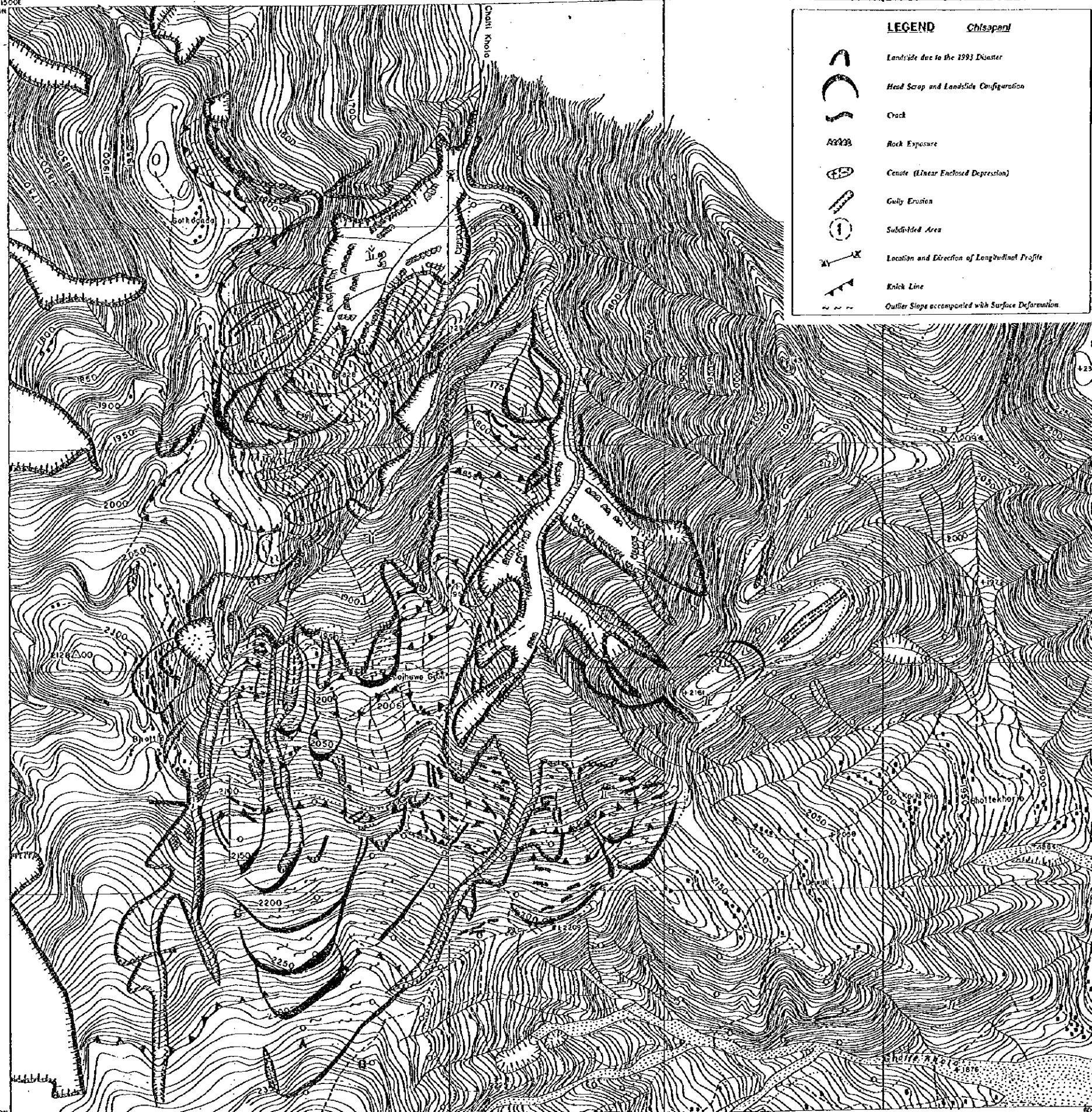


801500E
306000N

804000E
306000N



LEGEND Chisapani

	Landslide due to the 1993 Disaster
	Head Scrap and Landslide Configuration
	Crack
	Rock Exposure
	Cante (Linear Enclosed Depression)
	Gully Erosion
	Subsidied Area
	Location and Direction of Longitudinal Profile
	Kink Line
	Outlier Slope accompanied with Surface Deformation

LEGEND

Motorable road with bridge		Forest area	
Track with foot bridge		Land slide	
House		Contour	
Isolated tree, Bamboo		Spot height	
River with steep banks		Bench mark	
Khola, Kholst		Cliff	
Gablon wall		Water-mill	
Rocks, Boulders		Trigonometrical control point	

8058000N
801500E

804000E
8058000N

**Fig. 4.2.1
Disaster Map of Chisapani Area**

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation / Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

CHISAPANI/PHEDIGAON

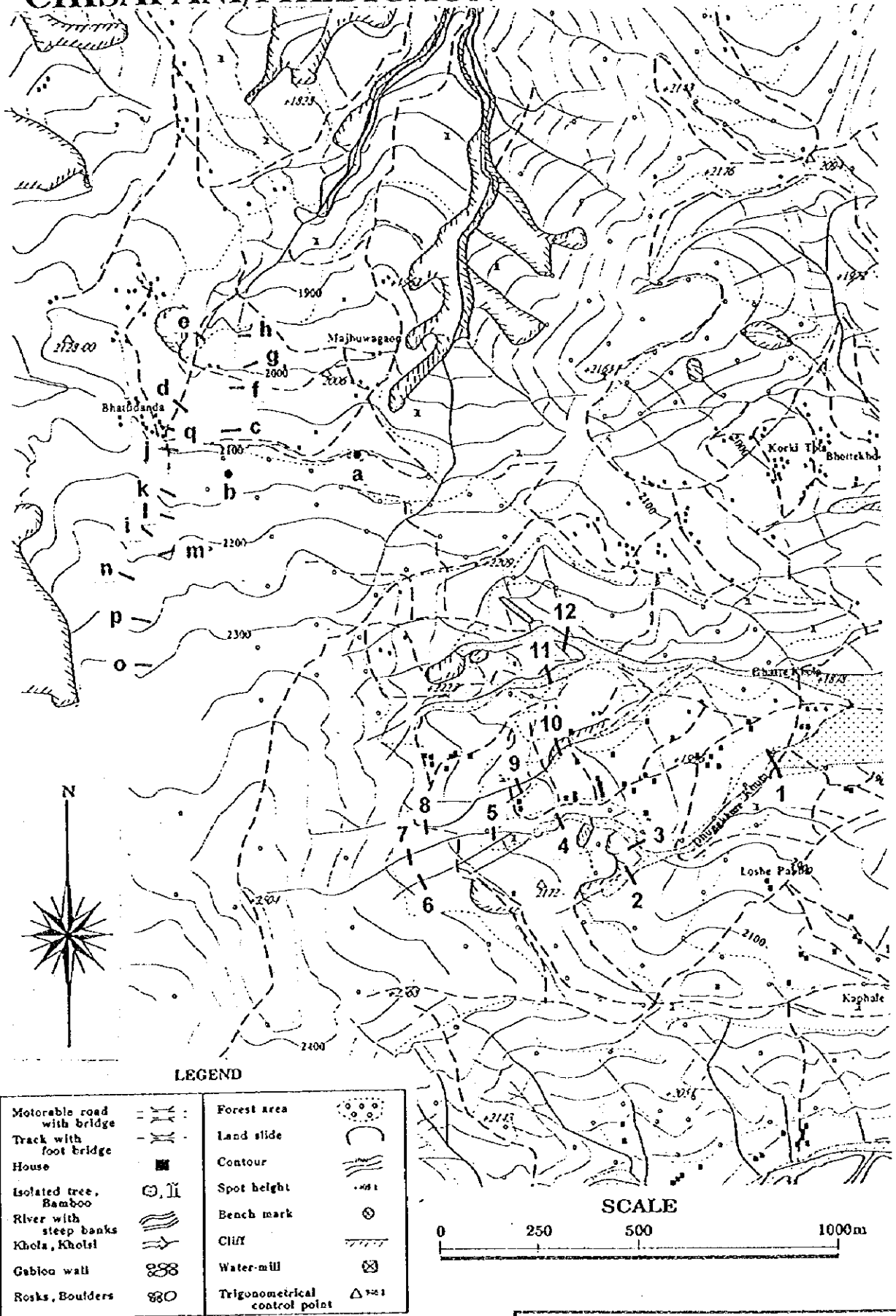


Fig. 4.2.2
Location Map of Slope Material and Cross Section Survey Area

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

Right bank

CHISAPANI

Left bank

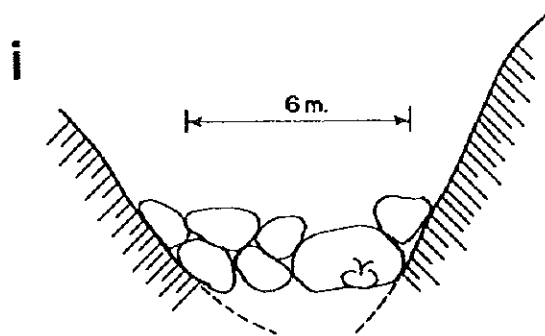
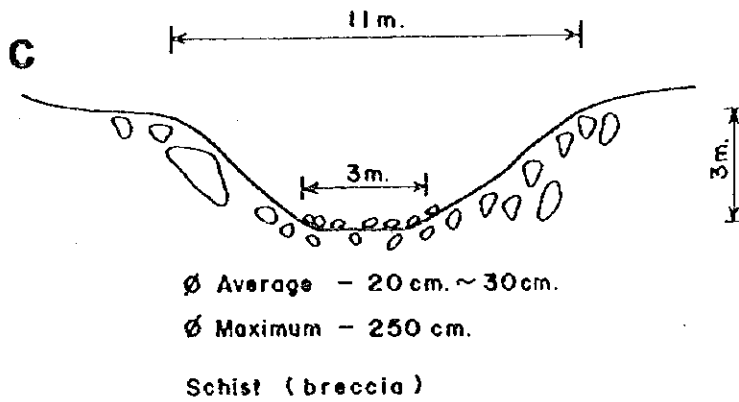
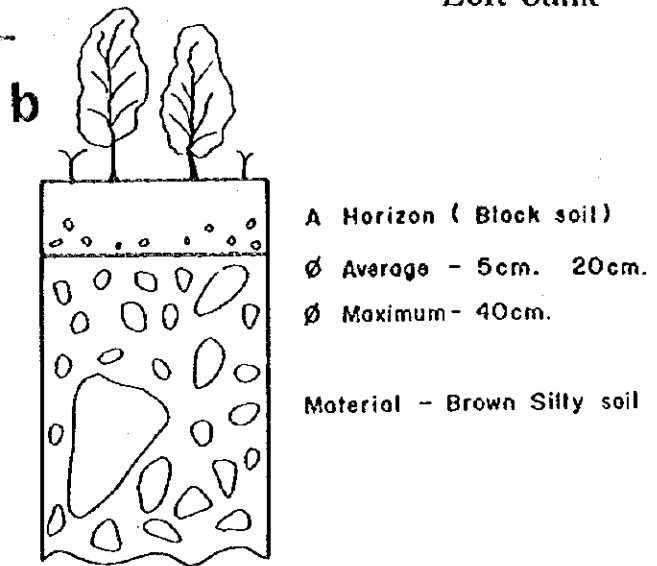
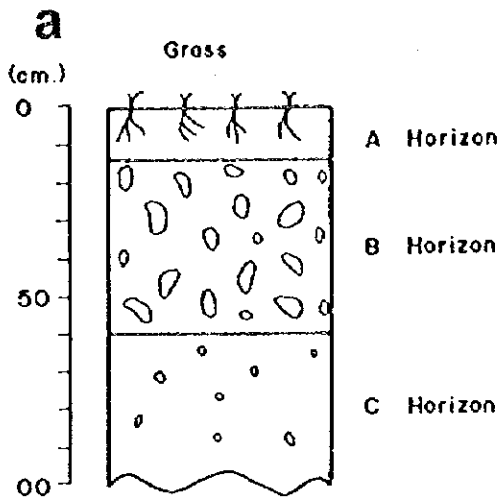


Fig. 4.2.3
Investigation Results of Slope Material
and Gully Sections (1/6)

The Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation

THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1994 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL

JAPAN INTERNATIONAL COOPERATION AGENCY

CHISAPANI

Right bank Left bank

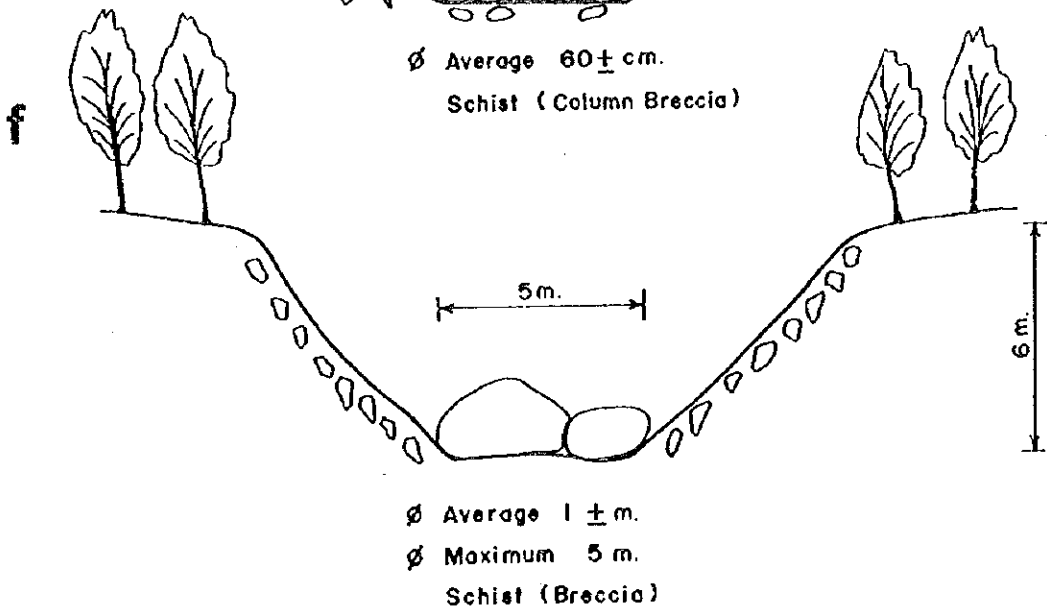
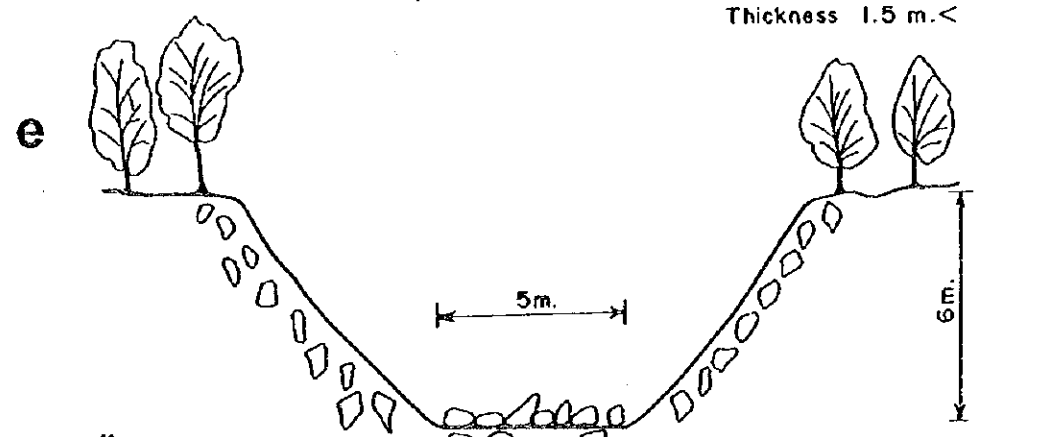
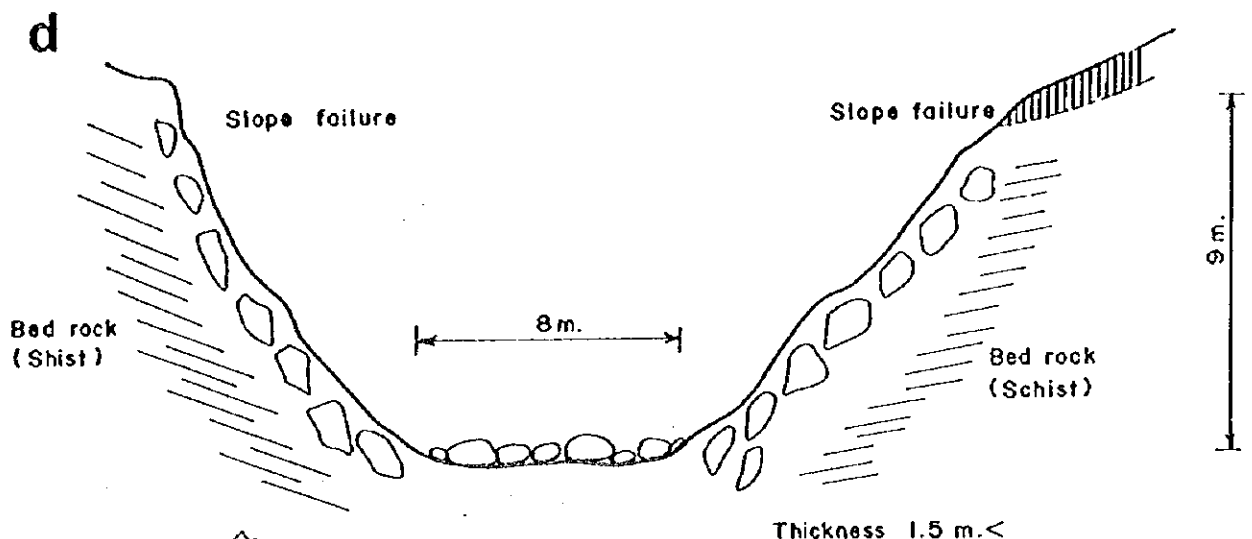


Fig. 4.2.4
Investigation Results of Slope Material
and Gully Sections (2/6)

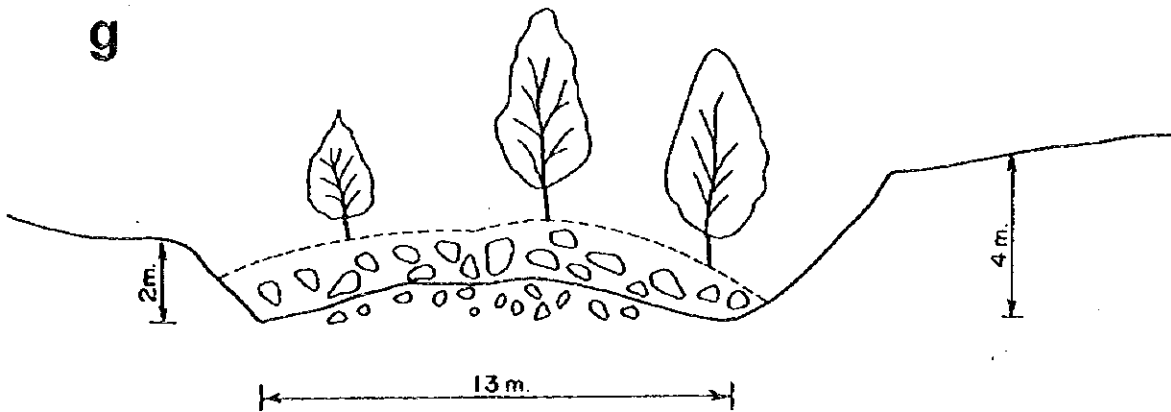
His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

CHISAPANI

Right bank

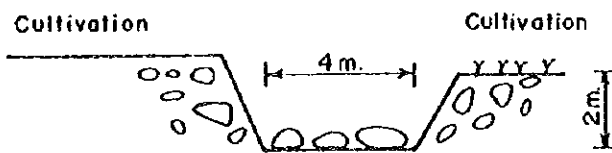
Left bank

g



Schist \varnothing Average - 30 cm.
 \varnothing Maximum - 200 cm.

h



Schist (Breccia)
 \varnothing Average - 30 cm.- 40 cm.
 \varnothing Maximum - 200 cm.

Fig. 4.2.5
 Investigation Results of Slope Material
 and Gully Sections (3/6)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1994 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

CHISAPANI, CHEPE KHOLA

Right bank

Left bank

j

Schist
N 72° W
38° N

7 m.

4 m.
4 m.

k

Schist (Breccia)
Ø Average - 1 to 2 m.

Schist (very flexured)

12 m.

6 m.

Thickness 4 m. <

l

Schist (Breccia)
Ø Average - 10 to 20 cm.
Ø Maximum - 300 cm.

13 m.

1 m.

Schist (very flexured)
Joint size
40 cm. X 20 cm.
Thickness 4 m. <

Fig. 4.2.6
Investigation Results of Slope Material
and Gully Sections (4/6)

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
JAPAN INTERNATIONAL COOPERATION AGENCY

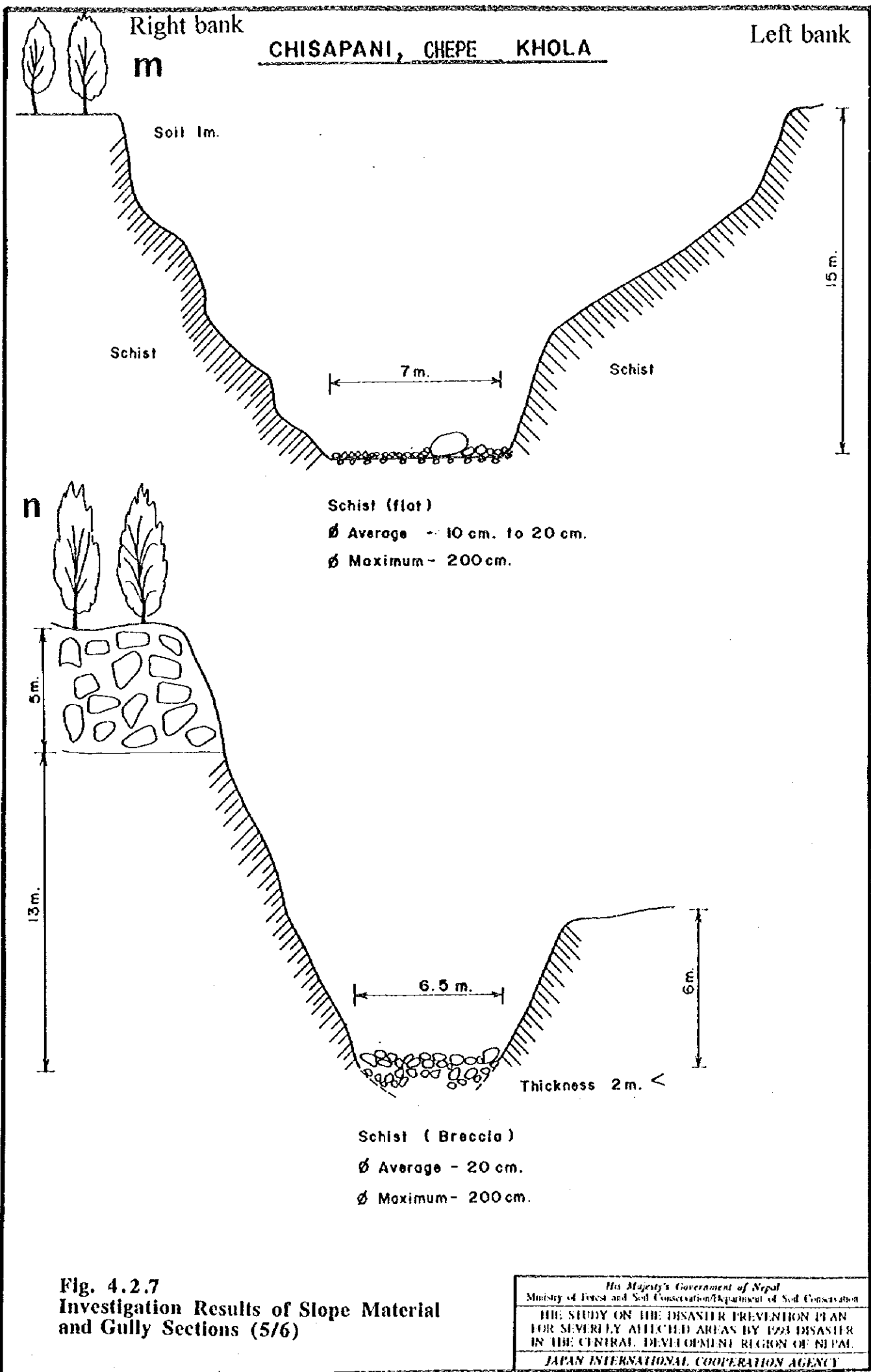


Fig. 4.2.7
Investigation Results of Slope Material
and Gully Sections (5/6)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1974 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

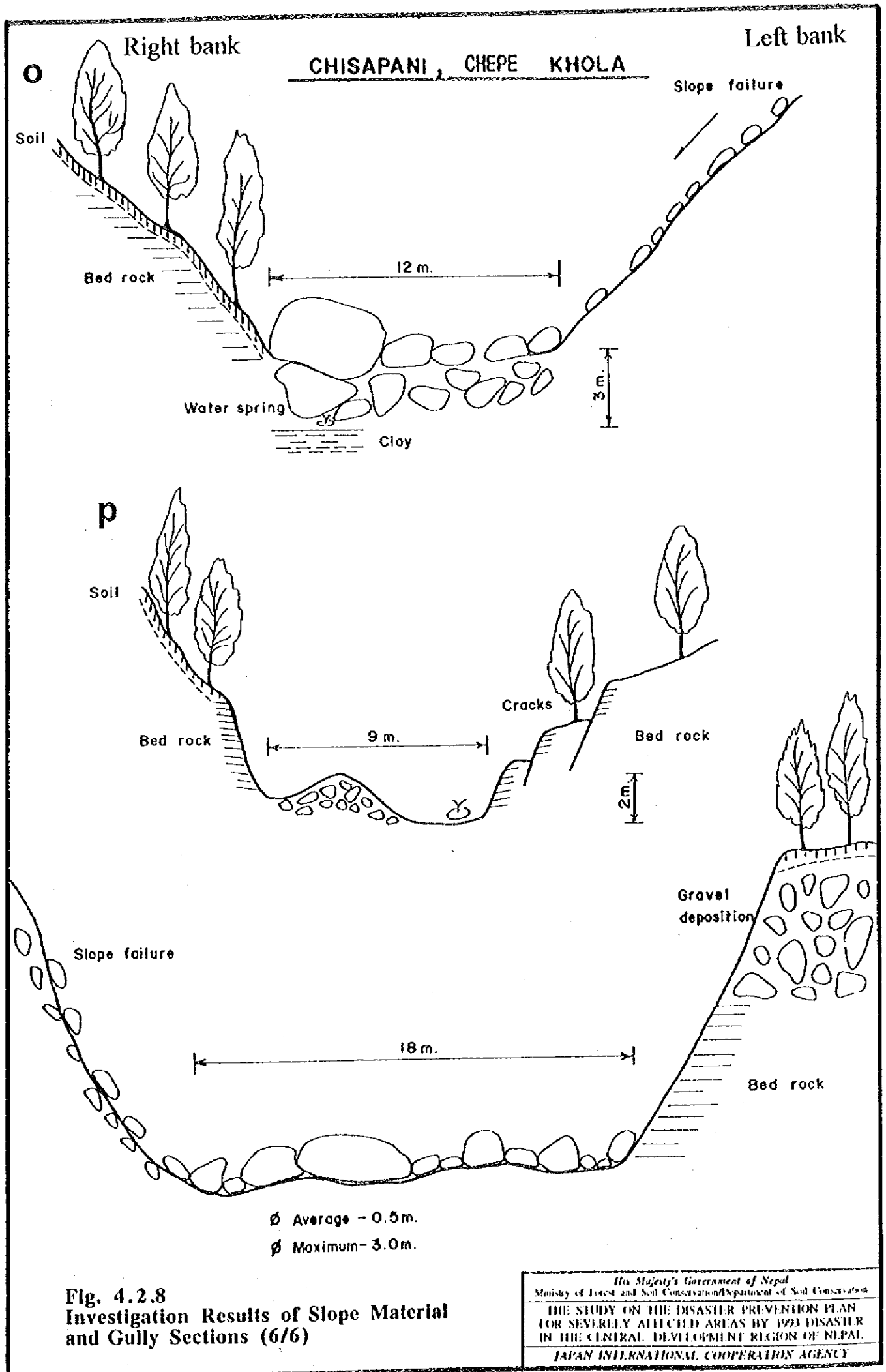
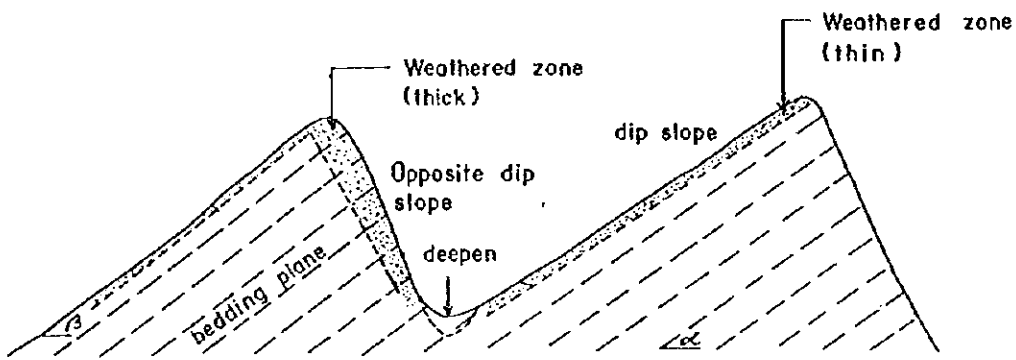
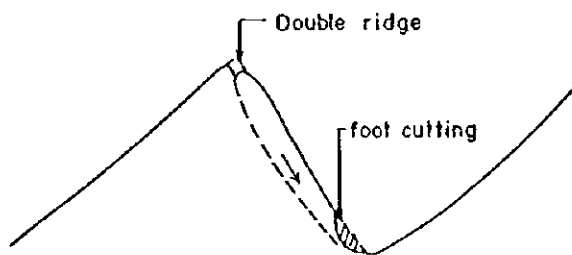


Fig. 4.2.8
Investigation Results of Slope Material
and Gully Sections (6/6)

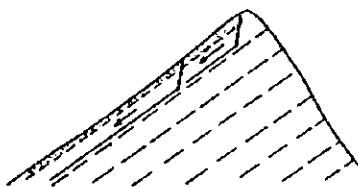
His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY



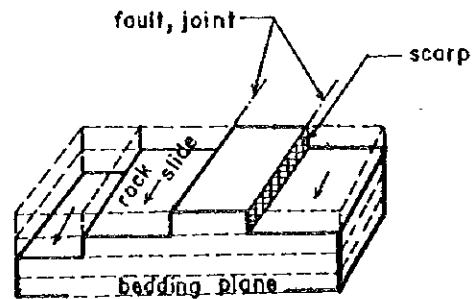
Opposite dip slope : Creep (A)



dip slope : Land slide
block slide (B)



Plane slide (C)



$\alpha = \beta$ or $\alpha < \beta$: unstable
 $\alpha > \beta$: stable

Fig. 4.3.1
Mass Wasting Model

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

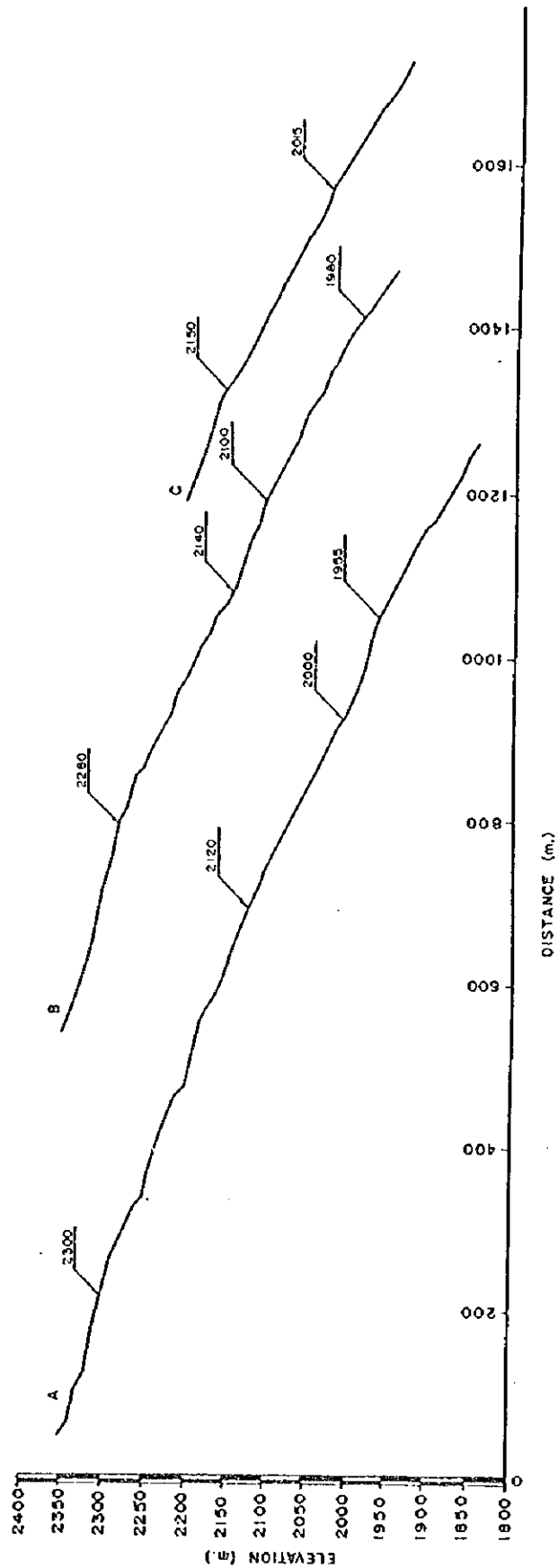


Fig. 4.3.2
Longitudinal Profiles of Chisapani Area

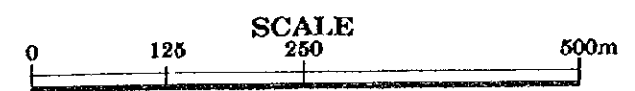
His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY



LEGEND		
Motorable road with bridge	-X-X-	Forest area
Track with foot bridge	-X-	Land slide
House	■	Contour
Isolated tree, Bamboo	⊙, ⊥	Spot height
River with steep banks	⊃	Bench mark
Khola, Kholsi	⊃	Cliff
Gabion wall	⊃	Water-mill
Rocks, Boulders	⊃	Trigonometrical control point

LEGEND	
[Dotted pattern]	Plane Slide, Failure due to the 1993 Disaster (hard rock exposed)
[Stippled pattern]	Semi-Safety Zone
[White box]	A little Zone
[Square with dot]	Hazardous House (need to take refuge in heavy rein)
Integrated Disaster Types	
[Dark stippled pattern]	Hazard Level A (High Hazard)
[Medium stippled pattern]	Hazard Level B (Medium Hazard)
[Light stippled pattern]	Hazard Level C (Low Hazard)
[Line with triangles]	Knick Line

Figure 4.4.1 Hazard Map of Chisapani Area



His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation / Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

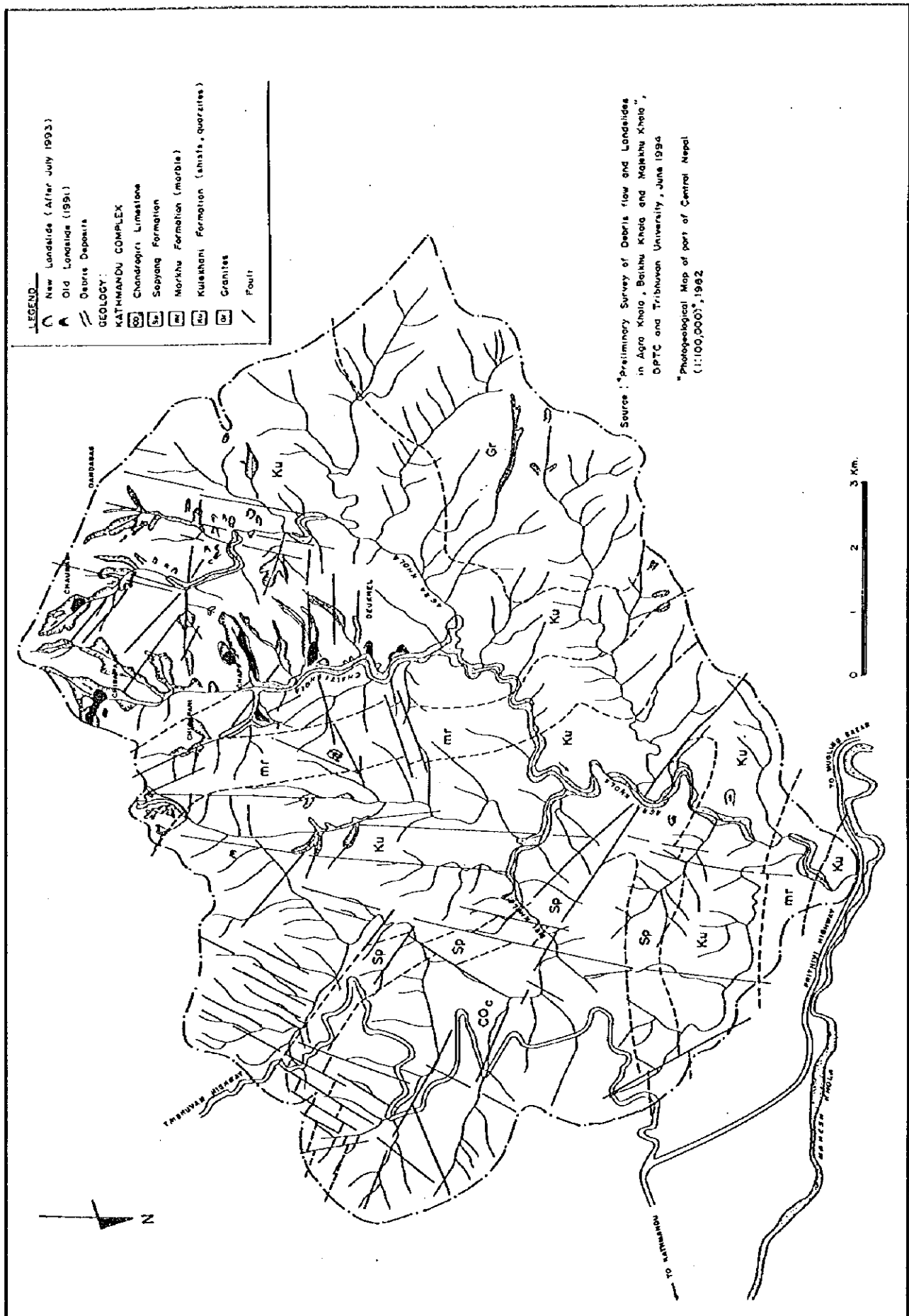
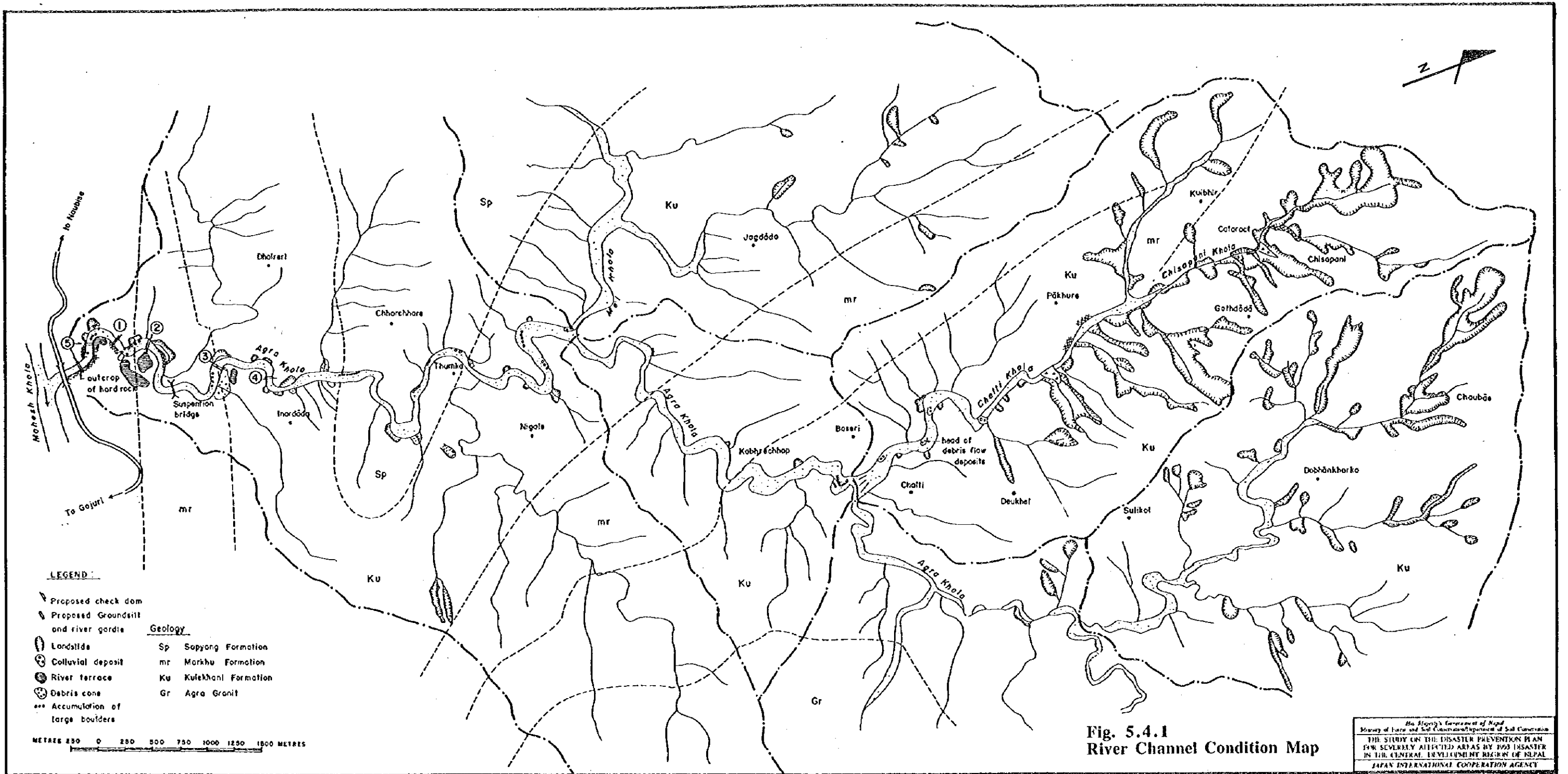


Fig. 5.2.1
Topographical and Geological Map of the
Agra Khola Basin

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation

THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL

JAPAN INTERNATIONAL COOPERATION AGENCY



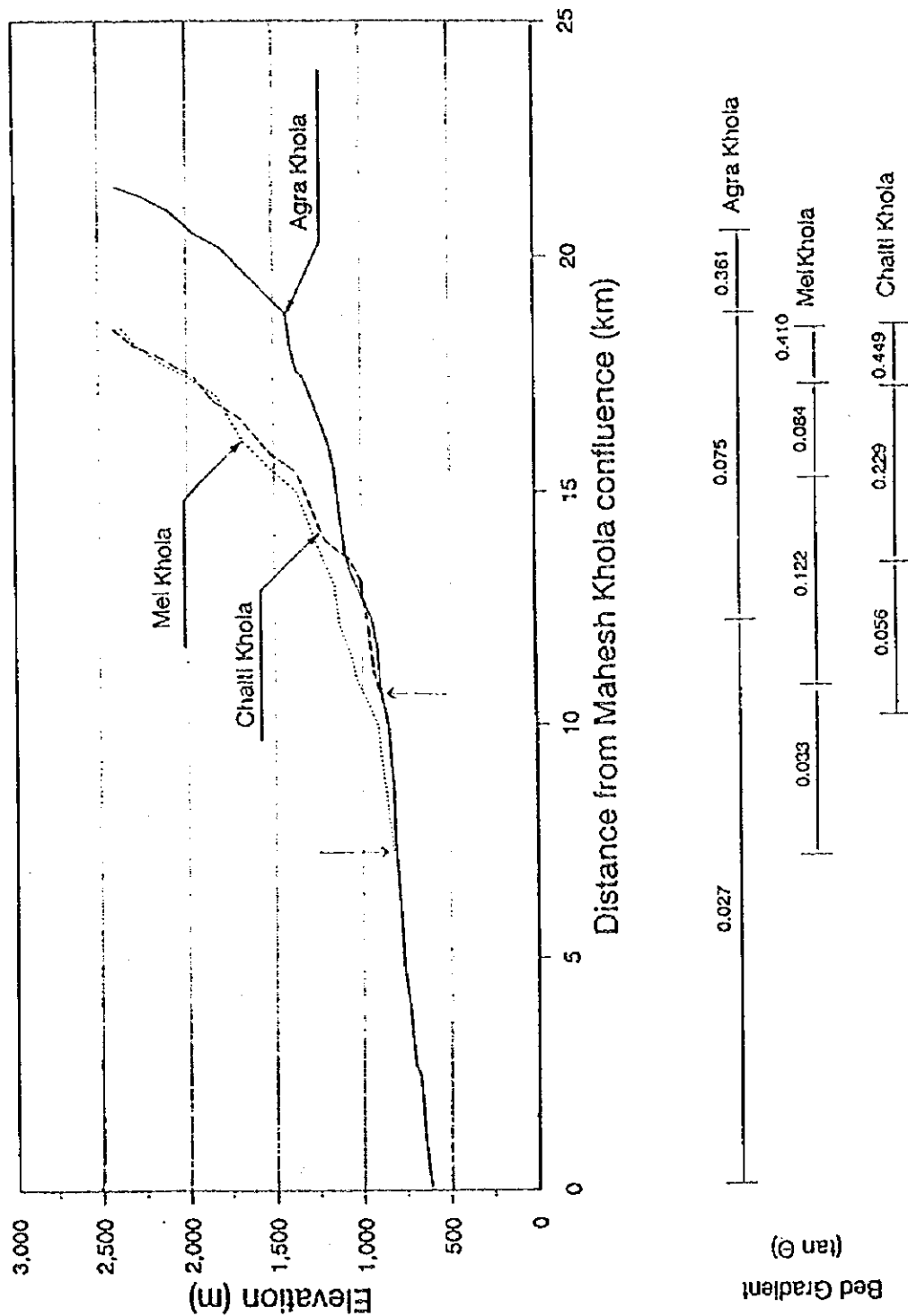


Fig. 5.4.2
Longitudinal Profiles of the Agra Khola,
Mel Khola and the Chalti Khola

Source: "Preliminary Survey of Debris Flow and Landslides in Agra Khola",
 DPTC and Tribuvan University, June 1994

The Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

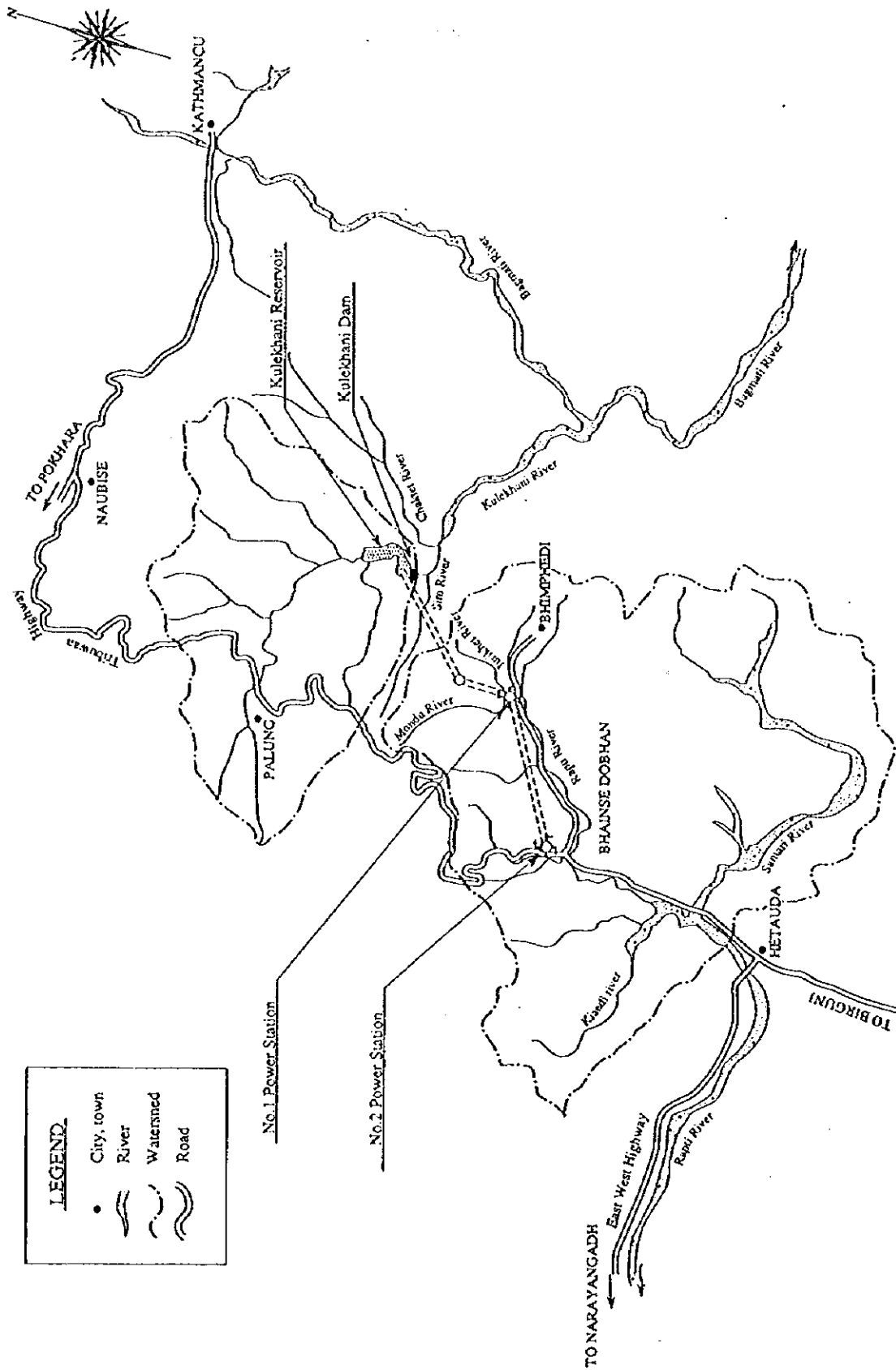
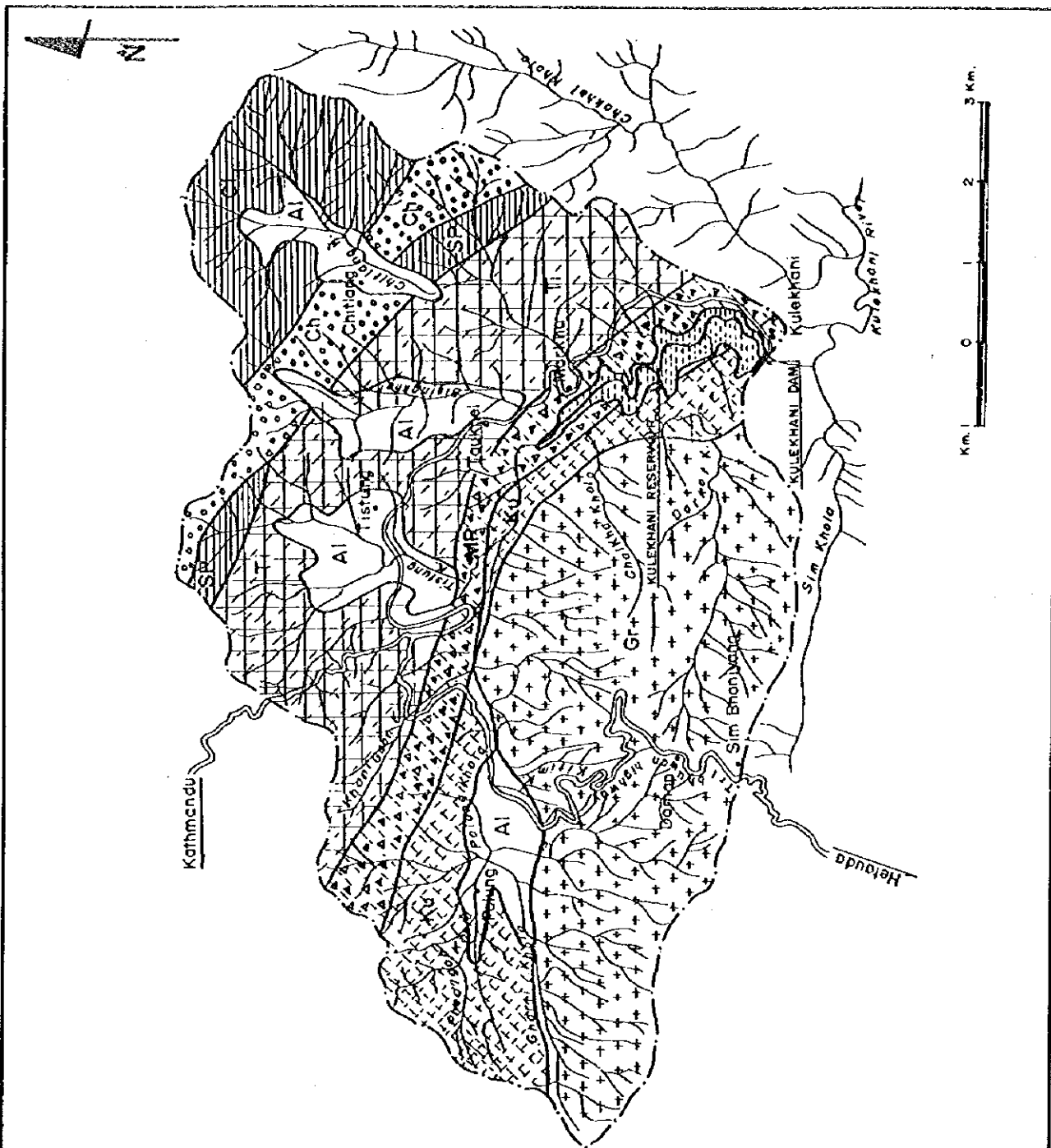


Fig. 6.1.1
Location Map of Kulekhani
Hydropower Project

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1973 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
JAPAN INTERNATIONAL COOPERATION AGENCY

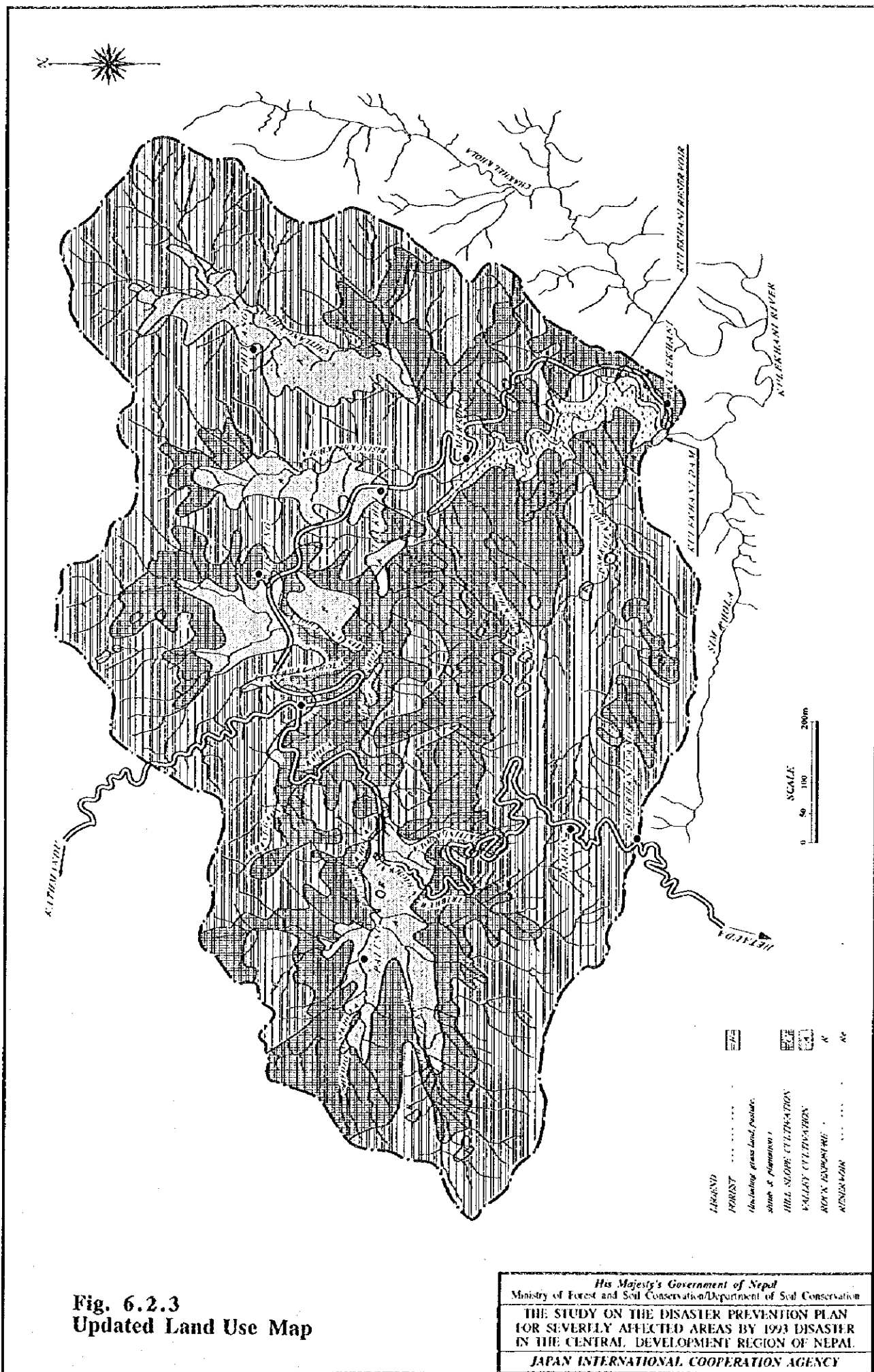


GEOLOGICAL FORMATION	
PHULCHOWKI GROUP	(Lower Palaeozoic)
AI	Alluvial Deposit
CI	Chitlang
Ch	Chandragiri
SP	Sopyang
Ti	Tistung
MR	Markhu
Gr	Palung
Ku	Kulekhani
BHIMPHEDI GROUP	(Precambrian)

LEGEND OF ROCK :	
[Horizontal lines pattern]	slate
[Vertical lines pattern]	phyllite
[Diagonal lines pattern]	quartzite
[Cross-hatch pattern]	schist
[Dotted pattern]	lime stone
[Triangle pattern]	marble
[Square pattern]	granite
[Blank box]	alluvial plain, terrace

Fig. 6.2.2
Geological Map of Kulekhani Watershed

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY



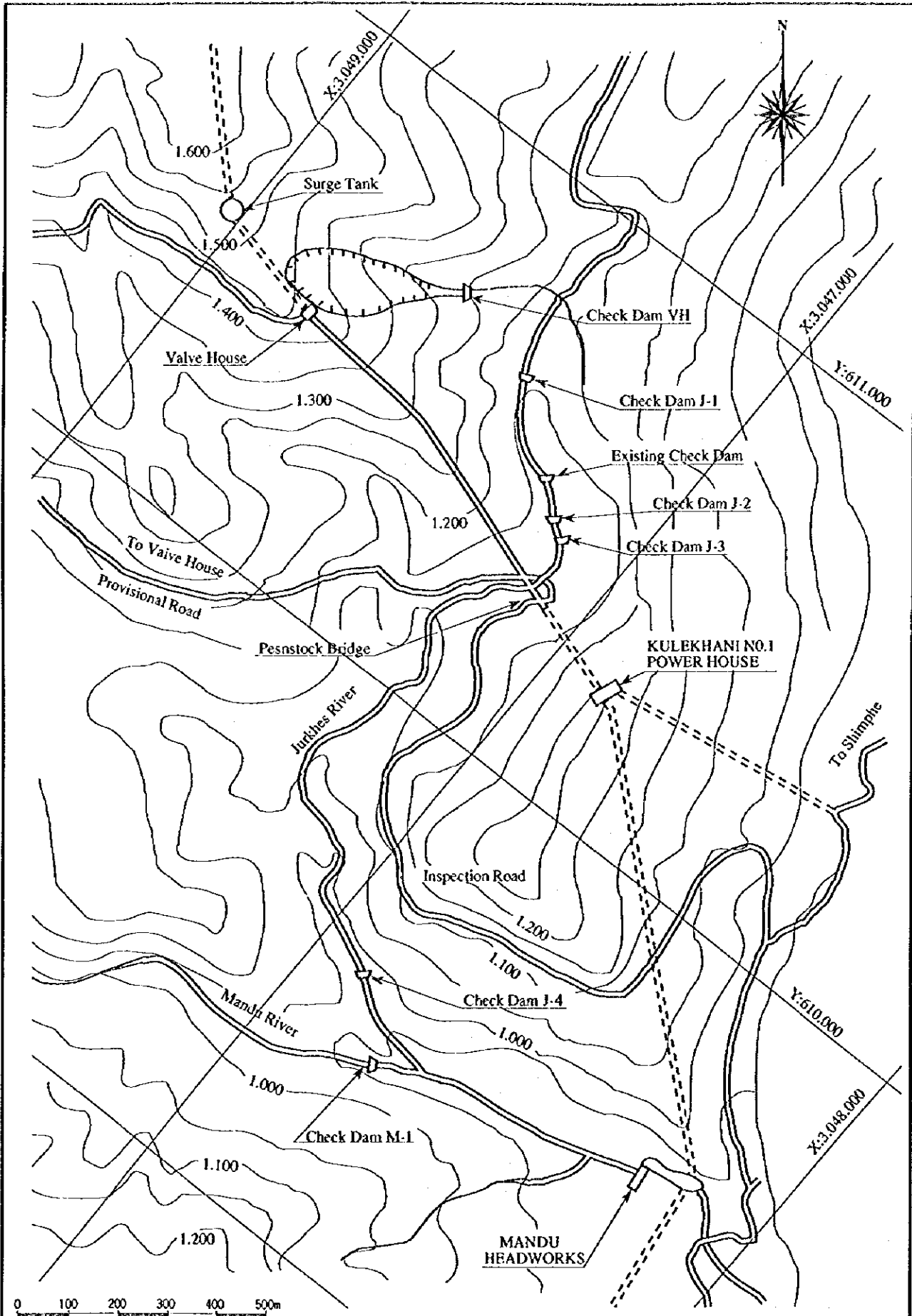
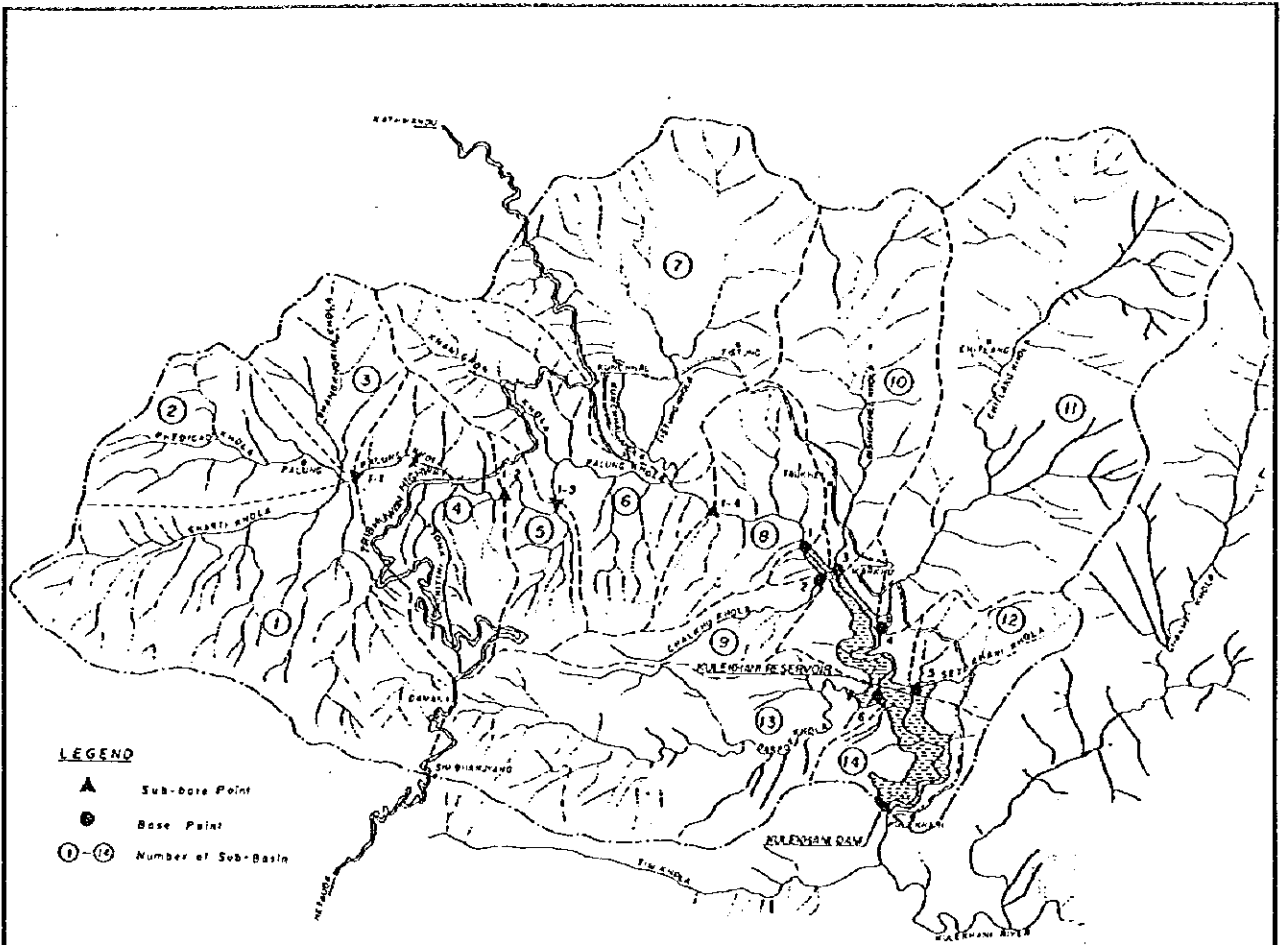


Fig. 6.3.1
Location Map of Previous Countermeasures
to Protect Power Facilities on the Mandu
and the Jurikhet River Basins

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY



Sub Basin	AREA		1993 Collapse Failures (1000m ³)	1993 River bank Erosion (1000m ³)	1993 Riverbed Erosion (1000m ³)	1993 Sediment Erosion (1000m ³)
	Catchment Area (km ²)	Accumulated Area (km ²)				
1	16.4	-	4,191.8	26.0	497.3	4,715.1
2	5.6	-	1,020.7	58.0	387.5	1,466.2
3	3.9	-	382.0	6.0	36.4	424.4
4	7.0	33.0	1,098.0	0.0	438.3	1,536.2
5	3.0	36.0	757.6	0.0	29.6	787.2
6	9.0	61.0	2,041.2	61.2	239.0	2,341.4
7	16.0	-	1,293.6	43.5	18.3	1,355.3
8	5.0	66.0	624.6	12.0	72.9	709.5
9	2.4	-	596.2	0.0	239.0	835.2
10	40.5	-	756.0	33.2	48.3	837.5
11	23.0	-	1,656.0	82.1	91.1	1,829.3
12	3.1	-	223.2	16.8	9.5	249.5
13	14.0	-	3,477.6	24.0	1,272.5	4,774.1
14	7.0	-	336.0	0.0	87.5	423.5
Total	126.0	126.0	18,454.4	362.8	3,467.1	22,284.3

List of Sub-basin of Kulekhani Watershed

Sub-basin No.	Sub-basin Name
No.1	Garti Khola
No.2	Phedigaon Khola
No.3	Bangkoria Khola
No.4	Kitini Khola
No.5	Residual basin of the Mainstream(1)
No.6	Khanigaon Khola
No.7	Tistung Khola
No.8	Residual basin of the Mainstream(2)
No.9	Chalkhu Khola
No.10	Bisingkbel Khola
No.11	Chillang Khola
No.12	Setikhani Khola
No.13	Darkot Khola
No.14	Residual basin of the Reservoir

Source: Master Plan Study on Sediment Control for Kulekhani Watershed, Nov. 1994, Nippon Koei

Fig. 6.3.2
Result of Sediment Yield Analysis for Kulekhani Watershed

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

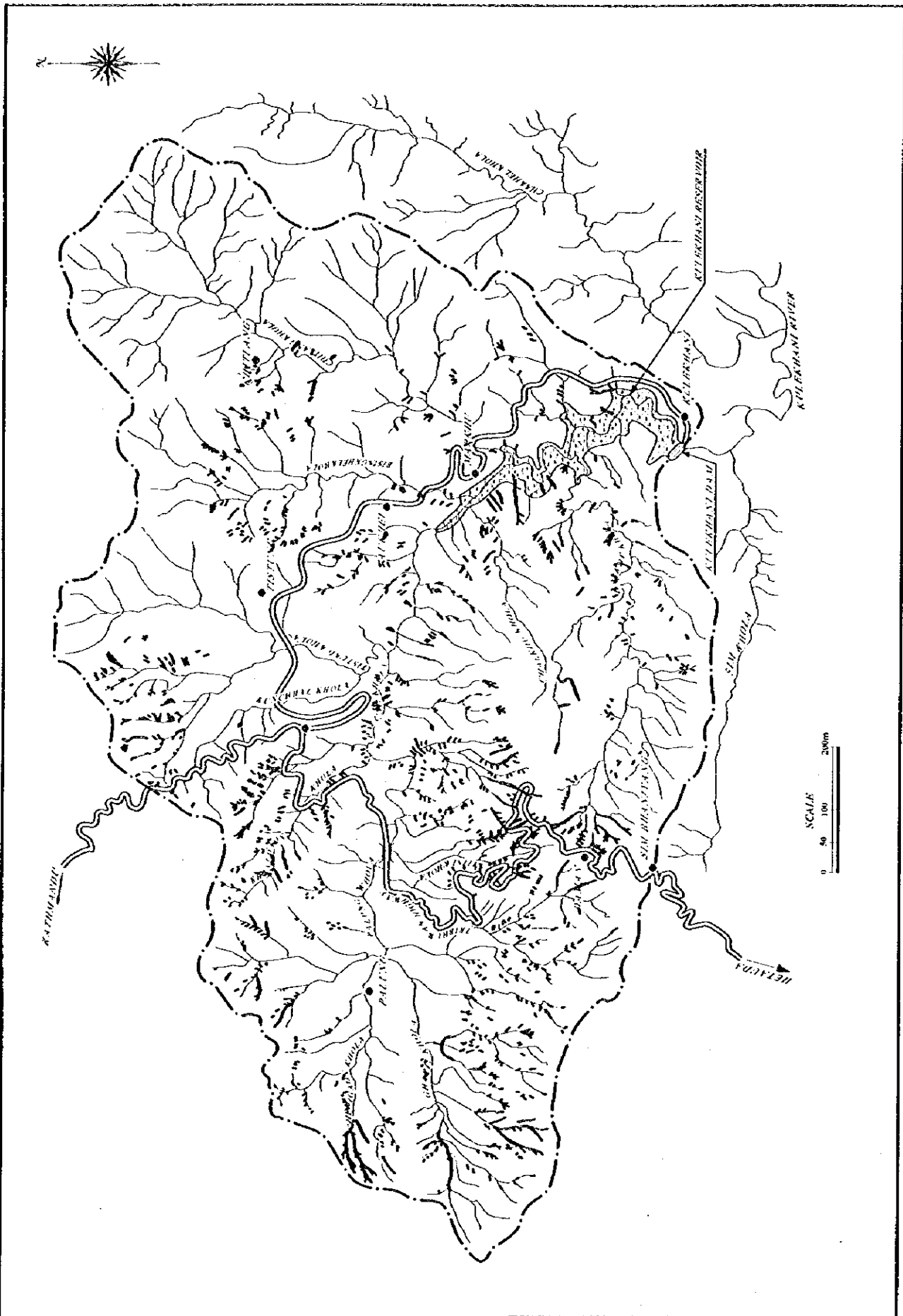


Fig. 6.3.3
Location Map of Slope Failure in
Kulekhani Watershed (As of Sep. 1994)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

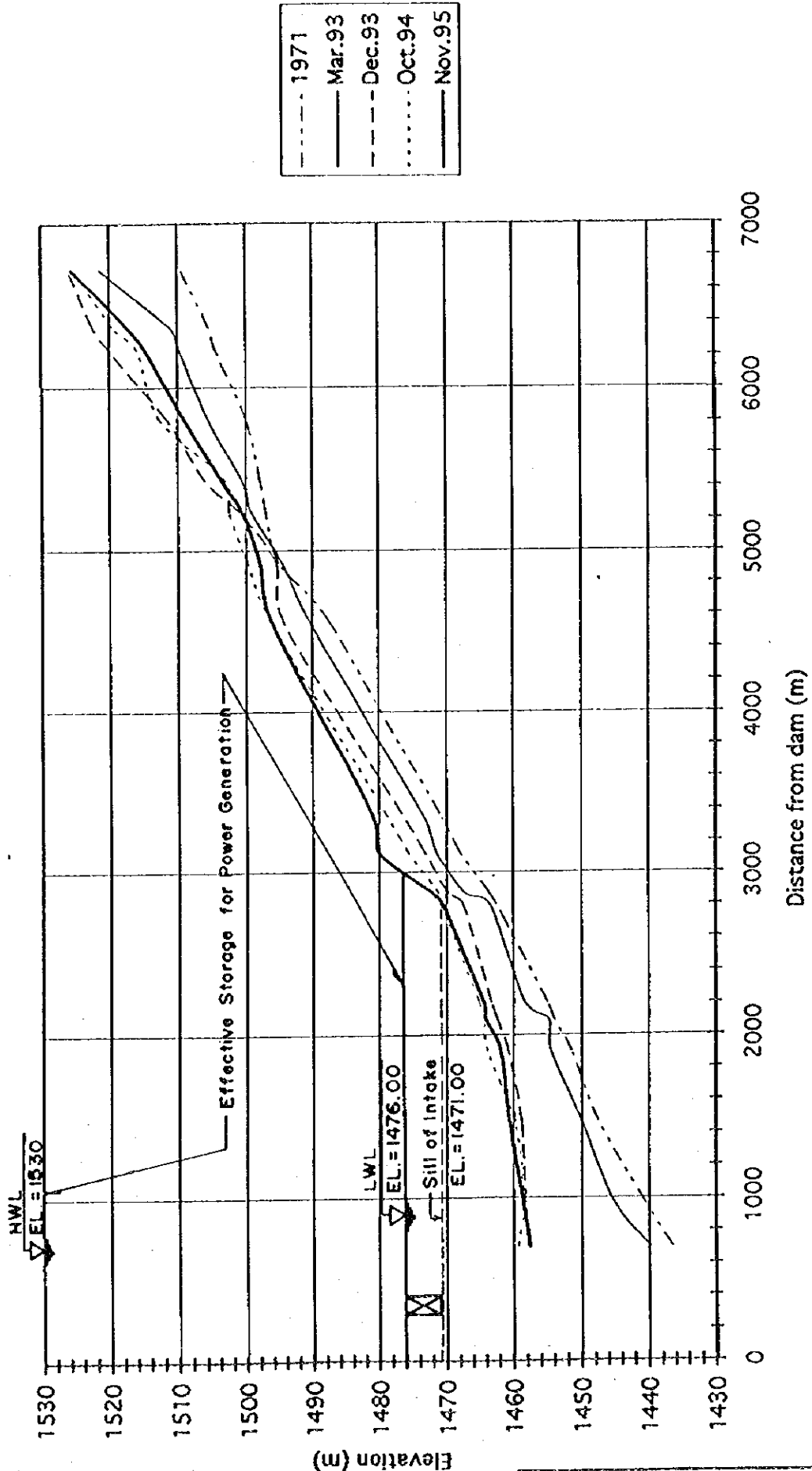
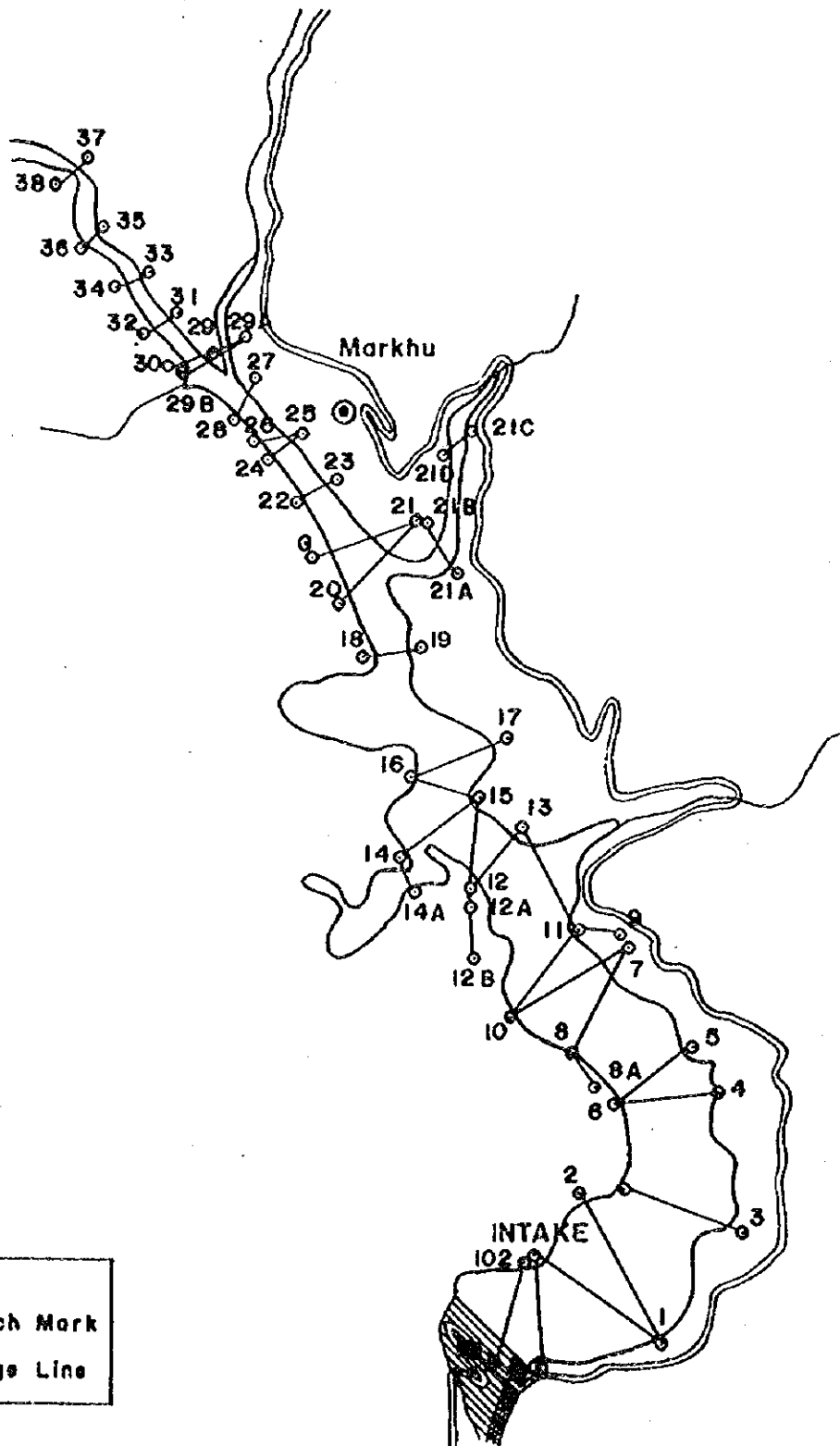


Fig. 6.3.4
Trend of Sediment Deposition in
Kulekhani Reservoir
(At the lowest point of Reservoir)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1994 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

KULEKHANI RESERVOIR



LEGEND:

- Bench Mark
- Rangs Line

Fig. 6.4.1
Location Map for Echo-Sounding Line
in Kulekhani Reservoir

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
JAPAN INTERNATIONAL COOPERATION AGENCY

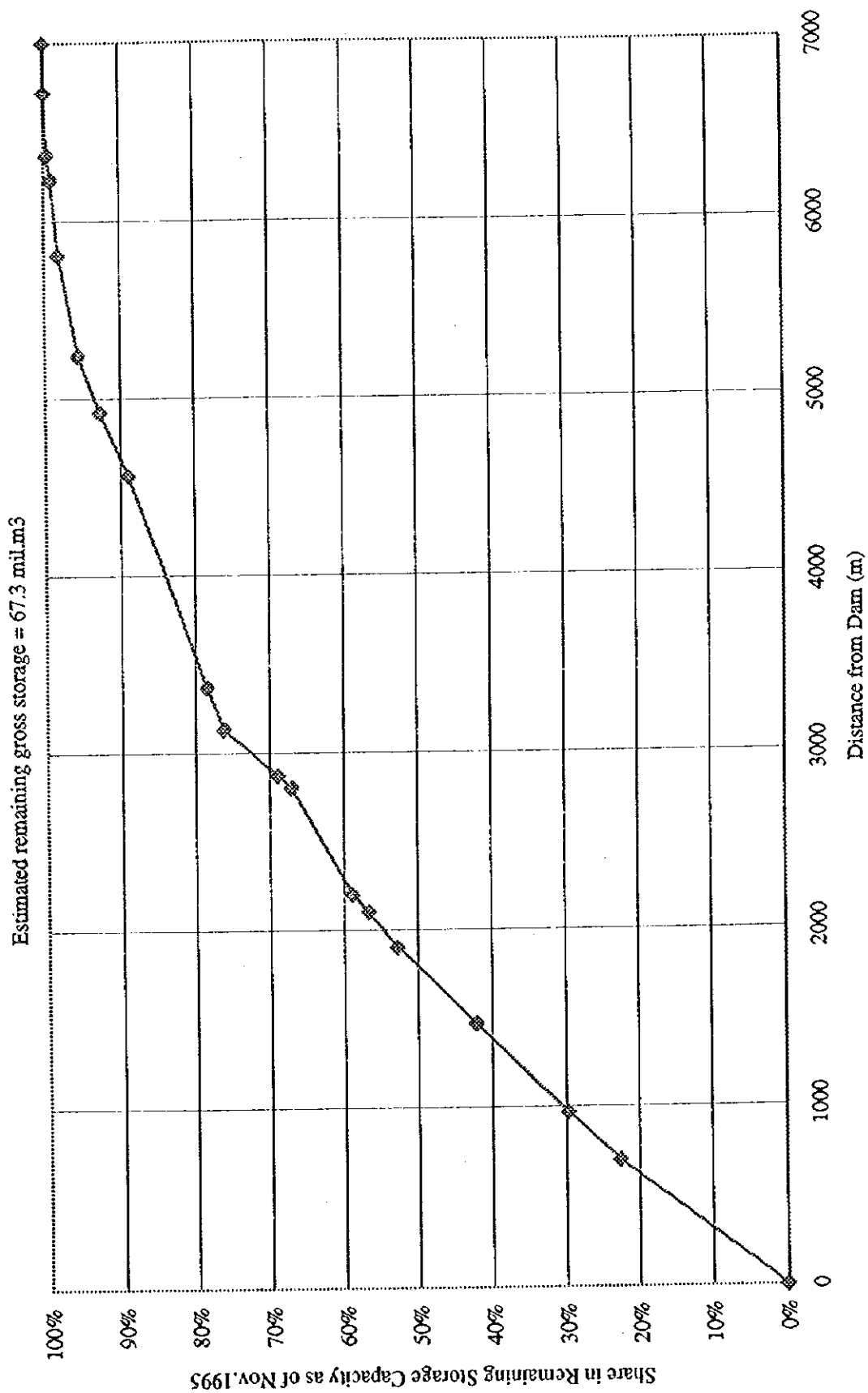
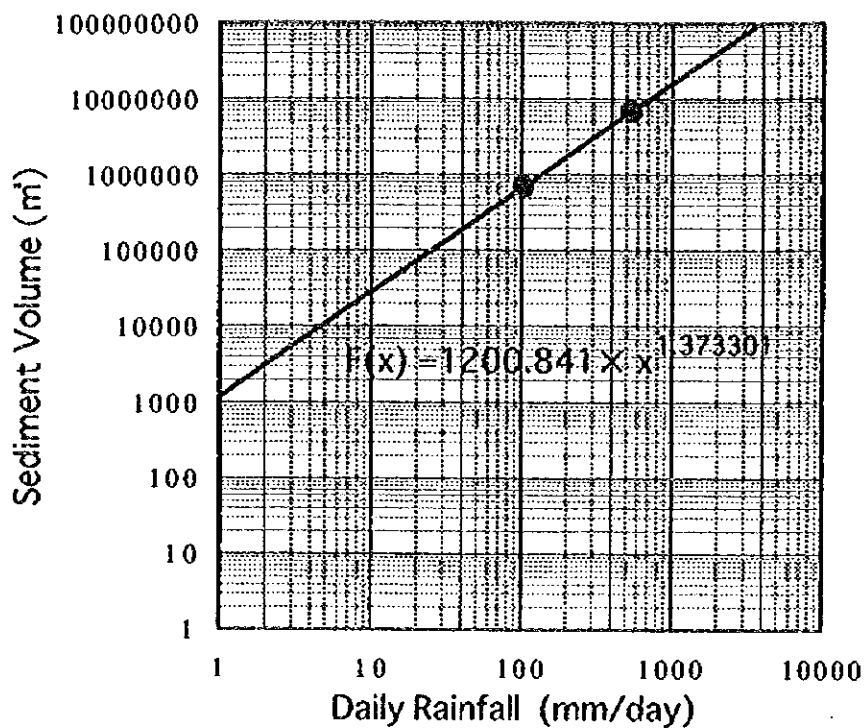


Fig. 6.4.2
Longitudinal Storage Distribution for
Kulekhani Reservoir

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY



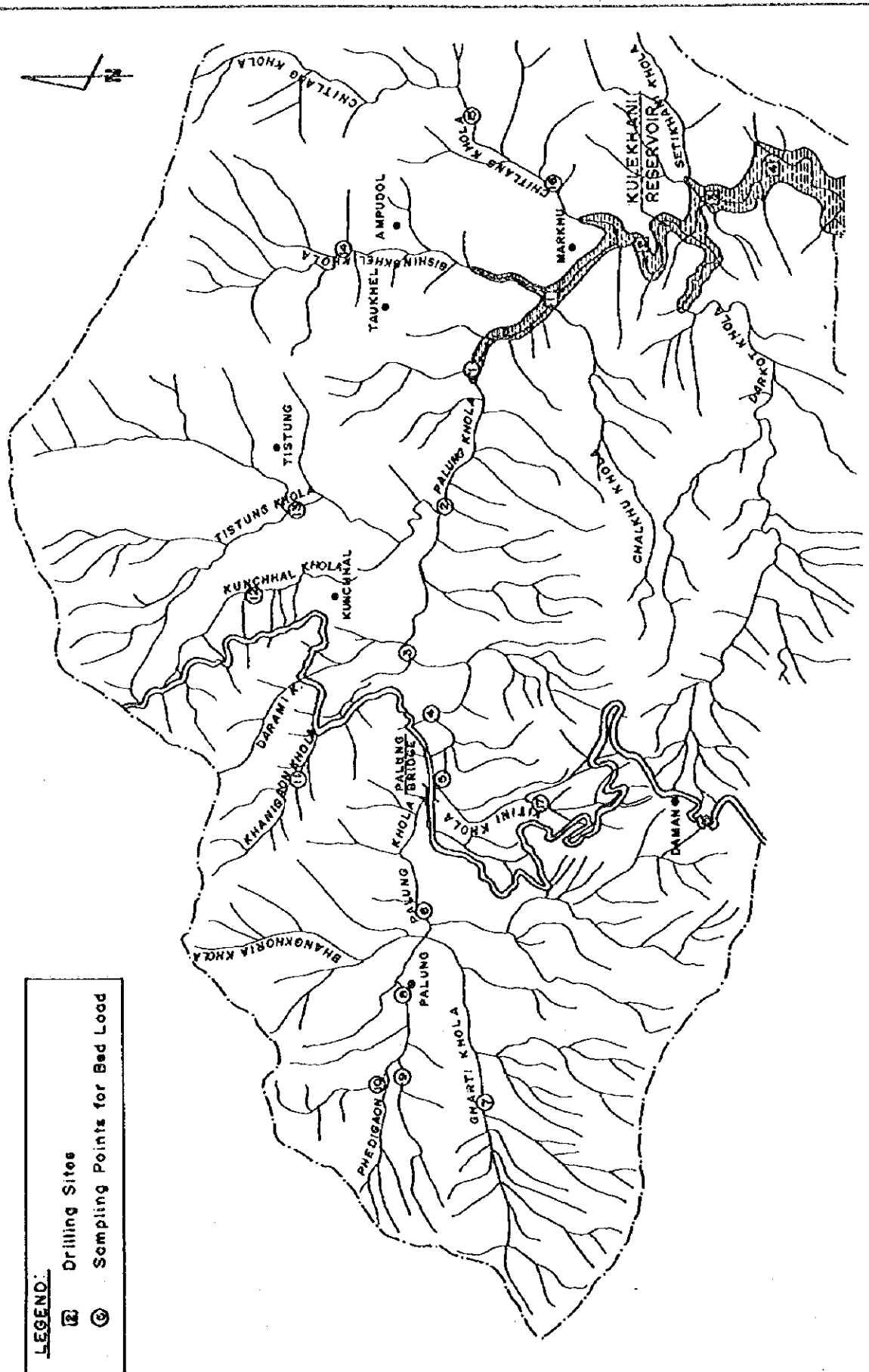
Year	Annual Max. Daily Rainfall (mm)	Assumed Annual Sediment Volume in Kulekhani Reservoir (m ³)	Observed Date	Rain Gauge Station Name
1981	121	865,580	Sep-29	Daman
1982	59	324,637	Jul-6	Daman
1983	111	768,488	Jul-17	Daman
1984	91	584,188	Sep-16	Daman
1985	97	638,027	Sep-5	Daman
1986	151	1,179,986	Aug-27	Daman
1987	125	905,282	Oct-20	Daman
1988	62	343,676	Sep-8	Daman
1989	76	459,630	Jul-6	Daman
1990	101	677,392	Jul-14	Daman
1991	69	402,512	Aug-28	Daman
1992	55	294,800	Jul-24	Daman
1993	540	6,790,232	Jul-19	Tistung
1994	60	332,217	Jun-25	Tistung
1995	104	702,433	Jun-11	Tistung
Total		15,269,080		

* Observed Accumulated Sedimentation within Kulekhani Reservoir = 17.7 mil m³

Source: Estimated by the Study Team

Fig. 6.4.3
Correlation between Annual Maximum Daily Rainfall and Annual Sediment Volume within Kulekhani Reservoir

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

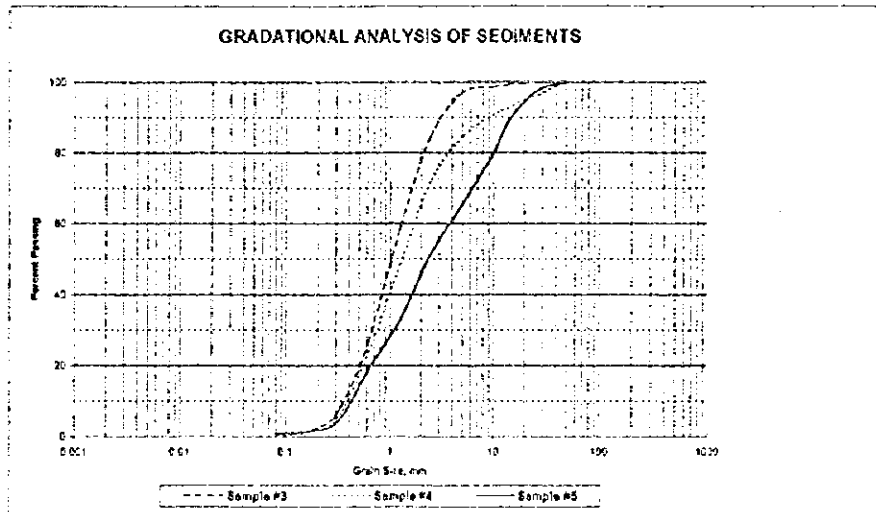


LEGEND:
 □ ● Drilling Sites
 ○ ● Sampling Points for Bed Load

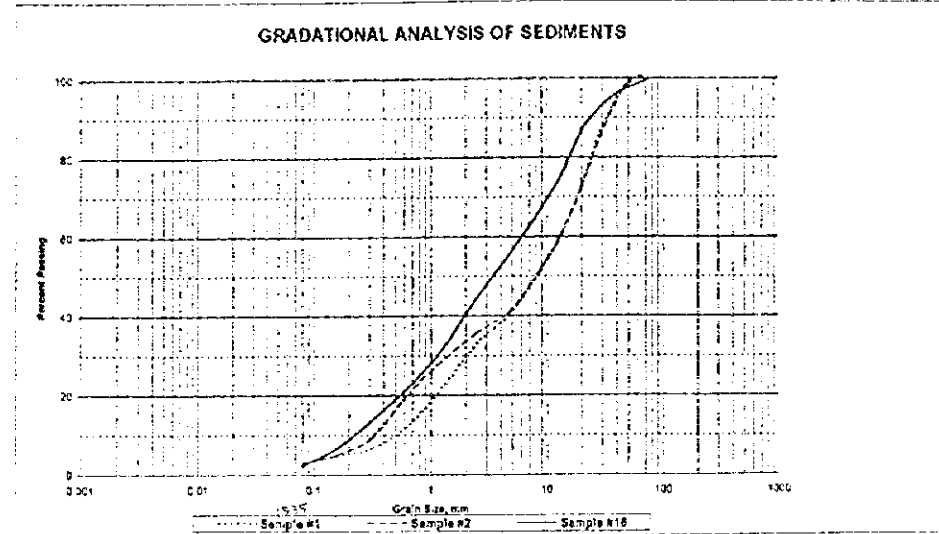
Fig. 6.5.1
Location Map of Drilling Sites and
Sampling Points for Bed Load
in Kutekhani Watershed

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

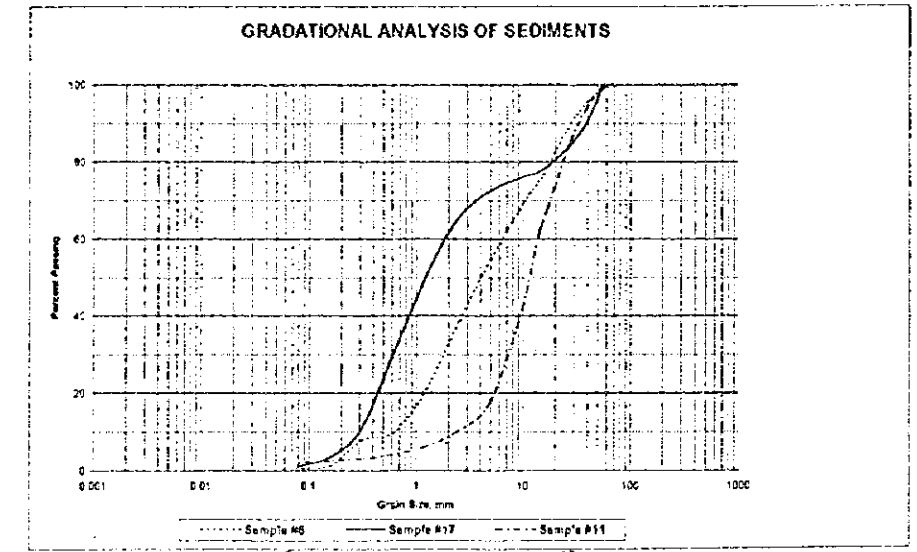
LOCATION: BETWEEN MARKHU AND KUNGBHAL



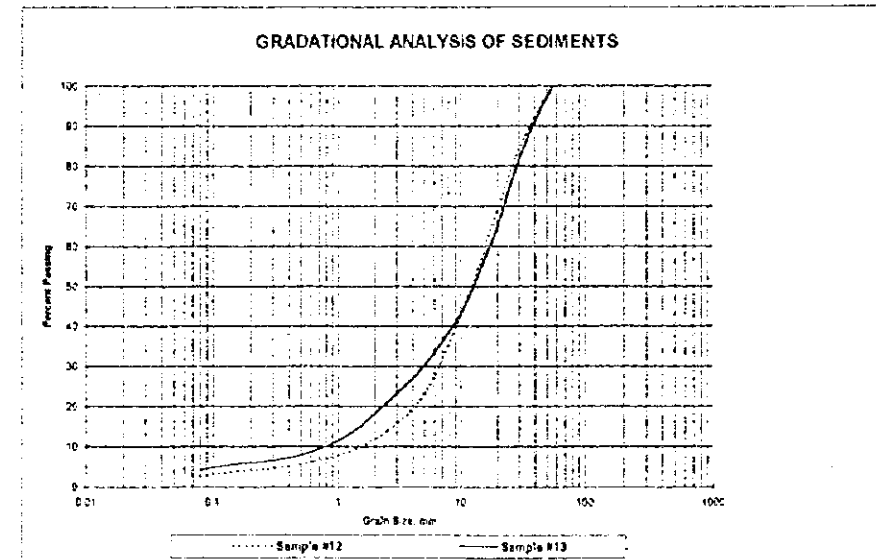
LOCATION: VICINITY OF MARKHU



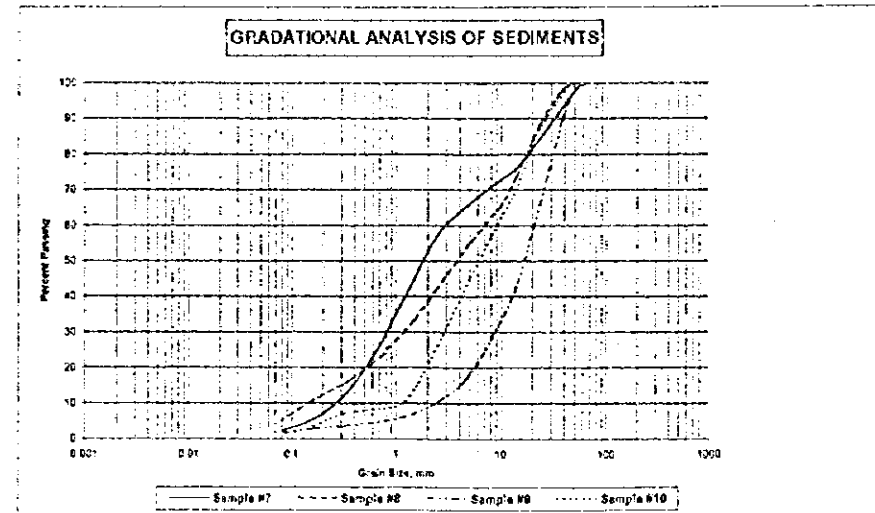
LOCATION: BETWEEN MARKHU AND KUNGBHAL



LOCATION: BETWEEN MARKHU AND KUNGBHAL



LOCATION: FALUNG VALLEY



LOCATION: CHITLANG VALLEY

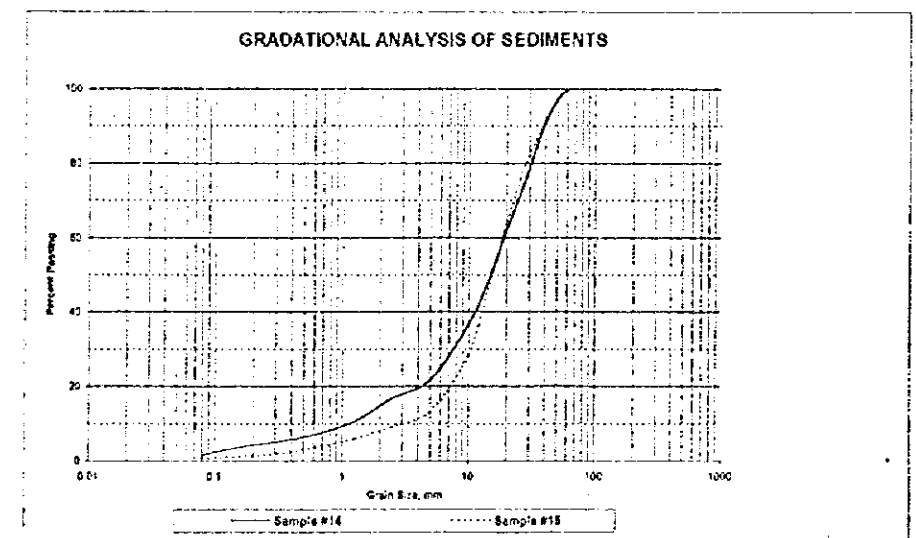


Fig. 6.5.2
Gradational Analysis of Sediments
 (Soil, Rock and Concrete Laboratory, NEA
 Kulekhani Disaster Prevention Project)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

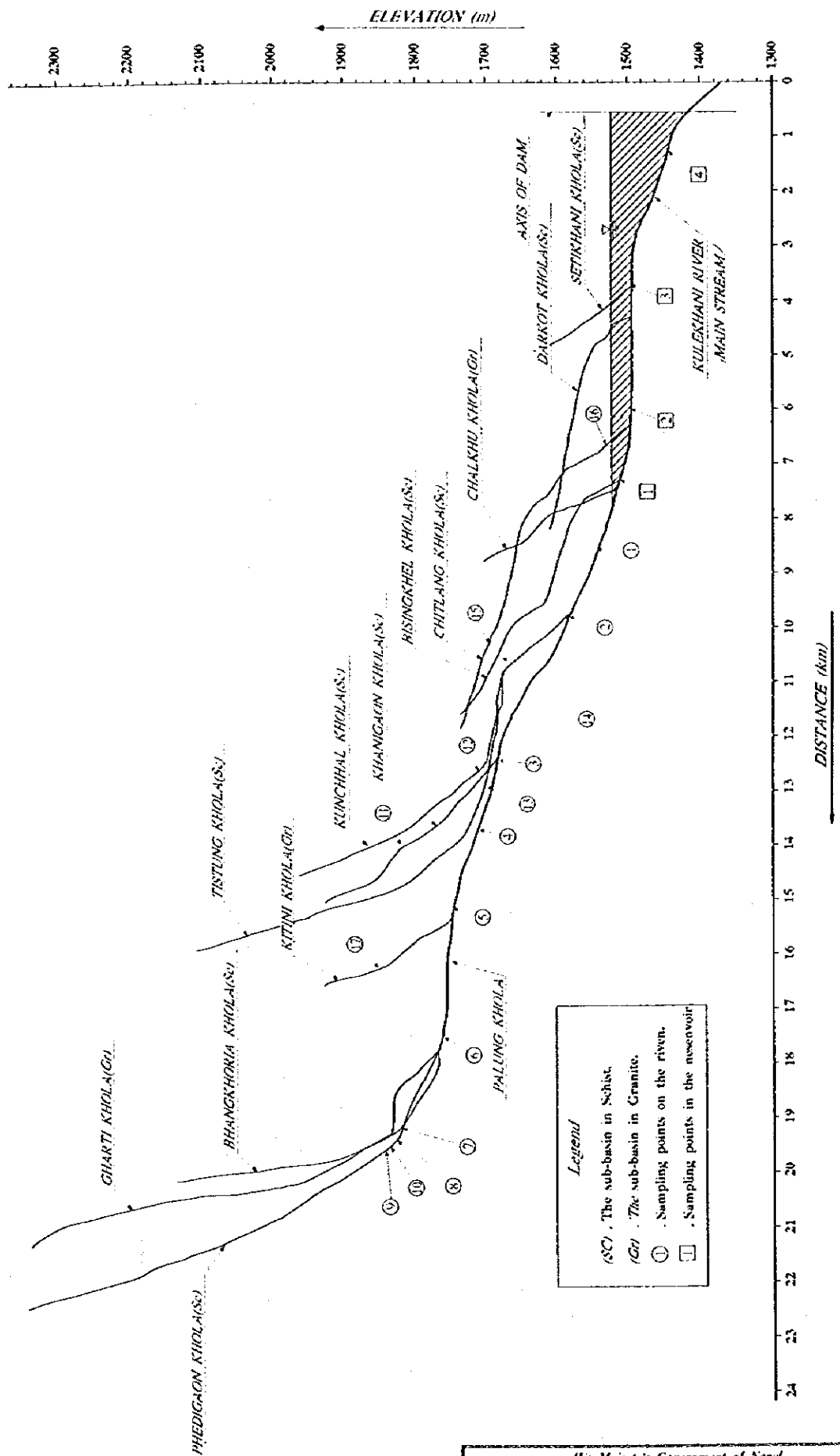


Fig. 6.5.3
Longitudinal Profile of Respective
Sampling Site

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
JAPAN INTERNATIONAL COOPERATION AGENCY

SRC Laboratory, NEA
NEA Engineering Company

BORE HOLE REPORT
BORE HOLE No. 1

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN
DRILLING MACHINE TYPE: TONE UD-5
DRILL HOLE DEPTH (m): 13.05

GROUND ELEVATION (m): 1518
DRILLED BY: BISHNU P. DHAKAL
LOGGED BY: J.R. RAIBACTIARYA
DATE: JULY 24, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH, m	TYPE #	REC %	20	40	60	80			
1.00	1.50		Sediments represented by light grey coloured gravelly sand with some fines.			90							
1.00	2.65		Gravels, pebbles and cobbles of weathered limestone and granite in sandy silty matrix.			80							
1.00	4.00		Pebbles, cobbles & boulders mainly of limestone (upto 9.55 m) and boulder of granite at 9.55 - 11.05 m.			75							
1.00	4.20												
1.00	4.75		The fines are represented by silty sands.			90							
1.00	6.00												
1.00	8.05		Gravels, pebbles and cobbles of limestone and quartzite.			30							
1.00	9.55												
1.00	11.05					45							
1.00	11.90					15							
1.00	12.55					75							
1.00	13.05					60							

Fig. 6.5.4
Bore Hole Report (Bore Hole No. 1)

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

SRC Laboratory, NEA
NEA Engineering Company

BORE HOLE REPORT
BORE HOLE No. 2

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN
DRILLING MACHINE TYPE: TONE UD-5
DRILL HOLE DEPTH (m): 10.80

GROUND ELEVATION (m): 1501
DRILLED BY: BISHRU P. OHAKAL
LOGGED BY: J.B. RAIRACHARYA
DATE: JULY 26, 1996

DEPTH (m)	DEPTH (m)	LOG	DESCRIPTION	SAMPLE		RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH (m)	TYPE #	REC %	20	40	60	80			
1.00	1.00	[Diagonal hatching pattern]	Silty sand with some clay										
1.50	1.50												
2.50	2.50												
3.15	3.15	[Diagonal hatching pattern]	Gravelly silt with sand										
3.75	3.75												
4.80	4.80	[Circular pattern]	Gravels and pebbles mostly of slate and of granite with sand in silty clayey matrix. It has a pocket of fines between 8.00 and 8.20 m.										
4.65	4.65												
5.80	5.80												
5.50	5.50												
5.70	5.70												
7.15	7.15												
7.50	7.50												
7.75	7.75												
8.00	8.00												
8.20	8.20												
9.50	9.50												
10.80	10.80		Hole terminated at 10.80 m.										

Fig. 6.5.5
Bore Hole Report (Bore Hole No. 2)

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
JAPAN INTERNATIONAL COOPERATION AGENCY

SRC Laboratory, NEA
NEA Engineering Company

BORE HOLE REPORT
BORE HOLE No. 3

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN
DRILLING MACHINE TYPE: ACKERACE
DRILL HOLE DEPTH (m): 10.00 m

GROUND ELEVATION (m): 1466
DRILLED BY: BISHNU P. DHAKAL
LOGGED BY: J.B. RAJBACHARYA
DATE: JULY 26, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH, m	TYPE #	RSC %	20	40	60	80			
1.00			Silt with sand. The content of sand increases with depth.			20							
2.50													
3.00			Silt with sand.			20							
4.00													
5.00	5.00		Silt with sand. The content of sand increases with depth.			30							
6.00	8.00												
7.00	7.00		Silt with sand			20							
8.00	8.00												
9.00	9.00		Silty fine sand			80							
10.00	10.00		Clayey silt Boring terminated at 10.00 m.										

Fig. 6.5.6
Bore Hole Report (Bore Hole No. 3)

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

SRC Laboratory, NEA
NEA Engineering Company

BORE HOLE REPORT
BORE HOLE No. 4

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT
 CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN
 DRILLING MACHINE TYPE: ACKER ACE
 DRILL HOLE DEPTH (m): 20.00

GROUND ELEVATION (m): 1460
 DRILLED BY: BISHNU P. DHAKAL
 LOGGED BY: J.B. RABACHARYA
 DATE: JULY 26, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		REC %	RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH m	TYPE #		20	40	60	80	100			
	1.50	[Hatched pattern]	Clayey silt with the percentage of clay varying from 16 % to 20 %.			65								
1.00	2.50					100								
	3.50													
4.00	4.00													
	5.50													
6.00	6.50													
	8.00													
9.00	9.50													
11.00														
12.00														
	13.00	[Hatched pattern]	Silt, fines			60								
14.00	14.00					20								
	15.00													
16.00						5								
18.00														
20.00	20.00		Note terminated at 20.00 m.											

Fig. 6.5.7
Bore Hole Report (Bore Hole No. 4)

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

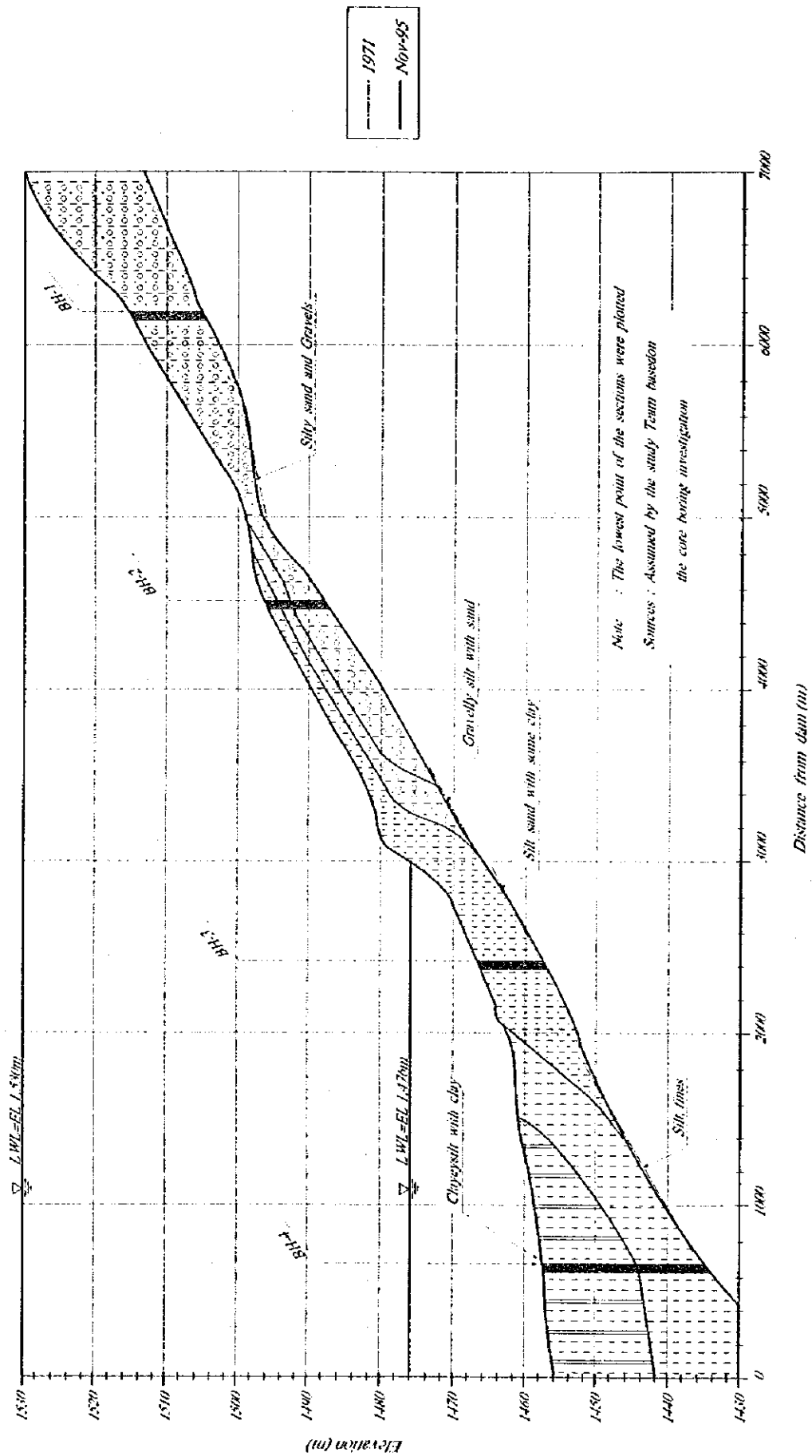


Fig. 6.5.8
Assumed Longitudinal Sediment
Profile of Kulekhani Reservoir

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL.
 JAPAN INTERNATIONAL COOPERATION AGENCY

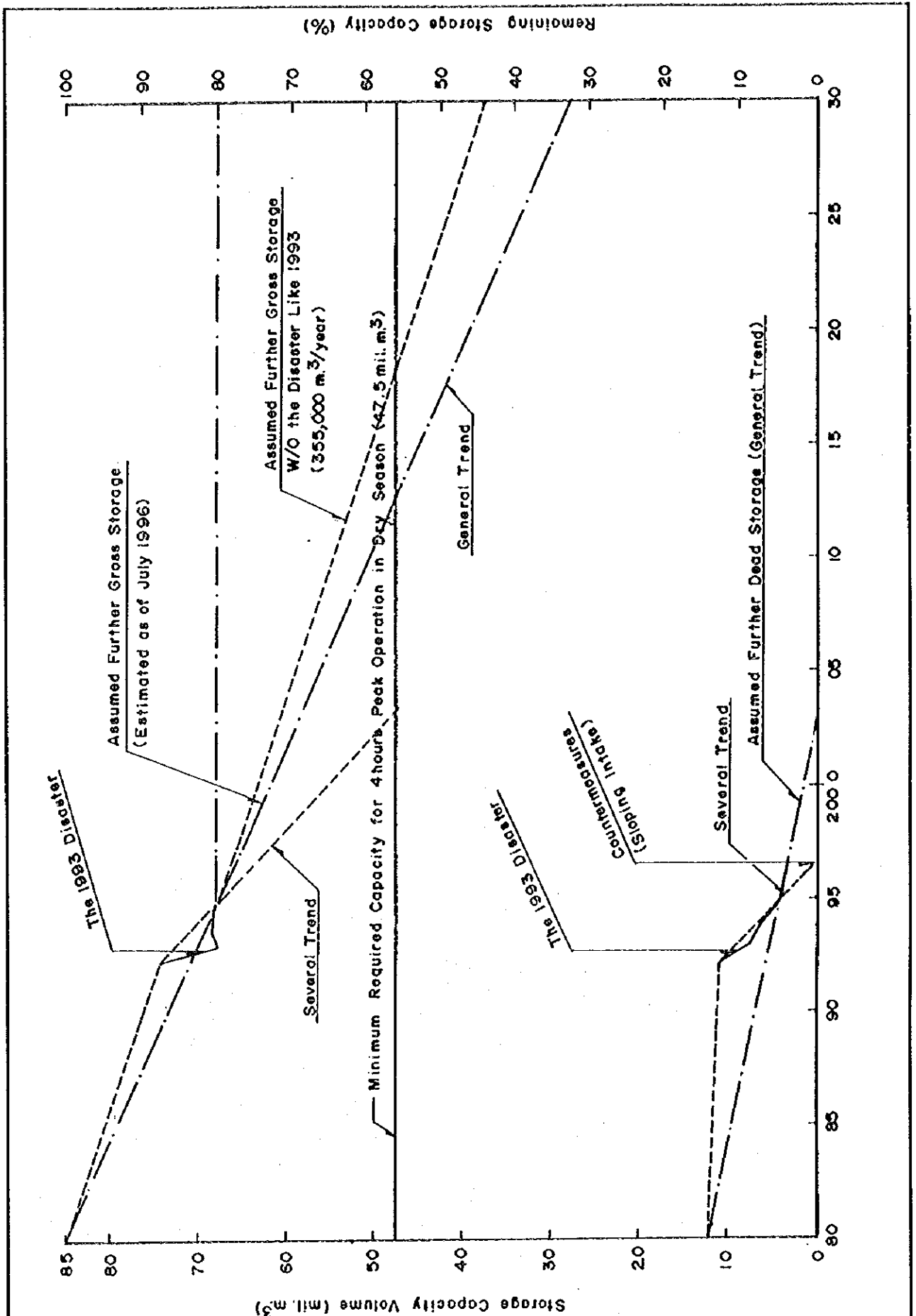
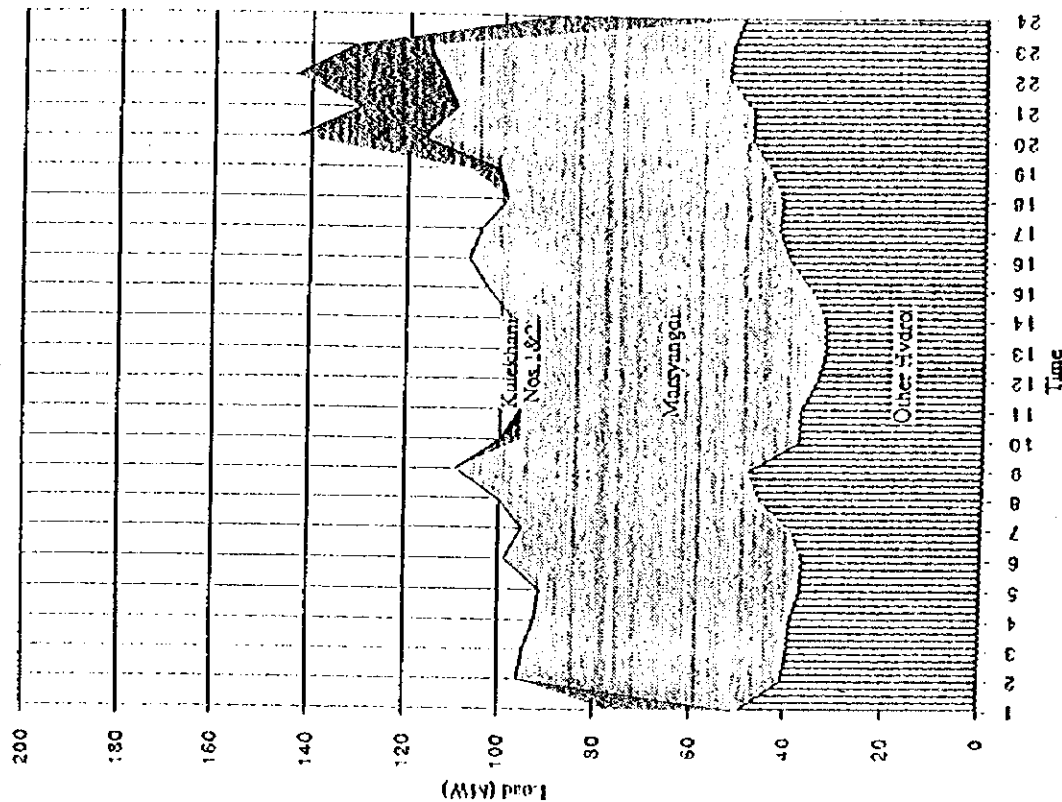


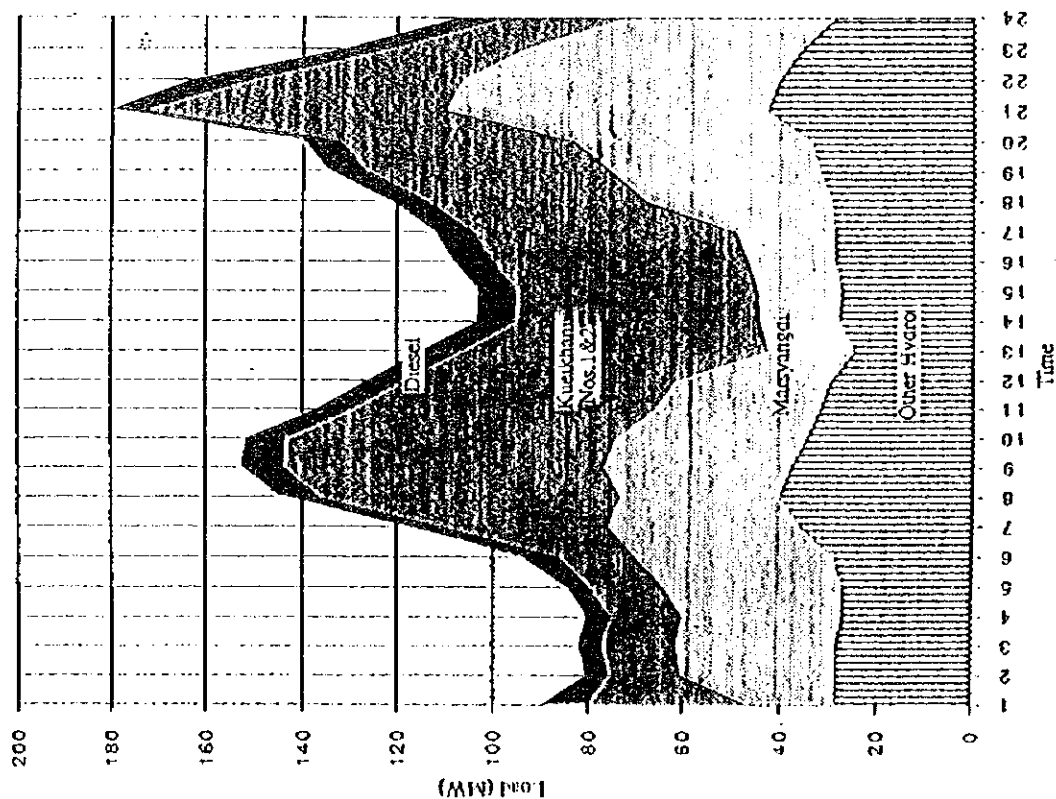
Fig. 6.6.1
Trend of Dead and Gross Storage Loss
due to Sediment Deposition

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY

Daily Load Curve, August 17, 1994
(Rainy Season)



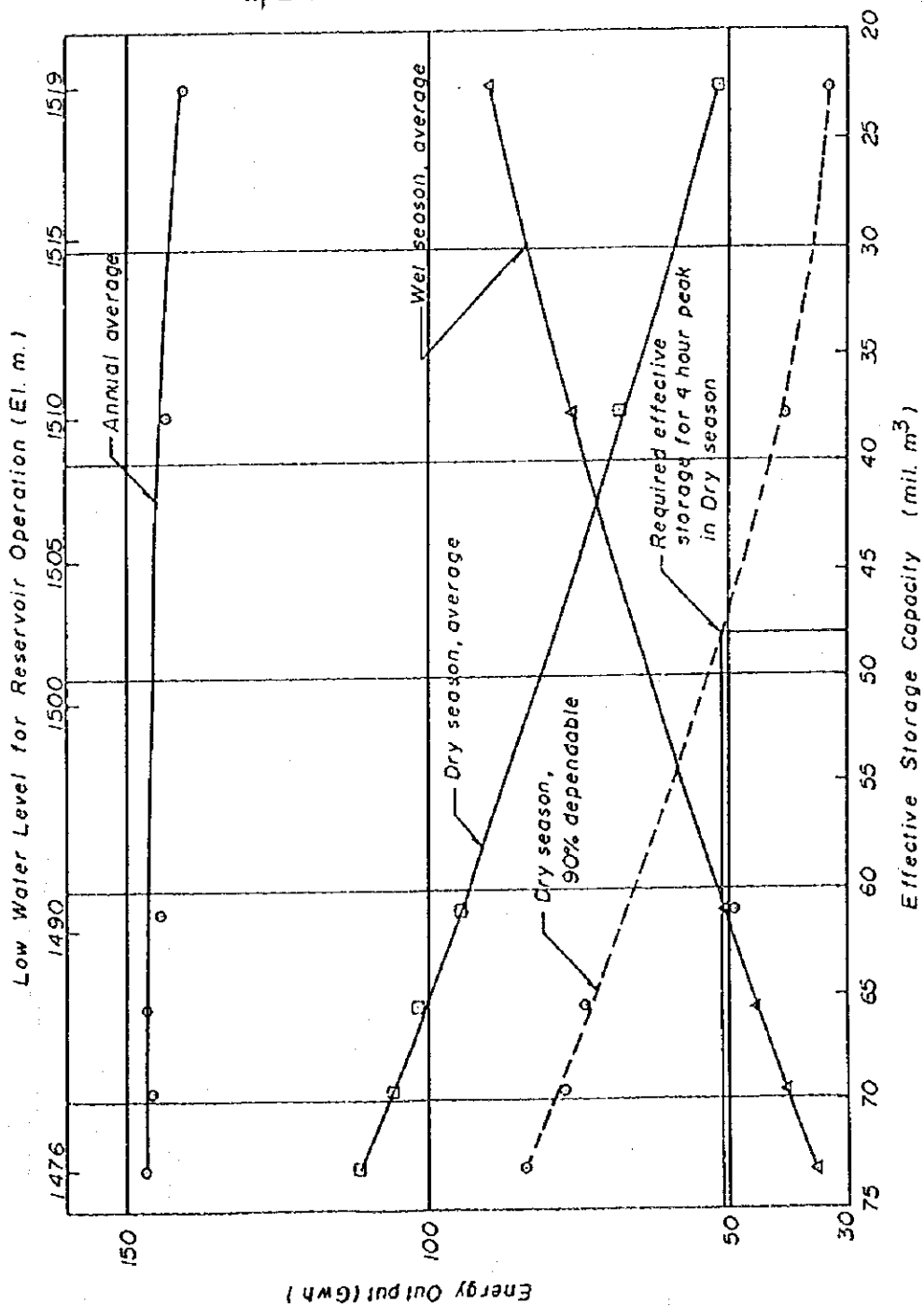
Daily Load Curve, January 19, 1994
(Dry Season)



Source: Master Plan Study on Sediment Control for Kulekhani Watershed

Fig. 6.6.2
Typical Operation Pattern of
Kulekhani Hydropower Stations

His Majesty's Government of Nepal
Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN
FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
JAPAN INTERNATIONAL COOPERATION AGENCY



Source:
 Master Plan Study on Sediment
 Control for Kulekhani Watershed,
 Nov. 1994 NEA

Notes:
 Wet season June-Oct.
 (5 months)
 Dry season Nov. - May
 (7 months)

Fig. 6.6.3
Relationship between Effective Storage
and Power Generation Capacity for
Kulekhani No. 1 Power Station

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
 THE STUDY ON THE DISASTER PREVENTION PLAN
 FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER
 IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY

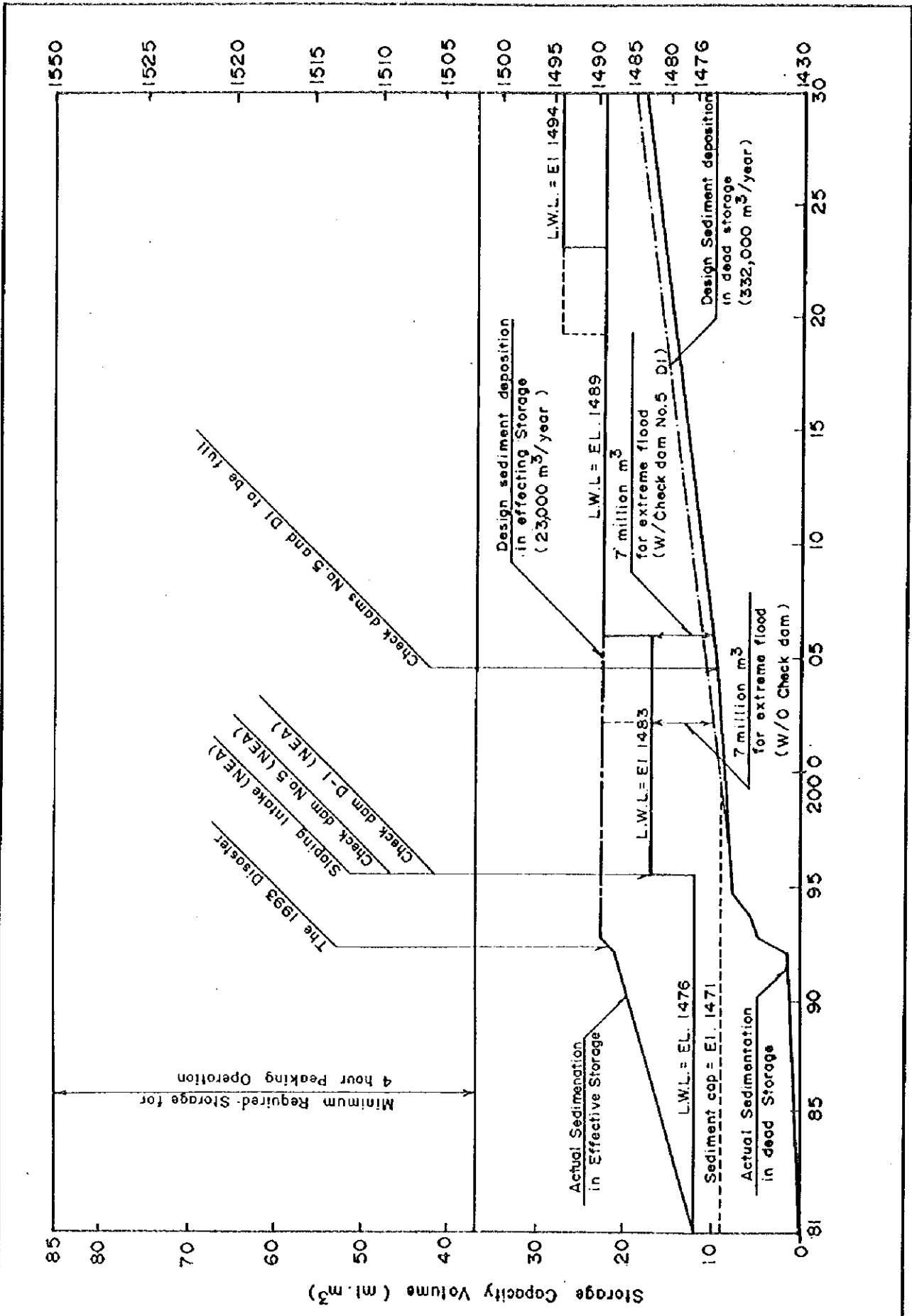


Fig. 6.6.4
Strategy of the NEA Master Plan

His Majesty's Government of Nepal
 Ministry of Forest and Soil Conservation/Department of Soil Conservation
THE STUDY ON THE DISASTER PREVENTION PLAN FOR SEVERELY AFFECTED AREAS BY 1993 DISASTER IN THE CENTRAL DEVELOPMENT REGION OF NEPAL
 JAPAN INTERNATIONAL COOPERATION AGENCY