4.03	0.39	1.57
55		28-May-97	0.69	0.28	0.07	0.02
56		27-Jan-99	1.01			1.36
57		9-Mar-00	0.82			1.06
		H <sub>max</sub> =	1.39		Q <sub>max</sub> =	4.07
		H <sub>min</sub> =	0.48		Q <sub>min</sub> =	0.01