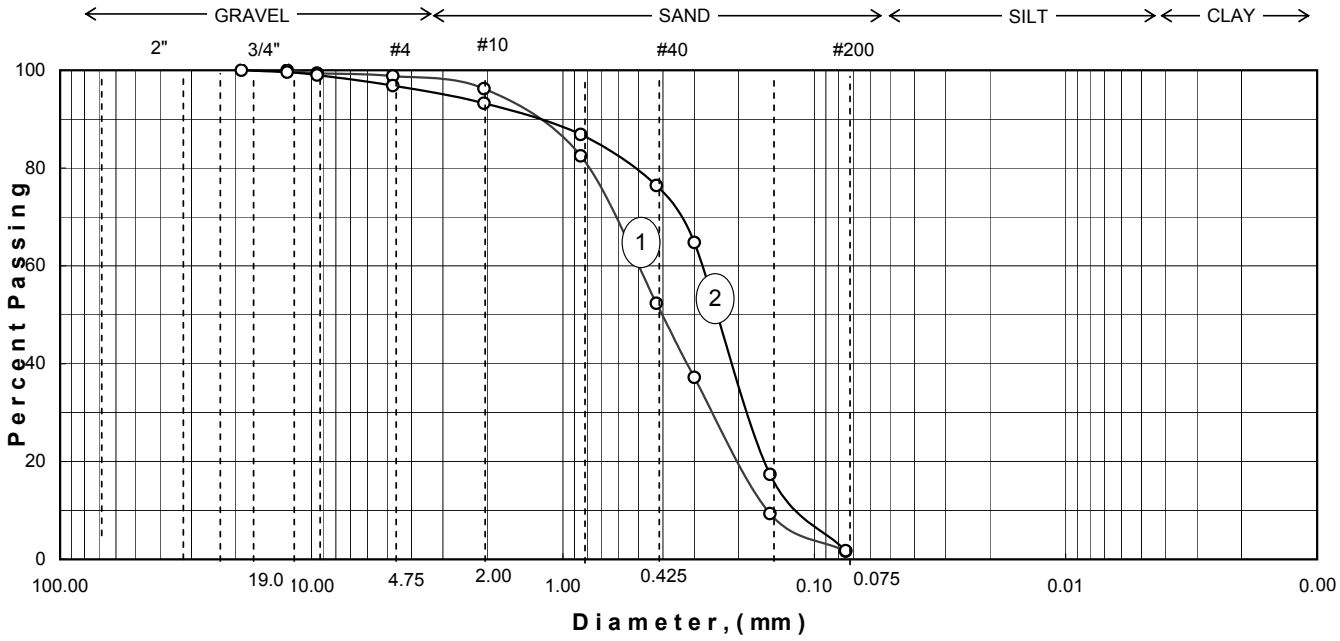
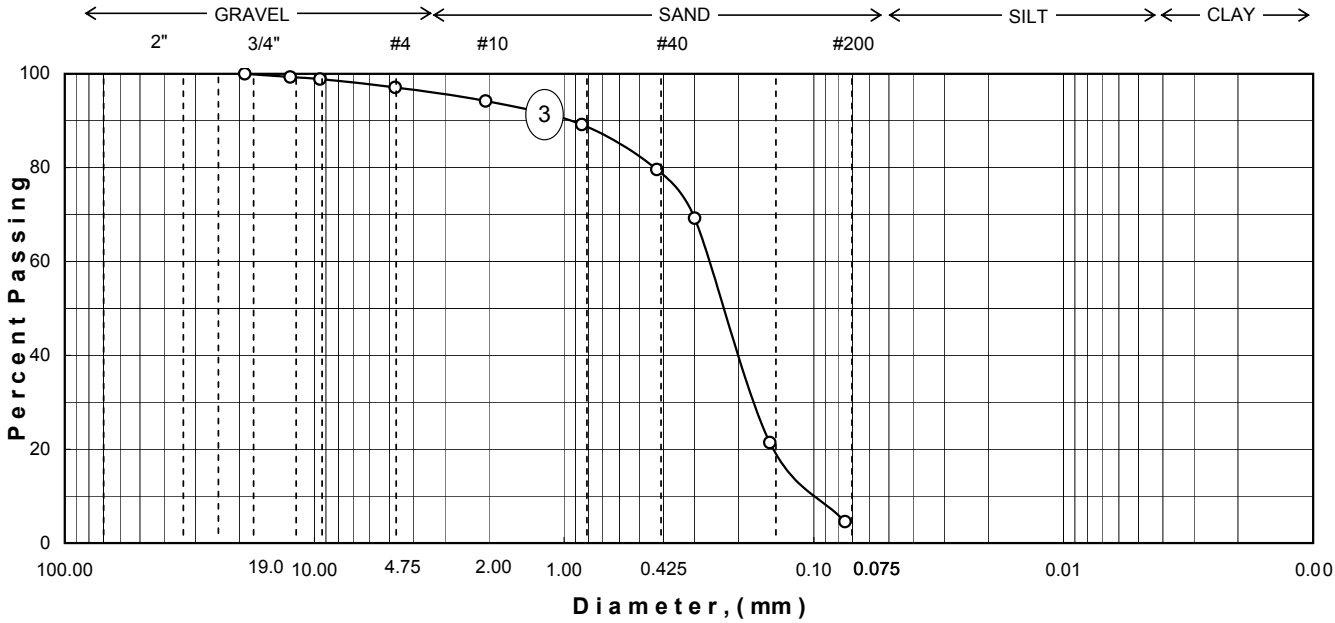
C3 Grain Size Distribution Curves

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
1 / Right side	1					SP	Gray fine to coarse SAND, some pyroclastic materials.
1 / Middle side	2					SP	Gray fine to coarse SAND, with pyroclastic materials.
1 / Left side	3					SP	Gray fine to coarse SAND, with pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Downstream) **Location No.:** 1

Description of Soil: Gray fine to coarse SAND, some pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	308.32
Wt. of container	26.83
Wt. of dry sample	**281.49**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	1.68	0.60	99.40
#4	4.75	3.30	1.17	98.83
#10	2.06	10.63	3.78	96.22
#20	0.85	49.25	17.50	82.50
#40	0.425	134.15	47.66	52.34
#50	0.30	176.78	62.80	37.20
#100	0.15	255.14	90.64	9.36
#200	0.075	276.80	98.33	1.67

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Downstream) **Location No.:** 1

Description of Soil: Gray fine to coarse SAND, with pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	533.07
Wt. of container	116.03
Wt. of dry sample	**417.04**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	1.62	0.39	99.61
3/8"	9.50	4.05	0.97	99.03
#4	4.75	13.06	3.13	96.87
#10	2.06	28.13	6.75	93.25
#20	0.85	54.75	13.13	86.87
#40	0.425	98.29	23.57	76.43
#50	0.30	146.83	35.21	64.79
#100	0.15	344.59	82.63	17.37
#200	0.075	409.73	98.25	1.75

% passing = 100 - **Σ** % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Downstream) **Location No.:** 1

Description of Soil: Gray fine to coarse SAND, with pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

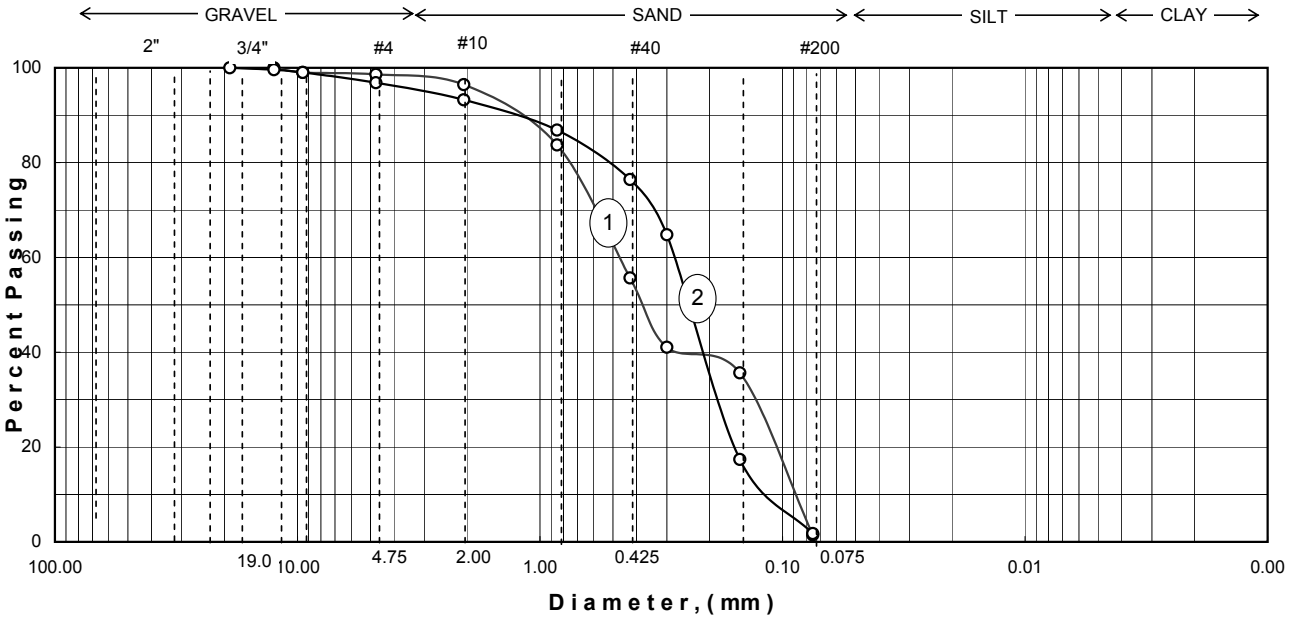
Wt. of dry sample+container	495.61
Wt. of container	99.69
Wt. of dry sample	**395.92**

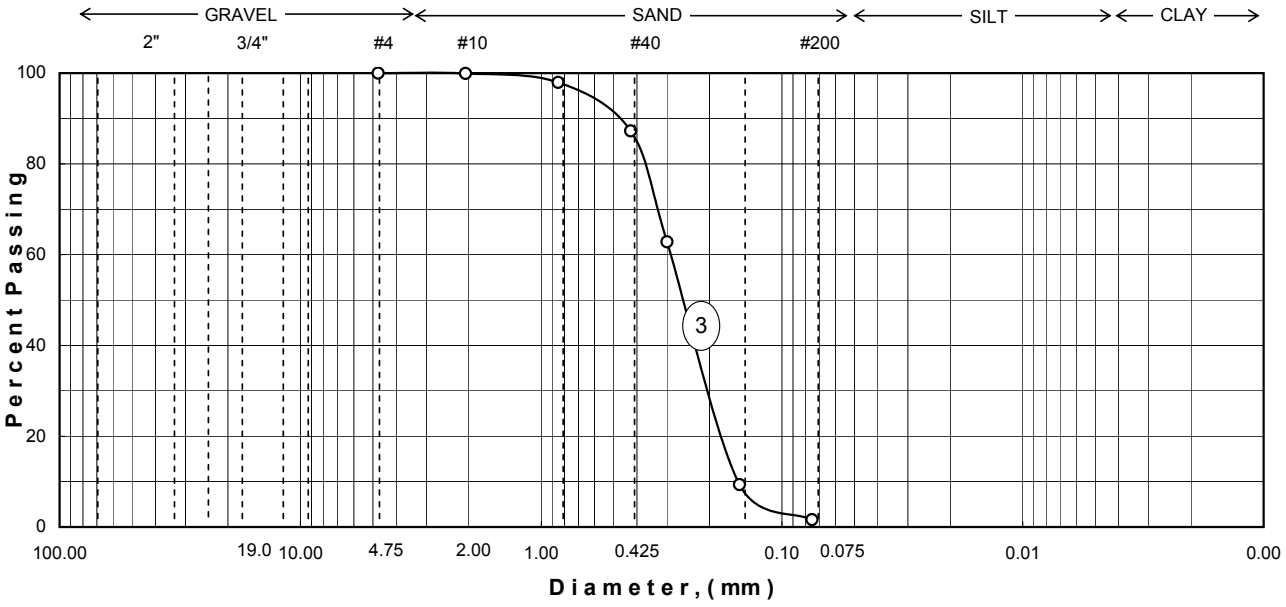
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	2.66	0.67	99.33
3/8"	9.50	4.40	1.11	98.89
#4	4.75	11.53	2.91	97.09
#10	2.06	22.90	5.78	94.22
#20	0.85	42.79	10.81	89.19
#40	0.425	80.70	20.38	79.62
#50	0.30	121.79	30.76	69.24
#100	0.15	311.18	78.60	21.40
#200	0.075	377.83	95.43	4.57

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
2 / Right side	1					SP	Light gray fine to coarse SAND, with pyroclastic materials.
2 / Middle side	2					SP	Gray fine to coarse SAND, traces of pyroclastic materials.
2 / Left side	3					SP	Gray fine to medium SAND, traces of pyroclastic materials

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Brgy. Malumboy) **Location No.:** 2

Description of Soil: Light gray fine to coarse SAND, with pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	490.77
Wt. of container	124.88
Wt. of dry sample	**365.89**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	3.59	0.98	99.02
#4	4.75	5.08	1.39	98.61
#10	2.06	12.97	3.54	96.46
#20	0.85	59.48	16.26	83.74
#40	0.425	162.19	44.33	55.67
#50	0.30	215.63	58.93	41.07
#100	0.15	235.49	64.36	35.64
#200	0.075	360.52	98.53	1.47

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Brgy. Malumboy) **Location No.:** 2

Description of Soil: Gray fine to coarse SAND, traces of pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	533.07
Wt. of container	116.03
Wt. of dry sample	**417.04**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	1.62	0.39	99.61
3/8"	9.50	4.05	0.97	99.03
#4	4.75	13.06	3.13	96.87
#10	2.06	28.13	6.75	93.25
#20	0.85	54.75	13.13	86.87
#40	0.425	98.29	23.57	76.43
#50	0.30	146.83	35.21	64.79
#100	0.15	344.59	82.63	17.37
#200	0.075	409.73	98.25	1.75

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Brgy. Malumboy) **Location No.:** 2

Description of Soil: Gray fine to medium SAND, traces of pyroclastic materials **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

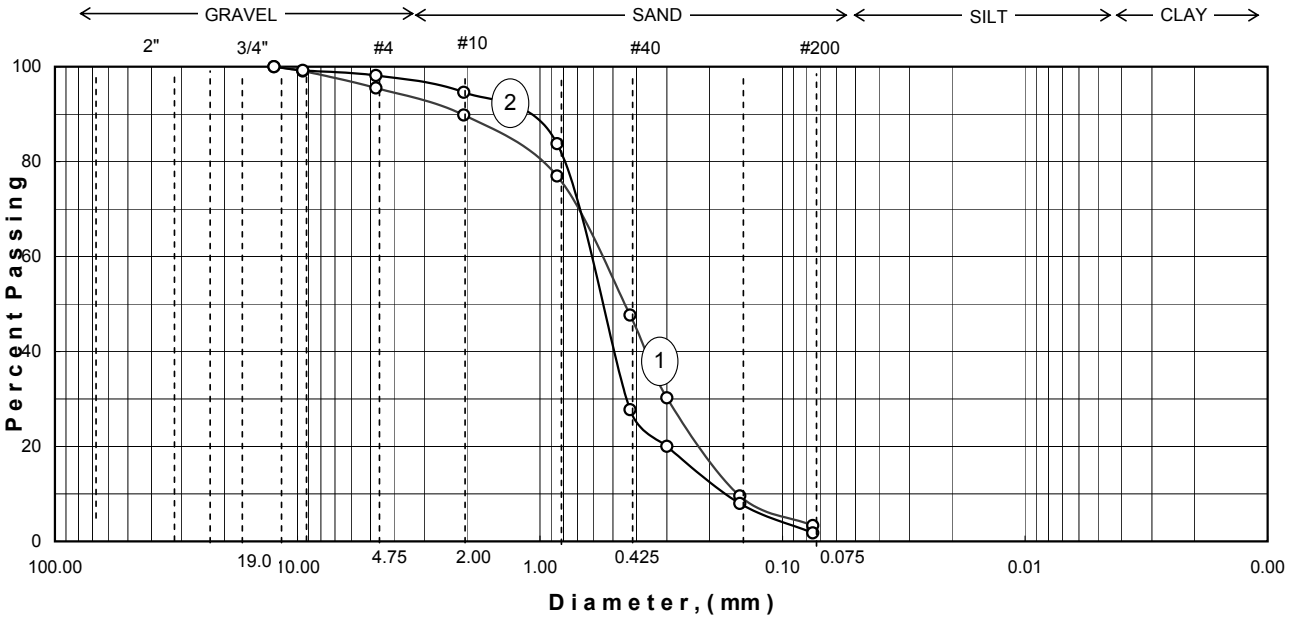
Wt. of dry sample+container	540.83
Wt. of container	98.41
Wt. of dry sample	**442.42**

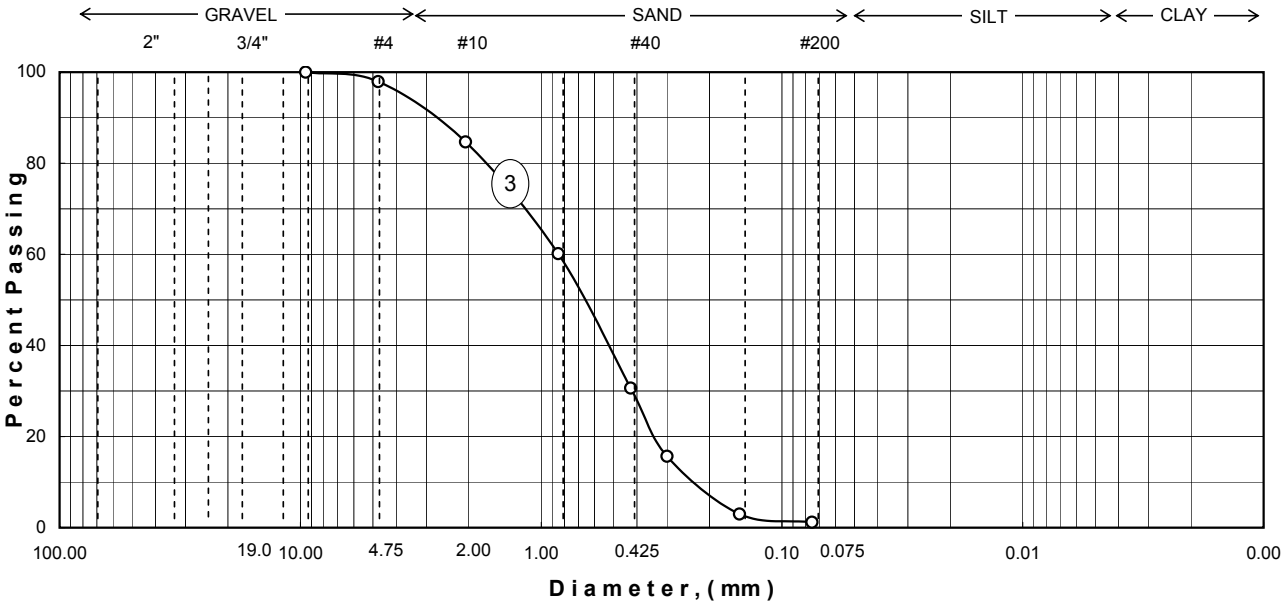
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50			
#4	4.75	0.00	0.00	100.00
#10	2.06	0.34	0.08	99.92
#20	0.85	9.09	2.05	97.95
#40	0.425	56.34	12.73	87.27
#50	0.30	164.41	37.16	62.84
#100	0.15	401.01	90.64	9.36
#200	0.075	435.20	98.37	1.63

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
3 / Right side	1					SP	Light gray fine to coarse SAND, some pyroclastic materials.
3 / Middle side	2					SP	Light gray sand-size PYROCLASTIC materials.
3 / Left side	3					SP	Light gray fine to coarse SAND, some pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Upstream) **Location No.:** 3

Description of Soil: Light gray fine to coarse SAND, some pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	604.61
Wt. of container	123.21
Wt. of dry sample	**481.40**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	4.31	0.90	99.10
#4	4.75	21.66	4.50	95.50
#10	2.06	49.09	10.20	89.80
#20	0.85	110.84	23.02	76.98
#40	0.425	251.90	52.33	47.67
#50	0.30	335.80	69.75	30.25
#100	0.15	435.34	90.43	9.57
#200	0.075	465.31	96.66	3.34

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Upstream) **Location No.:** 3

Description of Soil: Light gray sand-size PYROCLASTIC materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	458.26
Wt. of container	86.67
Wt. of dry sample	**371.59**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	2.94	0.79	99.21
#4	4.75	6.89	1.85	98.15
#10	2.06	20.10	5.41	94.59
#20	0.85	60.31	16.23	83.77
#40	0.425	268.44	72.24	27.76
#50	0.30	297.12	79.96	20.04
#100	0.15	341.93	92.02	7.98
#200	0.075	364.89	98.20	1.80

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Bucao River (Upstream) **Location No.:** 3

Description of Soil: Light gray fine to coarse SAND, some pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

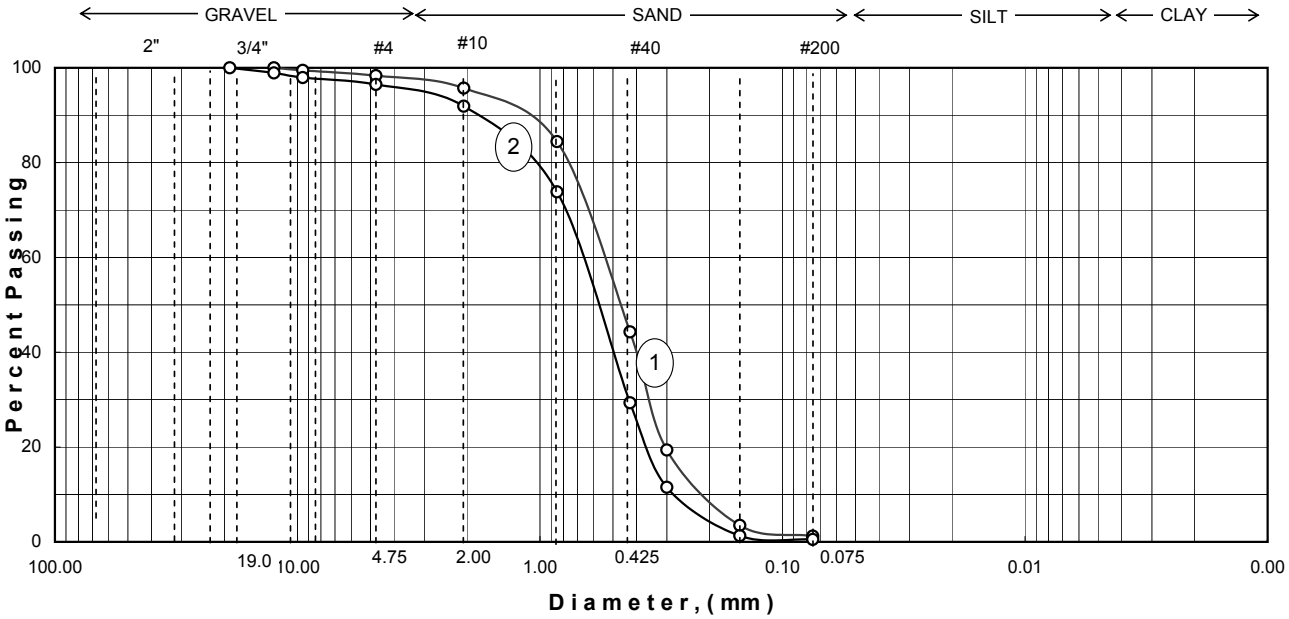
Wt. of dry sample+container	502.36
Wt. of container	93.62
Wt. of dry sample	**408.74**

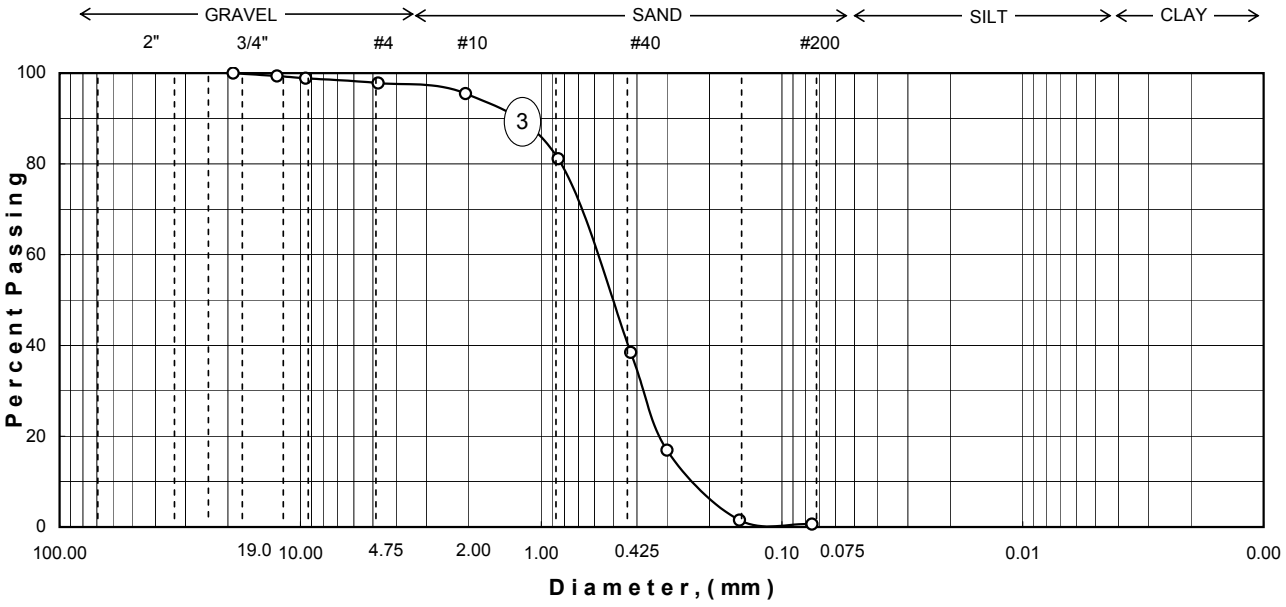
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50	0.00	0.00	100.00
#4	4.75	8.45	2.07	97.93
#10	2.06	62.62	15.32	84.68
#20	0.85	162.87	39.85	60.15
#40	0.425	283.57	69.38	30.62
#50	0.30	344.66	84.32	15.68
#100	0.15	396.50	97.01	2.99
#200	0.075	403.92	98.82	1.18

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
4 / Right side	1					SP	Grayish brown fine to coarse SAND, traces of pyroclastic materials.
4 / Middle side	2					SP	Light gray fine to coarse SAND, some pyroclastic materials.
4 / Left side	3					SP	Brownish gray fine to coarse SAND, some pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Downstream) **Location No.:** 4

Description of Soil: Grayish brown fine to coarse SAND, traces of pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	471.03
Wt. of container	87.79
Wt. of dry sample	**383.24**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	2.10	0.55	99.45
#4	4.75	6.31	1.65	98.35
#10	2.06	16.49	4.30	95.70
#20	0.85	59.59	15.55	84.45
#40	0.425	213.43	55.69	44.31
#50	0.30	309.01	80.63	19.37
#100	0.15	369.96	96.53	3.47
#200	0.075	378.60	98.79	1.21

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Downstream) **Location No.:** 4

Description of Soil: Light gray fine to coarse SAND, some pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	477.10
Wt. of container	103.78
Wt. of dry sample	**373.32**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	4.08	1.09	98.91
3/8"	9.50	7.73	2.07	97.93
#4	4.75	13.12	3.51	96.49
#10	2.06	30.27	8.11	91.89
#20	0.85	97.64	26.15	73.85
#40	0.425	263.82	70.67	29.33
#50	0.30	330.32	88.48	11.52
#100	0.15	368.49	98.71	1.29
#200	0.075	371.45	99.50	0.50

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Downstream) **Location No.:** 4

Description of Soil: Brownish gray fine to coarse SAND, some pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 04 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

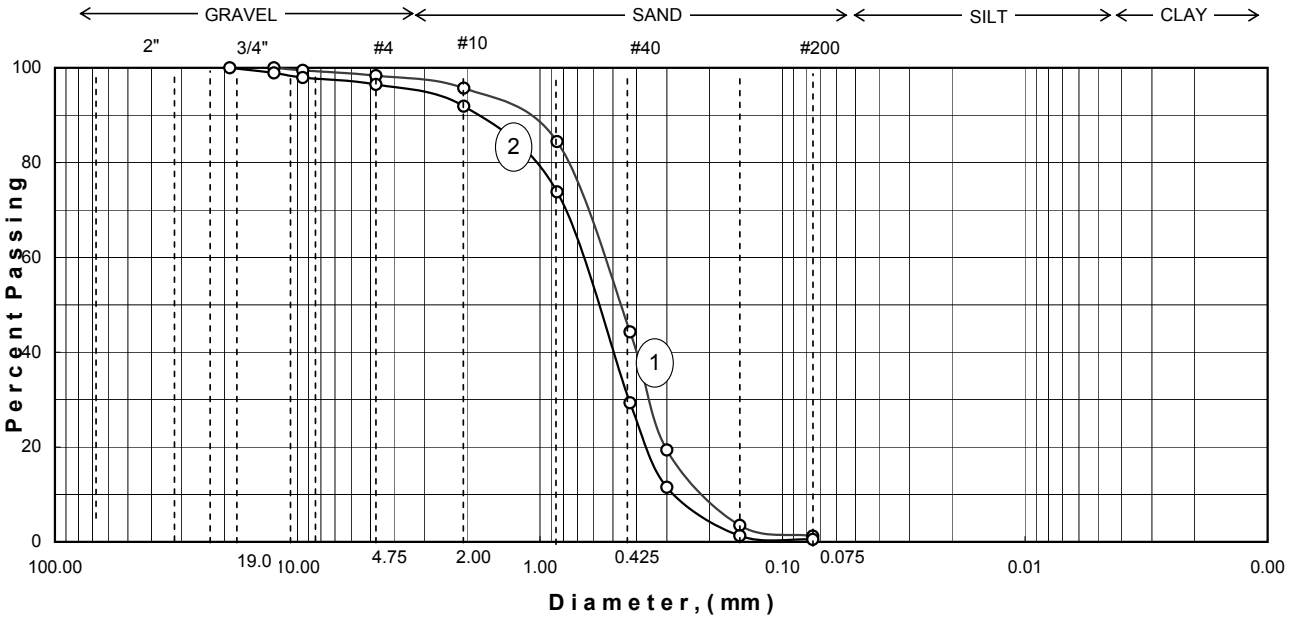
Wt. of dry sample+container	536.72
Wt. of container	60.21
Wt. of dry sample	**476.51**

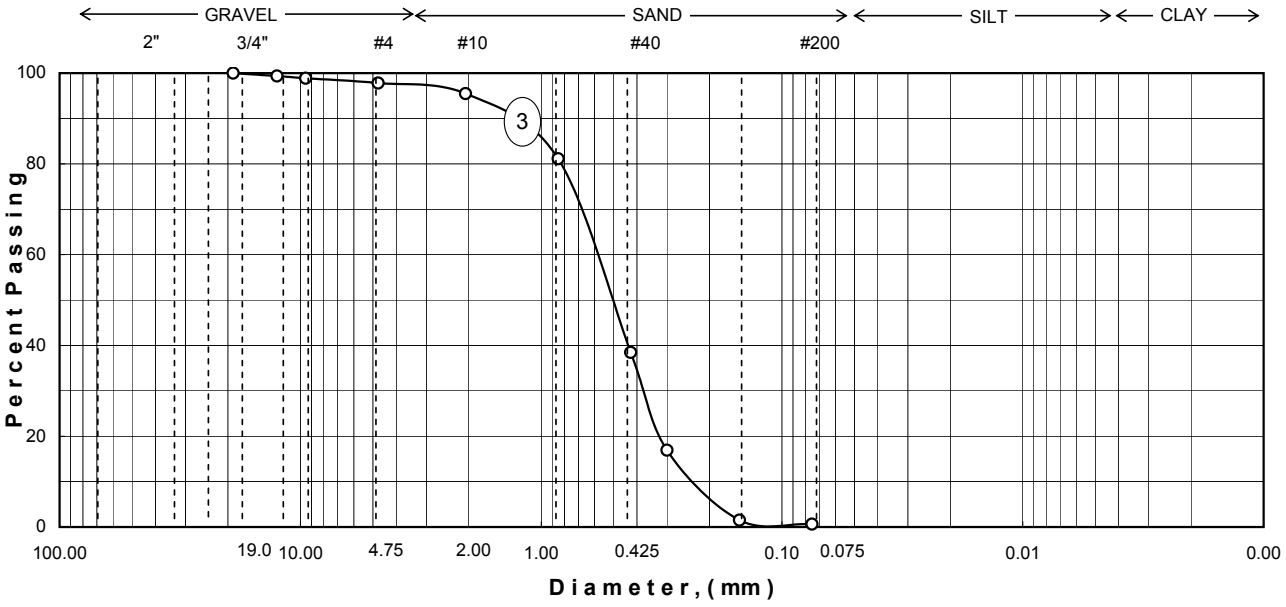
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	3.07	0.64	99.36
3/8"	9.50	5.46	1.15	98.85
#4	4.75	10.38	2.18	97.82
#10	2.06	21.45	4.50	95.50
#20	0.85	89.85	18.86	81.14
#40	0.425	293.25	61.54	38.46
#50	0.30	395.80	83.06	16.94
#100	0.15	469.27	98.48	1.52
#200	0.075	473.53	99.37	0.63

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
5 / Right side	1					SP	Gray fine to coarse SAND, some pyroclastic materials.
5 / Middle side	2					SP	Light gray fine to coarse SAND, traces of pyroclastic materials.
5 / Left side	3					SP	Brownish gray fine to coarse SAND, some pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 5

Description of Soil: Gray fine to coarse SAND, some pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	471.03
Wt. of container	87.79
Wt. of dry sample	**383.24**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	2.10	0.55	99.45
#4	4.75	6.31	1.65	98.35
#10	2.06	16.49	4.30	95.70
#20	0.85	59.59	15.55	84.45
#40	0.425	213.43	55.69	44.31
#50	0.30	309.01	80.63	19.37
#100	0.15	369.96	96.53	3.47
#200	0.075	378.60	98.79	1.21

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 5

Description of Soil: Light gray fine to coarse SAND, traces of pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	477.10
Wt. of container	103.78
Wt. of dry sample	**373.32**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	4.08	1.09	98.91
3/8"	9.50	7.73	2.07	97.93
#4	4.75	13.12	3.51	96.49
#10	2.06	30.27	8.11	91.89
#20	0.85	97.64	26.15	73.85
#40	0.425	263.82	70.67	29.33
#50	0.30	330.32	88.48	11.52
#100	0.15	368.49	98.71	1.29
#200	0.075	371.45	99.50	0.50

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 5

Description of Soil: Brownish gray fine to coarse SAND, some pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

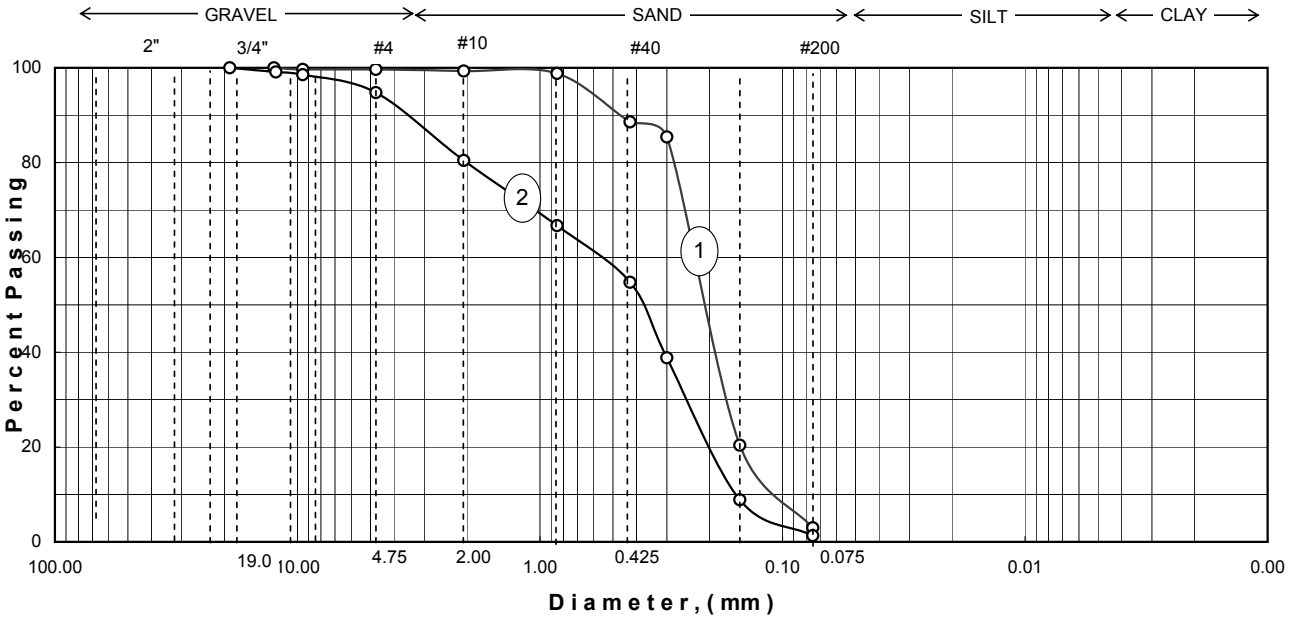
Wt. of dry sample+container	536.72
Wt. of container	60.21
Wt. of dry sample	**476.51**

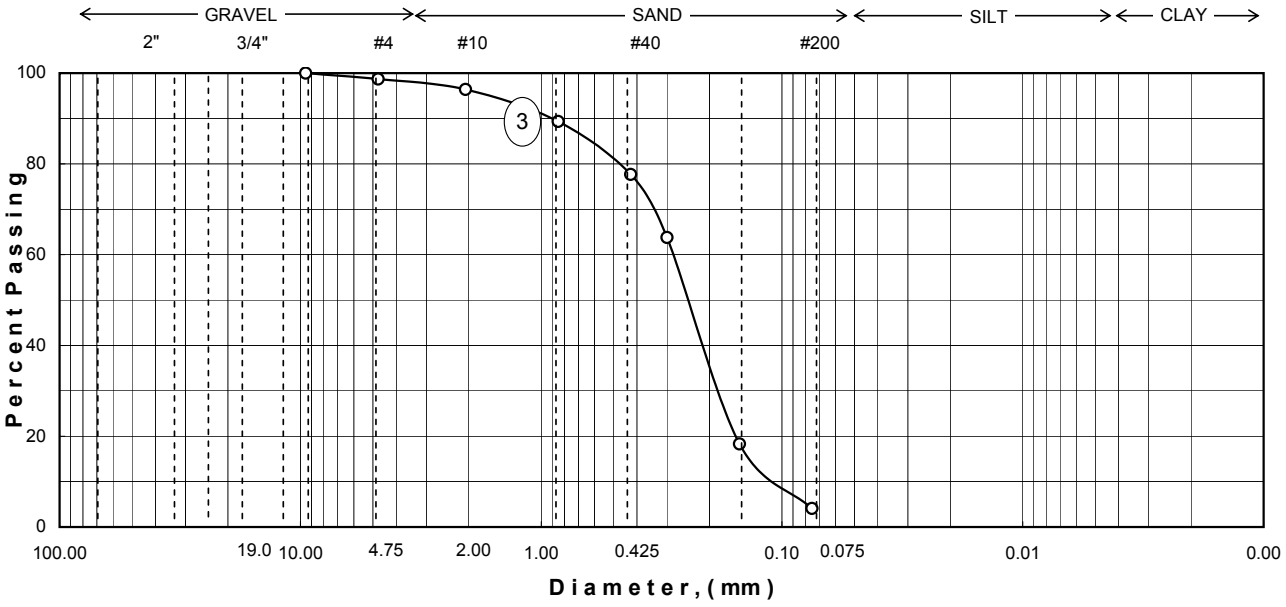
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	3.07	0.64	99.36
3/8"	9.50	5.46	1.15	98.85
#4	4.75	10.38	2.18	97.82
#10	2.06	21.45	4.50	95.50
#20	0.85	89.85	18.86	81.14
#40	0.425	293.25	61.54	38.46
#50	0.30	395.80	83.06	16.94
#100	0.15	469.27	98.48	1.52
#200	0.075	473.53	99.37	0.63

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
6 / Right side	1					SP	Gray fine SAND, traces of pyroclastic materials.
6 / Middle side	2					SP	Light gray fine SAND, with pyroclastic materials.
6 / Left side	3					SP	Gray fine to coarse SAND, some pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 6

Description of Soil: Gray fine SAND, traces of pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	580.97
Wt. of container	72.07
Wt. of dry sample	**508.90**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50	0.00	0.00	100.00
3/8"	9.50	1.73	0.34	99.66
#4	4.75	1.73	0.34	99.66
#10	2.06	3.42	0.67	99.33
#20	0.85	5.94	1.17	98.83
#40	0.425	58.00	11.40	88.60
#50	0.30	74.15	14.57	85.43
#100	0.15	405.12	79.61	20.39
#200	0.075	493.81	97.03	2.97

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 6

Description of Soil: Light gray fine SAND, with pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	536.61
Wt. of container	75.11
Wt. of dry sample	**461.50**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	4.08	0.88	99.12
3/8"	9.50	6.73	1.46	98.54
#4	4.75	24.12	5.23	94.77
#10	2.06	90.27	19.56	80.44
#20	0.85	153.64	33.29	66.71
#40	0.425	208.82	45.25	54.75
#50	0.30	282.32	61.17	38.83
#100	0.15	420.49	91.11	8.89
#200	0.075	455.45	98.69	1.31

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Maloma River (Upstream, Sitio Banawen) **Location No.:** 6

Description of Soil: Gray fine to coarse SAND, some pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

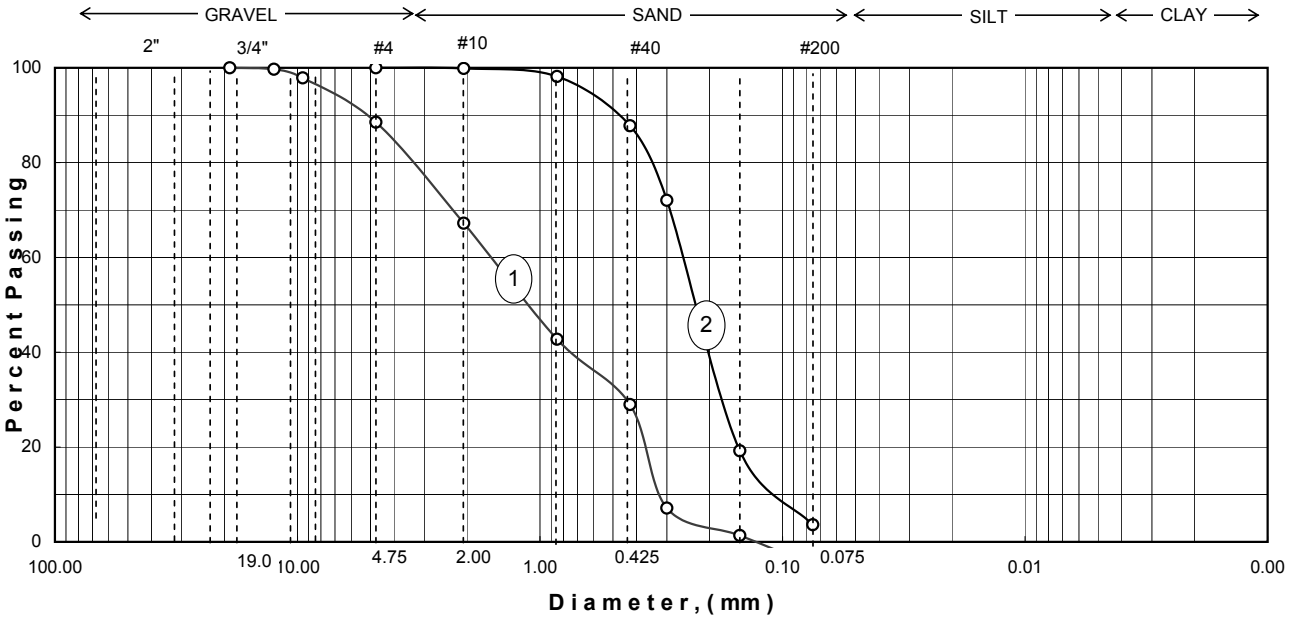
Wt. of dry sample+container	516.72
Wt. of container	100.21
Wt. of dry sample	**416.51**

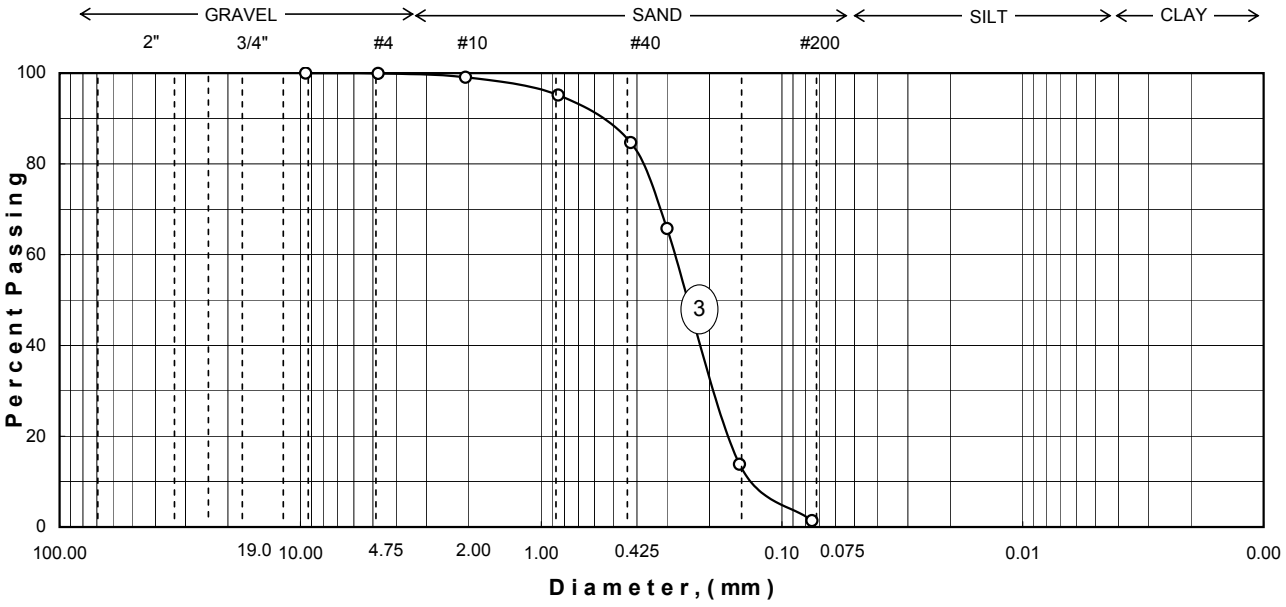
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50	0.00	0.00	100.00
#4	4.75	5.38	1.29	98.71
#10	2.06	15.05	3.61	96.39
#20	0.85	44.31	10.64	89.36
#40	0.425	92.98	22.32	77.68
#50	0.30	150.80	36.21	63.79
#100	0.15	340.27	81.70	18.30
#200	0.075	399.53	95.92	4.08

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
7 / Right side	1					SP	Light gray sand-size PYROCLASTIC materials.
7 / Middle side	2					SP	Light gray fine SAND, traces of pyroclastic materials.
7 / Left side	3					SP	Light gray fine SAND, traces of pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream) **Location No.:** 7

Description of Soil: Light gray sand-size PYROCLASTIC materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	567.78
Wt. of container	97.22
Wt. of dry sample	**470.56**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	1.46	0.31	99.69
3/8"	9.50	10.02	2.13	97.87
#4	4.75	54.08	11.49	88.51
#10	2.06	154.28	32.79	67.21
#20	0.85	269.45	57.26	42.74
#40	0.425	334.18	71.02	28.98
#50	0.30	437.03	92.87	7.13
#100	0.15	464.18	98.64	1.36
#200	0.075	493.81	104.94	-4.94

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream) **Location No.:** 7

Description of Soil: Light gray fine SAND, traces of pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	595.22
Wt. of container	98.94
Wt. of dry sample	**496.28**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50			
#4	4.75	0.00	0.00	100.00
#10	2.06	0.73	0.15	99.85
#20	0.85	9.09	1.83	98.17
#40	0.425	60.69	12.23	87.77
#50	0.30	138.81	27.97	72.03
#100	0.15	400.87	80.77	19.23
#200	0.075	478.27	96.37	3.63

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream) **Location No.:** 7

Description of Soil: Light gray fine SAND, traces of pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

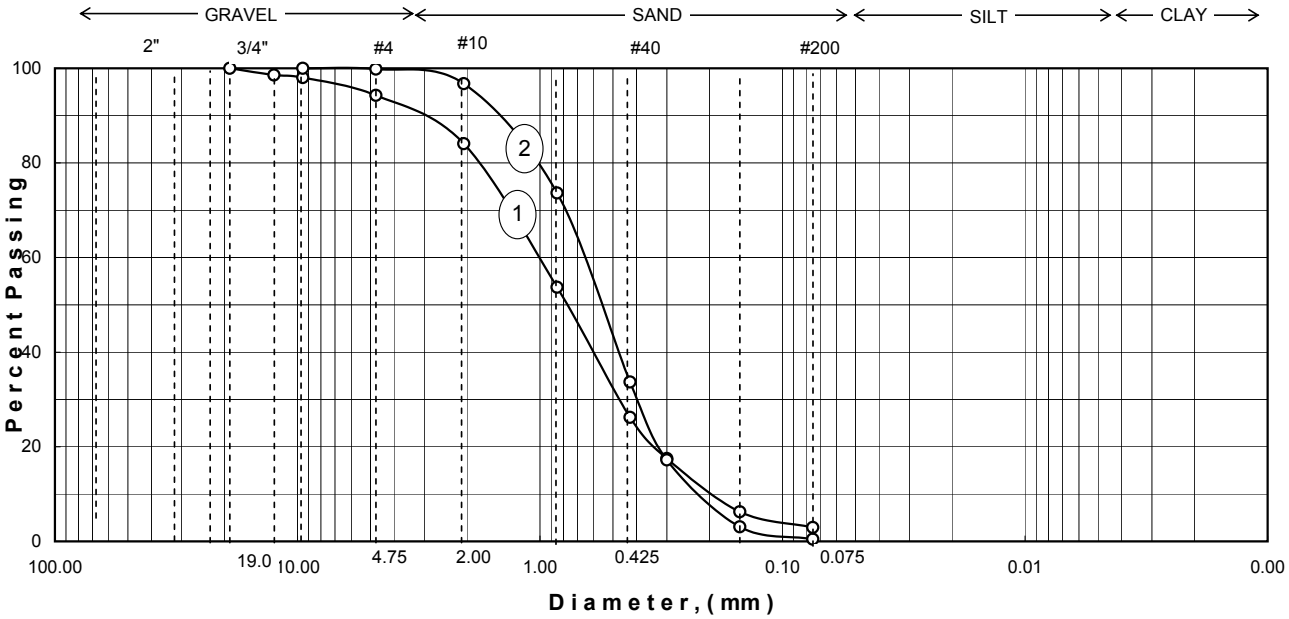
Wt. of dry sample+container	527.00
Wt. of container	99.58
Wt. of dry sample	**427.42**

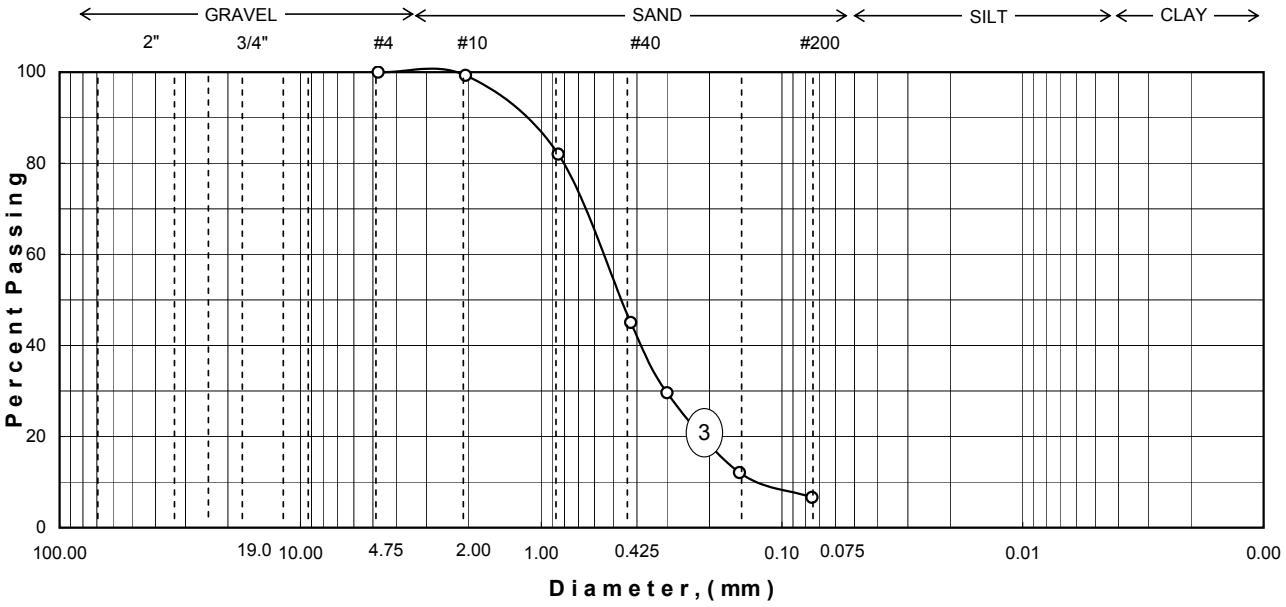
Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50	0.00	0.00	100.00
#4	4.75	0.32	0.07	99.93
#10	2.06	3.85	0.90	99.10
#20	0.85	20.68	4.84	95.16
#40	0.425	65.45	15.31	84.69
#50	0.30	146.38	34.25	65.75
#100	0.15	368.32	86.17	13.83
#200	0.075	421.34	98.58	1.42

% passing = 100 - Σ % retained.

GRAIN-SIZE DISTRIBUTION CURVES





LOCATION NO / DESIGNATION. NO.	CURVE NO.	NMC	LL	PL	PI	USCS	DESCRIPTION
8 / Right side	1					SP	Light gray fine to coarse SAND, traces of pyroclastic materials.
8 / Middle side	2					SP	Light gray fine SAND, traces of pyroclastic materials.
8 / Left side	3					SP-SM	Light gray fine SAND, traces of pyroclastic materials.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream Near Mount Bagang **Location No.:** 8

Description of Soil: Light gray fine to coarse SAND, traces of pyroclastic materials. **Designation :** Right side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	647.32
Wt. of container	133.61
Wt. of dry sample	**513.71**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00	0.00	0.00	100.00
1/2"	12.50	7.27	1.42	98.58
3/8"	9.50	10.11	1.97	98.03
#4	4.75	29.31	5.71	94.29
#10	2.06	81.87	15.94	84.06
#20	0.85	237.70	46.27	53.73
#40	0.425	378.95	73.77	26.23
#50	0.30	423.74	82.49	17.51
#100	0.15	481.48	93.73	6.27
#200	0.075	498.52	97.04	2.96

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream Near Mount Bagang **Location No.:** 8

Description of Soil: Light gray fine SAND, traces of pyroclastic materials. **Designation :** Middle side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	558.57
Wt. of container	135.08
Wt. of dry sample	**423.49**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50	0.00	0.00	100.00
#4	4.75	0.78	0.18	99.82
#10	2.06	13.78	3.25	96.75
#20	0.85	111.60	26.35	73.65
#40	0.425	280.79	66.30	33.70
#50	0.30	350.55	82.78	17.22
#100	0.15	410.45	96.92	3.08
#200	0.075	421.50	99.53	0.47

% passing = 100 - Σ % retained.

GRAIN-SIZE ANALYSIS - MECHANICAL

Project: SAMPLING OF RIVER BED MATERIAL **Job. No.:**

Location of Project: Sto. Tomas River (Upstream Near Mount Bagang **Location No.:** 8

Description of Soil: Light gray fine SAND, traces of pyroclastic materials. **Designation :** Left side

Tested By: L. Padual **Date of Testing:** 05 - 06 - 02

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample+container	705.17
Wt. of container	171.3
Wt. of dry sample	**533.87**

Sieve analysis and grain shape

Sieve no.	Diameter (mm)	Wt. retained	% Retained	% Passing
3"	76.20			
2 1/2"	63.50			
2"	50.00			
1 1/2"	38.00			
1"	25.40			
3/4"	19.00			
1/2"	12.50			
3/8"	9.50			
#4	4.75	0.00	0.00	100.00
#10	2.06	3.76	0.70	99.30
#20	0.85	96.07	18.00	82.00
#40	0.425	293.37	54.95	45.05
#50	0.30	375.79	70.39	29.61
#100	0.15	469.43	87.93	12.07
#200	0.075	498.44	93.36	6.64

% passing = 100 - Σ % retained.

C4 Specific Gravity Test

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Bucao River (Downstream)**
DATE TESTED: **May 04, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 1 (Right side)				Location 1 (Middle side)	
Volume of Flask @ 20^{o} , ml	250	250			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	400.11	400.37			398.10	398.55
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	339.20	339.20			339.20	339.20
Wt. of Dry Soil = Ws	100.00	100.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	39.09	38.83			41.10	40.65
Specific Gravity, Gs = Ws / Ww	2.56	2.58			2.43	2.46
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.55**	**2.57**			**2.42**	**2.45**

Designation Number	Location 1 (Left side)					
Volume of Flask @ 20^{o}C	250	250				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	394.69	400.60				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	333.52	339.20				
Wt. of Dry Soil = Ws	100.00	100.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	38.83	38.60				
Specific Gravity, Gs = Ws / Ww	2.58	2.59				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.57**	**2.58**				

Remarks:
Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Bucao River (Brgy. Malumboy)**
DATE TESTED: **May 04, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 2 (Right side)				Location 2 (Middle side)	
Volume of Flask @ 20^{o}, ml	250	250			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	393.55	399.83			395.79	401.74
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	333.52	339.20			333.52	339.20
Wt. of Dry Soil = Ws	100.00	100.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	39.97	39.37			37.73	37.46
Specific Gravity, Gs = Ws / Ww	2.50	2.54			2.65	2.67
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.49**	**2.53**			**2.64**	**2.66**

Designation Number	Location 2 (Left side)					
Volume of Flask @ 20^{o}C	250	250				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	397.49	403.12				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	333.52	339.20				
Wt. of Dry Soil = Ws	100.00	100.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	36.03	36.08				
Specific Gravity, Gs = Ws / Ww	2.78	2.77				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.77**	**2.76**				

Remarks:
Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Bucao River (Upstream)**
DATE TESTED: **May 04, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 3 (Right side)				Location 3 (Middle side)	
Volume of Flask @ 20^{o} , ml	250	250			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	396.53	401.55			391.49	397.71
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	333.52	339.20			333.52	339.20
Wt. of Dry Soil = Ws	100.00	100.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	36.99	37.65			42.03	41.49
Specific Gravity, Gs = Ws / Ww	2.70	2.66			2.38	2.41
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.69**	**2.65**			**2.37**	**2.40**

Designation Number	Location 3 (Left side)					
Volume of Flask @ 20^{o}C	250	250				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	395.32	401.44				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	333.52	339.20				
Wt. of Dry Soil = Ws	100.00	100.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	38.20	37.76				
Specific Gravity, Gs = Ws / Ww	2.62	2.65				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.61**	**2.64**				

Remarks:
Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Maloma River (Downstream)**
DATE TESTED: **May 04, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 4 (Right side)				Location 4 (Middle side)	
Volume of Flask @ 20^{o} , ml	250	250			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	395.80	401.80			393.21	399.21
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	333.52	339.20			333.52	339.20
Wt. of Dry Soil = Ws	100.00	100.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	37.72	37.40			40.31	39.99
Specific Gravity, Gs = Ws / Ww	2.65	2.67			2.48	2.50
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.64**	**2.66**			**2.47**	**2.49**

Designation Number	Location 4 (Left side)					
Volume of Flask @ 20^{o}C	250	250				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	394.78	400.57				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	333.52	339.20				
Wt. of Dry Soil = Ws	100.00	100.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	38.74	38.63				
Specific Gravity, Gs = Ws / Ww	2.58	2.59				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.57**	**2.58**				

Remarks:

Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS	LOCATION: **Maloma River (Upstream, Sitio Banawen)**
PROJECT : ***SAMPLING OF RIVER BED MATERIAL***	DATE TESTED: **May 04, 2002** TESTED BY: **J. Castro** SHEET NO. **1 of 1**

Designation Number	Location 5 (Right side)				Location 5 (Middle side)	
Volume of Flask @ 20^{o} , ml	250	250			500	500
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	393.87	394.30			796.60	799.73
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	333.52	333.52			671.99	675.22
Wt. of Dry Soil = Ws	100.00	100.00			200.00	200.00
Wt. of Water, Ww = Ws + Wbw - Wbws	39.65	39.22			75.39	75.49
Specific Gravity, Gs = Ws / Ww	2.52	2.55			2.65	2.65
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.51**	**2.54**			**2.64**	**2.64**

Designation Number	Location 5 (Left side)					
Volume of Flask @ 20^{o}C	500	500				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	789.17	798.12				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	666.13	675.55				
Wt. of Dry Soil = Ws	200.00	200.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	76.96	77.43				
Specific Gravity, Gs = Ws / Ww	2.60	2.58				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.59**	**2.57**				

Remarks:

Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Sto. Tomas (Downstream)**
DATE TESTED: **May 05, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 6 (Right side)				Location 6 (Middle side)	
Volume of Flask @ 20^{o} , ml	500	500			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	796.41	798.49			391.24	397.45
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	669.61	671.35			333.52	339.20
Wt. of Dry Soil = Ws	200.00	200.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	73.20	72.86			42.28	41.75
Specific Gravity, Gs = Ws / Ww	2.73	2.74			2.37	2.40
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.72**	**2.73**			**2.36**	**2.39**

Designation Number	Location 6 (Left side)					
Volume of Flask @ 20^{o}C	500	500				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	786.61	793.36				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	666.13	671.99				
Wt. of Dry Soil = Ws	200.00	200.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	79.52	78.63				
Specific Gravity, Gs = Ws / Ww	2.52	2.54				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.51**	**2.53**				

Remarks:

Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Sto. Tomas River (Upstream)**
DATE TESTED: **May 05, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 7 (Right side)				Location 7 (Middle side)	
Volume of Flask @ 20^{o} , ml	250	250			500	500
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	395.89	390.44			801.78	798.00
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	339.20	333.52			675.55	671.99
Wt. of Dry Soil = Ws	100.00	100.00			200.00	200.00
Wt. of Water, Ww = Ws + Wbw - Wbws	43.31	43.08			73.77	73.99
Specific Gravity, Gs = Ws / Ww	2.31	2.32			2.71	2.70
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.30**	**2.31**			**2.70**	**2.69**

Designation Number	Location 7 (Left side)					
Volume of Flask @ 20^{o}C	250	250				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	402.21	401.77				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	339.20	339.20				
Wt. of Dry Soil = Ws	100.00	100.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	36.99	37.43				
Specific Gravity, Gs = Ws / Ww	2.70	2.67				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.69**	**2.66**				

Remarks:
Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

SPECIFIC GRAVITY OF SOIL SOLIDS

LOCATION: **Sto. Tomas River (Upstream Near Mount Bagang)**
DATE TESTED: **May 05, 2002**
TESTED BY: **J. Castro**
SHEET NO. **1 of 1**

PROJECT : ***SAMPLING OF RIVER BED MATERIAL***

Designation Number	Location 8 (Right side)				Location 8 (Middle side)	
Volume of Flask @ 20^{o} , ml	500	500			250	250
Method of air removal	Rolling	Rolling			Rolling	Rolling
Wt. of Flask + Water + Soil = Wbws	796.46	791.00			396.83	402.52
Temperature, ^{o}C	28	28			28	28
Wt. of Flask + Water = Wbw	671.99	666.13			333.52	339.20
Wt. of Dry Soil = Ws	200.00	200.00			100.00	100.00
Wt. of Water, Ww = Ws + Wbw - Wbws	75.53	75.13			36.69	36.68
Specific Gravity, Gs = Ws / Ww	2.65	2.66			2.73	2.73
Viscosity Correction	0.9963	0.9963			0.9963	0.9963
Specific Gravity corrected for Temp.	**2.64**	**2.65**			**2.72**	**2.72**

Designation Number	Location 8 (Left side)					
Volume of Flask @ 20^{o}C	500	500				
Method of air removal	Rolling	Rolling				
Wt. of Flask + Water + Soil = Wbws	791.03	799.77				
Temperature, ^{o}C	28	28				
Wt. of Flask + Water = Wbw	666.13	675.22				
Wt. of Dry Soil = Ws	200.00	200.00				
Wt. of Water, Ww = Ws + Wbw - Wbws	75.10	75.45				
Specific Gravity, Gs = Ws / Ww	2.66	2.65				
Viscosity Correction	0.9963	0.9963				
Specific Gravity corrected for Temp.	**2.65**	**2.64**				

Remarks:
Note: It was observed during testing, that some light weight materials or pyroclastic materials floats in water.

D. Environmental Impact Assessment (EIA)

D. Environmental Impact Assessment

List of Tables and Figures

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All the data are results of investigations conducted by the local sub-consultants (JBJ Consulting, Inc.) during the study.

D1 Consultation Workshop 1

JICA STUDY TEAM
The Study on Sabo and Flood Control for Western River Basins of Mt. Pinatubo in the Republic of the Philippines

CONSULTATION WORKSHOP
ON COMMUNITY DEVELOPMENT COMPONENT OF THE STUDY
Resettlement Area -1 (Baquilan, Loob-Bunga & Taugtog)
25 January 2003; South Central Elementary School, Botolan, Zambales

CONSULTATION WORKSHOP REPORT

1. 0 Brief Background of the Consultation

The consultation was conducted as part of the Study on Sabo and Flood Control for the Western River Basins of Mt. Pinatubo. Last year, a household survey was conducted to know the present situation of the people that was affected by the eruption of Mt. Pinatubo specially those who were relocated in resettlement centers. Part of the survey was identifying their existing conditions in terms of socio-economic related problems in their respective communities. It appeared in the survey that their main problems were related to lack of basic social services, disaster/flood, livelihood and governance. The result of the consultation will verify if their problems still exist today and if the proposed non-structural measures and community disaster prevention system of the study are still applicable based on the people's present conditions. *Refer to **Attachment-1** for the copy of the Project Brief provided to the participants.*

2. 0 Workshop Objectives and Design

2.1 Objectives

The Consultation Workshop was conducted to gather substantial inputs for the community development component of the feasibility study on the Sabo and Flood Control for Western River Basins of Mt. Pinatubo, as stipulated in the following specific objectives:

i) to inform the local community of the background, process, objectives and initial findings of the study;
ii) to provide a venue where community representatives can express their own perspectives and opinion regarding major issues and problems in their area as well as on the proposed social development priority projects, and;
iii) to gather information about the socio-economic conditions of the families represented in the workshop.

2.1 Major Activities

The whole-day Consultation Workshop was composed of the major activities briefly described below. *Refer to **Attachment-2** for the Program of Activities*

2.1.1. Opening Ceremony

The program began with a short prayer led by Ms. Ureka Manalo, SKP Adviser of Poon-bato and followed by the national anthem led by Councillor Amparo Fabra of Bgay. Maguisguis.

The Municipal Administrator, Mr. Erlin Rico gave the opening remarks on behalf of Botolan Mayor Rogelio Yap. Mr. Rico informed the participants that initial studies were conducted by the JICA Study Team as early as last year with the purpose of consulting the people of Botolan. The realization of this project is the solution to their yearly problem of flooding especially during the rainy season. He encouraged everyone to listen carefully and actively participate so that they can voice out their views and opinions.

It was clarified by the Moderator that this workshop was especially conducted for the people in the community for them to better understand the design of the proposed projects and the overall study itself. Similar consultations were already conducted in the past for different stakeholders.

2.1.2 Presentation of Inputs

Mr. Ken Nishino, Co-team Leader of the JICA study team presented two major inputs before and after the small group workshops. The Background and Framework of the Study was presented before the small group workshop while the Overview of the Social Development Component and Presentation of Proposed Community Development Projects was explained in detail after the presentation of the small group workshop outputs by the participants. Mr. Abelardo Cruz, Social Development Specialist helped in the translation and summary of the presentations. *Refer to section 4.0 for the summary of inputs presented.*

2.1.1. Group Survey

To maximize the presence of community representatives from the three Resettlement Centers, a brief questionnaire was prepared to gather additional socio-economic data at household level. The two-page questionnaire covered socio-economic data, presence and effectiveness of basic social services in the resettlement areas and a comparison of peoples' condition before the eruption of Mt. Pinatubo and at present. *Refer to **Attachment-3** for the copy of the questionnaire.*

The interview was conducted by group by designated facilitators. Some representatives from the LGU and other line agencies also assisted the group survey especially the indigenous peoples (IPs).

2.1.2. Small Group Workshops

The participants were grouped into five for the small group workshops. The grouping was generally based on the resettlement status of the participants. Those who are permanently staying in the resettlement centers composed one group while four groups were formed for those who are semi-permanently settled

or those who occasionally go back to the original barangay for livelihood reasons. One of the four groups was composed of all-IP members. Members of the LGUs were requested to spread out and act as observers.

The small group workshop was conducted to make in-depth and focus-discussion possible and to provide more opportunity for each participant to share his/her views on the issues discussed. Each group was assigned a facilitator and a translator when necessary.

The workshop process encouraged individual participation through *Cause and Effect Analysis* and *Problem Tree Approach* where each member of the group was requested to use *meta-cards* in sharing their inputs. The process ensured every member's contribution during the group discussion.

The discussion in each small group was focused on the following guide questions:

i) What are the five major problems in the community?
ii) What community development projects do you consider successful in your resettlement centers?
iii) What are the community-initiated activities in you area?
iv) What are your proposed projects?

2.1.3. Presentation of Small Group Workshop Outputs

The output of each small group workshop was presented one by one in the plenary by the participants themselves. This was done to share the summary of each group's discussion.

2.1.4. Open Forum

The floor was opened for questions, suggestions and comments after the presentation of the inputs in the morning and in the afternoon. The objective was to enhance the rationale and the details of the proposed community development projects, such as the Early Warning and Evacuation System, extension of on-going Community-Based Forest Management Project and Pilot projects for Agricultural Development. Clarifications and responses were provided by Mr. Ken Nishino and Mr. Abelardo Cruz. *Refer to section 6.0 for key issues raised during the open forum.*

2.1.5. Synthesis and Closing

To level-off the outcome of the whole-day Consultation, a brief synthesis of the small group workshop outputs as well as the issues raised and the responses made during the open forum was presented in closing by the moderator, Ms. Lyn Galang. Also, the certificate of participation was distributed as form of acknowledgement.

3.0 Consultation Workshop Participants

A total of 85 representatives from the selected barangays in Botolan, LGU, NGOs and other agencies such as HUDCC-PPMO, NCIP, etc. attended the workshop. Barangay representatives, mostly Barangay Chairman and Councillors, composed 76% of the participants. Barangay Burgos, Nacolcol and Maguisguis were the most represented Barangays. It was also noted that most Barangay representatives were from the IP group. On the other hand, the Local Government was represented by PPDO, DENR, etc. from provincial and NCIP, DAR Botolan, MSWDO, MPDC, etc. from municipal level. The Consultation was also attended by some Japanese observers from Kyoto University, Japan. *Refer to **Attachment- 5,** Attendance Sheet.*

Table 1: Summary of Participants

Organization/Barangay	Number of Representatives
LGU	
Provincial Level Representatives	10
Municipal Level Representatives	10
NGOs/Other Agencies	10
Barangay Representatives	
✓ Maguisguis	7
✓ Palis	5
✓ Taugtog	3
✓ Moraza	4
✓ Nacolcol	8
✓ Poon Bato	3
✓ Cabatuan	3
✓ Villar	6
✓ Belbel	1
✓ Owaog	1
✓ Burgos	9
✓ Malomboy	6
TOTAL	**85**

4.0 Summary of Inputs Presented

Project Description with emphasis on CD components and the priority Projects by the JICA STUDY Team

Mr. Ken Nishino, Co-Team Leader of the JICA Study Team presented the initial results of the study and the master plan. The duration of the study is from March 2002 to August 2003. The main goal of the study is sustainable development of the western region of Mt. Pinatubo with following specific objectives:

i) to formulate a master plan for flood and mudflow control;
ii) to carry-out a feasibility study and
iii) to transfer technology

He gave a description of the study area as well as the past and present condition of the lahar/sediment flow in the river systems (Bucao, Maloma and Sto. Tomas Rivers) with the headwaters coming from Mount Pinatubo. He also presented the existing condition of the Maraunot Notch and Mapanuepe Lake.

The Master Plan has three major components as follows:

i) Structural Measures that include infrastructures such as dikes, bridges or road system in strategic locations of the study area.

ii) Non-Structural Measures with the purpose of mitigating potential damage. This include establishment of early forecasting/warning/ and evacuation system/ institutional set-up/Basin Management.

iii) Community-based Disaster Prevention Plan with the aim of reducing economic and social vulnerabilities. This component includes income generation/livelihood/community rehabilitation and development as well as resettlement.

iv) The Non-Structural Measures of the study include the Flood/Mudflow Forecasting System. It was mentioned that a rain gauge was established as part of a previous JICA project but was stolen since it was not introduced in the community. Under this measure a provincial/municipal level forecasting system will be established by telemeter system through cellular phone network. Priority areas for establishing evacuation centers will also be identified. Basin Management for Mapanuepe Lake is also proposed specifically environmental management for the Dizon Mining Area. Expansion of Community-Based Forest Management Project in four areas is also proposed.

It was emphasized in Mr. Nishino's presentation that among the three components, the Community Disaster Prevention Plan (CDPP) is the most critical because it involves people's participation with the end goal of empowering them. The plan works on the premise that a 'STRONG ECONOMY MUST BE THE BEST DEFENCE AGAINST DISASTERS". The Plan was formulated based on the result of the survey conducted last year. The survey revealed that 60 percent of the respondents have an average income of less than 3,000 pesos (comparing to the National Average of 12,0000 pesos per month), this income is very low. Major sources of income were mainly on agriculture (38 percent), small business (12 percent) and hired labor (12 percent). According to the respondents, their development needs include livelihood development (83 %), river improvement/flood control (53%), drainage (46%), water supply (28%) and road improvement/development (28%). On people's participation on disaster prevention activities, early warning and evacuation (38%) is the most critical followed by information dissemination (14%), livelihood development (11%) and small scale financing (6%). Based on this result that the CDPP was formulated with the following framework;
Livelihood Program is essential to reduce vulnerability against disasters
Income generation through agriculture is the most effective
Improvement of early warning and evacuation system will contribute to encourage self-disaster prevention activities.

Under the Community Disaster Prevention Plan, it was proposed that in lahar covered areas agricultural development will be implemented since agriculture is the main source of livelihood and that most farmlands were covered by lahar. Baquilan and Malomboy are two areas along the Bucao River which were proposed for agriculture development. It was mentioned that the priority of the people in MPC Resettlement Centers are livelihood, water supply, sewerage treatment and public health, while in NGO Resettlement Centers the needs are

elementary school, electric supply, road system, livelihood and water supply.

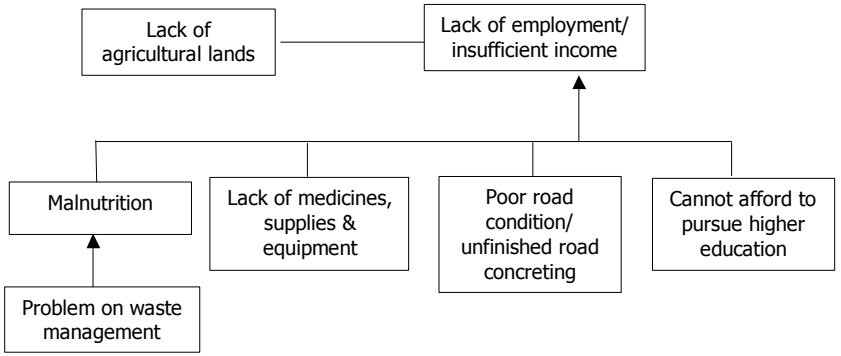
5.0 Small Group Workshop Outputs

The outputs presented below are the enhanced version based on the reassessment / in-depth analysis of the facilitators on the outcome of the workshop as guided by the recorded documentation

5.1 Workshop Group 1– PERMANENT SETTLERS

	Name	Barangay	Designation	Occupation
1	Rafael Dequiña			
2	Maritess Bulatao	Brgy. Malomboy	Captain	
3	Freddie De Vera	Brgy. Malomboy	Kagawad/Chieftain	
4	Tessie Dimaano	Brgy. Malomboy	Kagawad	
5	Delia Sabian	Brgy. Malomboy	Kagawad	
6	Ester Calinog	Brgy. Malomboy	Kagawad	
7	Aileen Bulanhican	Brgy. Villar		Secretary
8	Ofelia Cabanlig	Brgy. Villar		VIPS-MPC Sec
9	Amparo Fabra	Brgy. Maguisguis	Kagawad	
10	Anita Manalaysay	Brgy. Maguisguis	Kagawad	
11	Arlito Daer	Brgy. Taugtog	Captain	
12	Susan Daer	Brgy. Taugtog		Pres-Kababaihan
13	Vicky Echon	Brgy. Taugtog	Residente	Staff - HUDCC
14	Gino Busok	Brgy. Taugtog	Residente	ARPT- DAR
15	Edwina Sibul		MSWDO-Botolan	MSWDO
16	Precilla Docuyanan	Taugtog	Site Manager, RA	HUDCC - PPMO
	Facilitator:	Florita P. Rañeses		

PROBLEM TREE



EFFECTIVE PROJECTS

PROJECTS	AGENCY/OFFICE IMPLEMENTED	YEAR IMPLEMENTED
1. Primary & Secondary High School	Mt. Pinatubo Commission (MPC)	1993 to present
2. Housing Project	MPC	1993 to present
3. Health Center	MPC	1993 to present
4. Day-Care Project	MPC/DSWD/LGU	1992 to present
5. Scholarship Project	World Vision/ Congressional Fund/ LGU Fund PDI/NCIP	2002 to present 2000 to present
6. Supplementary Feeding	MPC/ DSWD	1992 to present
7. Animal Dispersal	DA	1992 to present
8. Livelihood School Canteen	LGU/Nutrition Council	1999 to present
9. Training on Health & Sanitation	PRRM/RHU	1992 to present
10. Electrification (Brgy. Baquilan, Loob Bunga)	MPC	1996 to present
11. Road Concreting All sites/bridge Loob Bunga	MPC	1992 to 1995 1992 to 1995
12. Water System	PMS/CFS	1993 to present
13. Artesian Well	Brgy. Council/JICA	1991 to 1992
14. Emergency Hospital	JICA	1994

D1-4

PROJECTS IMPLEMENTED/ BEING IMPLEMENTED IN THE RESETTLEMENT CENTERS

PROJECTS	AGENCY/OFFICE IMPLEMENTED	YEAR IMPLEMENTED
1. Street Lights	Brgy./LGU	2002 to present
2. Waiting Shed	-do-	1994
3. House Numbering	-do-	1994
4. Drainage Canal	-do-	2002
5. Toilet Bowl Installation	-do-	2002 to present
6. Repair of Day-Care Centers	-do-	1994, 2000, 2003
7. Tree Planting	-do-	1999, 2002
8. Construction of Brgy. Plaza	-do-	1994
9. Multi-Purpose Building	-do-	1993, 1997
10. Construction of Health Centers	-do-	1993
11. Construction of Brgy. Hall	-do-	1999, 2003
12. Construction of Comfort Rooms	-do-	1997

POSSIBLE PROJECTS

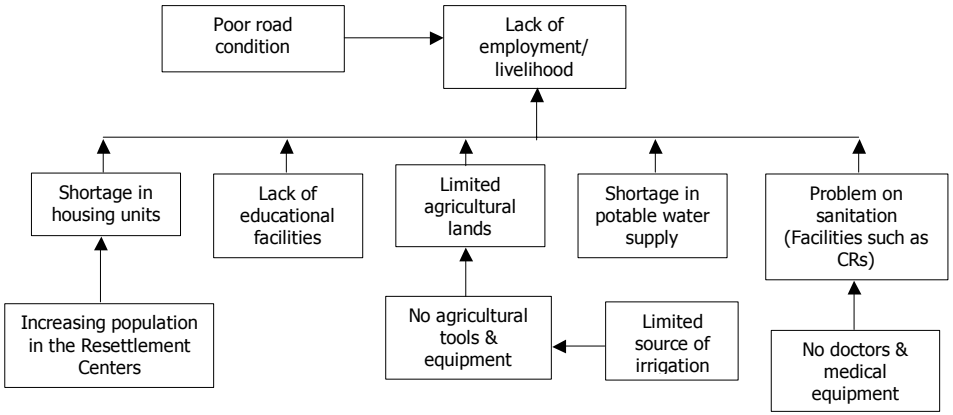
PROPOSED PROJECTS	SOURCE OF FUND	YEAR TO BE IMPLEMENTED
1. Construction of Brgy. Hall Annex	Brgy. IRA	2003
2. Completion and Improvement of Barangay Villar Hall	-do-	2003
3. Additional Street Lights in the Resettlement Area	-do-	2003
4. Repair of water system	-do-	2003
5. Activation of Women Sectoral Group (KALIPI) Trainings	Brgy./LGU	2003
6. Purchase of Mobile Car	Brgy. IRA	2003
7. Repair of Day-Care Centers	-do-	2003
8. Renovation of Comfort Rooms	-do-	2003
9. Continuation/Extension of Brgy. Roads	-do-	2003
10. Electrification of whole Brgy. Villar	-do-	2003
11. Fencing & Repair of Malomboy Brgy. Hall		
12. Pavement of Brgy. Plaza	-do-	2003
13. Construction of Villar Brgy. Arch	-do-	2003

5.2 Workshop Group 2 – SEMI-PERMANENT SETTLERS ("Paulit-ulit")

Presentor: Brgy. Kapt. Alfredo Daria
Members:

Name	Barangay	Designation
Benigno de San Juan	– Brgy. Cabatuan	- Kagawad
Pedro Dumlao	– Brgy. Cabatuan	- Kagawad
Juanillo Francisco	– Brgy. Cabatuan	- Secretary
Naning Badar	– Brgy. Poon Bato	- SKP Chairman
Efren Badar	– Brgy. Poon Bato	- SKP Auditor
Eduardo Badar	– Brgy. Poon Bato	- SKP
Luis Laxamana	– Brgy. Burgos	- Kapitan
Cristina Lugo	– Brgy. Burgos	- Treasurer
Conrado Cariño	– Brgy. Burgos	- Chieftain
Candelaria Raquiño	– DepEd – Botolan	
Myrna Encinares	– NCIP Botolan	
Egmidio Gonzales, Jr.	– NCIP Botolan	
Facilitator:	Elrem A. Peña	

PROBLEM TREE



EFFECTIVE PROJECTS

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Secondary/Primary Education	DECS	1992 to present
2. Day-Care Centers	MSWD, Barangay	1992 to present
3. Scholarship Program	NCIP	1993 to present
4. Health Center	NGOs/LGUs	1992 to present
5. Artesian Well (needs repair)	JICA	1994-1995

COMMUNITY INITIATED PROJECTS

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Alay Tanim (Tree Planting along the roads)	Kababaihan	Yearly
2. Farm Production Project	Farmers from Poon Bato, Villar, Cabatuan, Maguisguis & Palis	proposed

POSSIBLE COMMUNITY INITIATED

- Skills Training
- Bamboo/Rattan Handicrafts
- Livestock Raising
- Agro-forestry
- Farm Production

D1-5

5.2 Workshop Group 3 – SEMI-PERMANENT SETTLERS ("Mc Arthur")

Presentor: Brgy. Kapt. Willy Bulanhigan
Members:

Name	Barangay	Designation
Nicomedes Dioyan	– Brgy. Maguisguis	- Kapitan
Joey Famularcano	– Brgy. Maguisguis	- Kagawad
Paquita Famularcano	– Brgy. Maguisguis	- Kagawad
Felipe Candule	– Brgy. Villar	- Kagawad
Bernesto Balintay	– Brgy. Villar	- Kagawad
Ben Atanacio	– Brgy. Villar	- V-PASS
Jully Tiburcio	– Brgy. Burgos	- Kagawad
Saldy Tiburcio	– Brgy. Burgos	- Kagawad
Gonzalo Mariano	– Brgy. Burgos	- Kagawad
Jocelyn Bonus	– Brgy. Burgos	- Secretary
Lorna Dumangas	– Brgy. Burgos	- Chieftain
Emilio Mostar	– PNP Botolan	

Facilitator: Noel A. Marasigan and Chito Balintay

EFFECTIVE PROJECTS

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Road	MPC,	1998 (3 mos)
2. Church	Private Individual	1993-1994
3. 29 units of deep well	JICA	1995-1996
4. Day-Care Center	JICA	1993-1994
5. Primary & Secondary School	National Government	1992-1993
6. Spring Development	Nissan	1993-1994
7. Toilets	MPC	
8. Deep Well	Gen. Dumlao	1991
9. Balikatan Center	Balikatan Soldiers	1991
10. Satellite Mini Hospital	JICA	2001-2002
11. Electrification	Cong. Diaz	1999-2002
12. Water Control	National Government	2000-2001
13. Spring Development	MerciPhil, Red Cross Rotary of Hawaii Cong. Torres	1992 1993-1994 2002

5.2 Workshop Group 4 – SEMI-PERMANENT SETTLERS

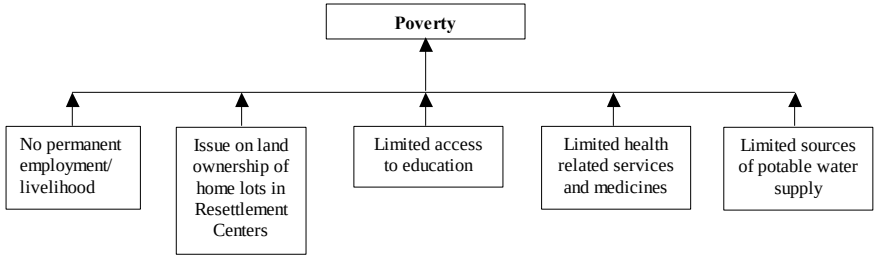
"Pabalik-balik"

Presentors:

Members:

Name	Barangay	Designation
Gregorio Cabalic	– Brgy. Belbel	- Kapitan
Jose Famularcano	– Brgy. Maguisguis	- Kagawad
Rodrigo dela Cruz	– Brgy. Palis	- Kapitan
Lita Famularcano	– Brgy. Palis	- Treasurer
Lito dela Cruz	– Brgy. Palis	- Kagawad
Danilo Gutierrez	– Brgy. Palis	- Kagawad
Arnold dela Cruz	– Brgy. Palis	- Chieftain
Esperidion Ignacio	– Brgy. Moraza	- Kagawad
Ceferino Cabulag	– Brgy. Moraza	- Kagawad
Lino dela Cruz	– Brgy. Moraza	- Kagawad

PROBLEM TREE



EFFECTIVE PROJECTS

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Micro-Lending (Grameen) (Brgy. Belbel & Maguisguis)	Coop Bank of Zambales	2002 to present
2. Brgy. Hall & Plaza (Brgy. Palis)	Brgy. Council (IRA)	2002 to present
3. Brgy. Moraza Day-Care Center	MPC	1992 to present

COMMUNITY INITIATED

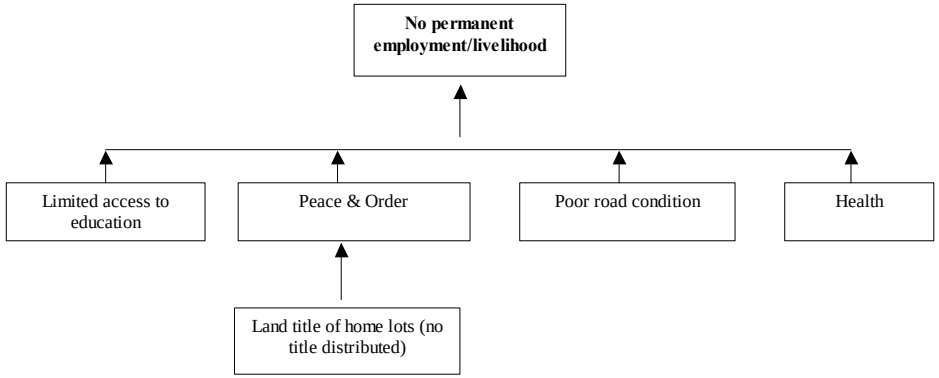
PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Road – Rosaban to Villar (Brgy. Belbel)	LGU, Brgy. Council (Brgy. Dev`t Fund)	2003
2. Asphalt Overlay, Drainage Improvement & Street Light (Brgy. Palis)	LGU	2003
3. Concreting of canals and sides of creek (Brgy. Maguisguis)	LGU	2003
4. Renovation of Brgy. Hall & School Building for Aetas (Brgy. Moraza)	Brgy. Dev`t Fund SICAT & LGU	2003

5.5 Workshop Group 5 - SEMI-PERMANENT SETTLERS

Name	Barangay	Designation
Rodante Cruzado	– Brgy. Nacolcol	- Kapitan
Marina Cruzado	– Brgy. Nacolcol	- Kagawad
Dianesto Bulatao	– Brgy. Nacolcol	- Kagawad
Rufino Manalaysay	– Brgy. Nacolcol	- Kagawad
Agnes Cruzado	– Brgy. Nacolcol	- Kagawad
Diego dela Cruz	– Brgy. Nacolcol	- Kagawad
Warlito Basa, Jr.	– Brgy. Nacolcol	- Kagawad
Alberto de San Juan	– Brgy. Nacolcol	- Tanod
Nick Cebrian	– Brgy. Oweaog	- Secretay
Eurika Manalo	– Brgy. Poon Bato	- SKP Adviser
Dolores Canduli	– Brgy. Maguisguis	- MB

Facilitator: Rezelyn Sabian

PROBLEM TREE



EFFECTIVE PROJECTS

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1.Bridge (Kahoy) Concrete	MPC Gov. Magsaysay	1992 to 1997 1998
2. Alley Road Feeder Road	LGU, DPWH	1994 to present
3. School Buildings Elementary Secondary (Private) (Public)	Mt. Pinatubo Task Force Fidel V. Ramos	 1991 1991-1994 1994 to present
4. Electricity	MPC/LGU/Tibal leaders	1998
5. Water System	CFS (Child & Family Service) & Gov`t Nissan KADRE (additional)	1992-1994 1994- to present 2002 to present
6. Partial Housing Materials	MPC, NHA	1992
7. Reforestation	Samahan ng Katutubo TLRC	2002 to present 1991-1992
8. Nutrition Program	COLF MSWD	2002 to present every 2 months
9. Livestock Dispersal/Fattening	MAO	
11. Trainings on First Aid and Livelihood (Bigasang Bayan)	BHW/MHO	
12. Botika		

COMMUNITY INITIATED

PROJECTS	SOURCE OF FUND	YEAR IMPLEMENTED
1. Reforestation Project		
2. Toilet Bowl	Kababaihan/PRRM	
3. Domestic Water Works		
4. Micro Finance	KASAMA-GRAMEEN	
5. Cooperative Loan	KASAMA KO	
6. Scholarship		

PROPOSED PROJECT

- Upland and Lowland Agricultural Production

6.0 Key Issues (Open Forum)

6.1 Morning Open Forum

D1-7

Councilor Laxa: You talked about strengthening and upgrading the dike to protect agricultural lands in Botolan. Reconstruction of bridges was not tackled. We wanted to preserve landmarks specifically the Bucao Bridge. So, If you have additional budget it is better to construct a new bridge.

Mr. Nishino (KN): We will take your suggestion. I will study about it.

6.2 Afternoon Open Forum *(Q: Question; R: Response)*

Q: What is meant by Sabo?
R: It is a Japanese term meaning to control the sediment/sand from the mountains.

Mr. Ohno: "Sa" means sand while "Bo" means to protect against disaster caused by sand.

Q: Is the project a loan or a grant of the Philippine Government?

R: There is no fund for implementation. We are still doing the study. There is no source of fund yet. The Philippine Government requested support from the Government of Japan to conduct the study. The result of the study will be presented to possible donors.

Q: Can the water from Bucao River be used for irrigation?
R: We conducted a water quality study and the result revealed that the waters of Bucao River is not very suitable for irrigation. The upstream of Baquilan River can be used for irrigation since it is not affected by lahar. There is an on-going environmental impact study that include studies in air, water and soil as well as geologic studies. The result of this is open to all LGUs.

Q: How long will it take to start the construction of Sabo Dam? Will it generate employment in the resettlement centers?

R: We could recommend as a policy the hiring of local people. The Sabo Dam is very expensive and that it is a long term plan. The immediate proposal is the strengthening of the dike and bridges. The Sabo Dam will come later when the lahar goes down. The long-range plan is also to construct the trench.

Q: The study was approved by the Japanese Government, but how long will we wait for the construction?

R: This is just a study. We will finish the study first and submit it for funding considerations. The Phil. Government will submit it. If funding comes then construction will commence.

Q: What are the immediate plans especially this coming rainy season?
R: The proposed short term projects in this study is the construction of bridges and strengthening of dikes.

Moderator: Questions that can be answered in this open forum are those plans of the project and the stages that it will undergo. The study will be finished by middle of next year then it will be further evaluated for funding. On the other hand, the threat of flooding this coming rainy season is recognized. However, it is beyond the scope of the study, hence, the study cannot recommend immediate measures. The LGU representatives or DPWH in particular is in a better position to respond but the issue will be definitely noted as additional input in the study.

Councilor Laxa: I would like to thank our friends from Japan. All we have to do is to wait for the result of the study and ask JICA to approve the proposal, although it will take quite a long time, nevertheless we will need all your help.

Q: What is the relationship of the workshop to the study on Sabo Dam?
Moderator: Based on the objectives of the study, this is not the first consultation that was conducted. There were consultations as early as last year. The team already conducted household survey and consultations with government officials and meetings of experts to get the real conditions especially on livelihood in the Resettlement Areas. Priority projects were proposed based on those studies. In this consultation, the study team would like to validate the information particularly on conditions related to the proposed projects. Furthermore, the study team also focused on non-structural components of the project particularly the Community Development Projects.

R: As early as 1990 the social dimension of every project particularly infrastructure is a requirement set by the donor agencies and the government. Social dimension include the effect of the project on women, children and IPs. There are also Acts and Laws that strengthen this process such as IPRA and the Local Government Code. So, whether we are affected by the project positively or negatively, consultation is always part of the process. If ever the project will reach the second stage, then another consultation will be conducted. The suggestion on hiring local people during the construction is a good suggestion and will be taken into consideration. So, rather than saying that the project is "Yours" the community can now say it is "Ours".

Q: It was observed during the last flash flood in the eastern part of the barangay that lahar is flowing rapidly. I almost lost my husband during that disaster. After the flood we saw what happened. The water is very deep. Now if heavy rains will come, it would be dangerous for us especially near Bucao.

R: That is what I explained before. That is what we call it remobilization of sediments. The break-up of Maraunot Notch causes the flow of sediments rapidly into the downstream. That is why we are proposing to raise the dike, to put up trench and sand pockets. But this is very expensive and these are medium to long-term proposals. The short-term proposal is strengthening and increasing the height of the existing dike. Unfortunately, the project will take sometime to implement and we do not have funds now. Probably you

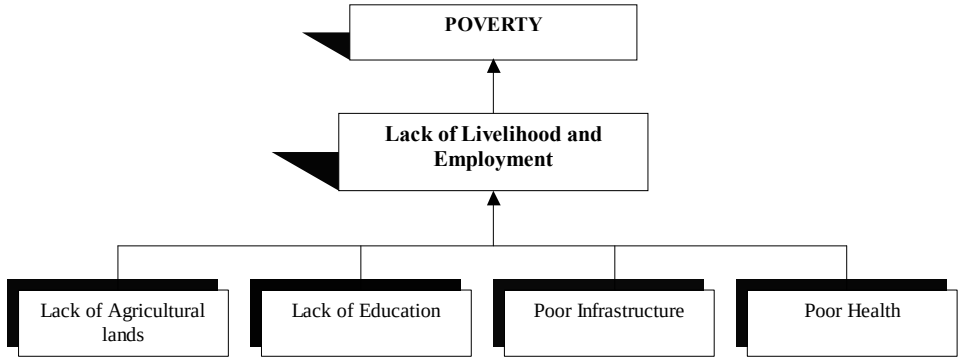
can use the calamity fund of the province or the District Office of the DPWH in the meantime. The barangay can request for the urgent repair of the dike.

Q: Are there areas where Sabo Dam is constructed?
R: In Pampanga, there are similar proposals. They have already constructed sand pockets in the midstream of Sacobia River. Mega dike on the other hand, is constructed in the Pasig-Potrero River.

Since there are no other questions related to community development, all the information provided in this consultation will be studied.

7.0 Synthesis

Both the permanently settled and semi-permanently settled participants considered the issue of poverty and livelihood/employment as major problems in the community. Similarly, insufficiency in most basic services was found to be the major causes of household poverty.



Major Problems	
Permanently Settled	**Semi-permanently Settled**
▪ Lack of agriculture lands ▪ Lack of Employment/insufficient income	▪ Poverty ▪ Lack of Sources of Livelihood/ Employment ▪ Lack of Permanent Source of Income

Major Causes	
▪ Malnutrition ▪ Lack of Education (especially Aetas) ▪ Poor Infrastructure (road) ▪ Poor Health and Lack of Medicine	▪ Unstable employment ▪ Lack of land for agriculture ▪ Untitled (House lots) ▪ Lack of Education (especially Aetas) ▪ Poor Infrastructure (road) ▪ Lack of Housing ▪ Lack of Water Supply ▪ Poor Health and Lack of Medicine

The following tables, presents the summary listing of identified community projects considered to be effective and successful by the participants, community-initiated projects and possible projects which the community can implement by themselves given outside support. Note that most of the projects reflect the need for basic services which were identified as major causes of poverty. Considering the present condition, there is a need for deeper analysis in terms of real impacts of community interventions. Successful projects may be re-assessed for replication while community-initiated and proposed community projects can be considered more sustainable interventions.

Effective Community Projects
1. Micro-Lending (Grameen Bank) 2. Schools (Day Care Centers, Elementary and HS, School for Aetas) 3. Scholarship Programs 4. Health Centers/Nutrition Programs/First Aid Training/Botika/Toilet Construction 5. Artesian Wells 6. Infrastructure Projects (Electrification, Street Lights, Canal Concreting, Bridge, Road, waiting Shed) 7. Water System/Spring Development 8. Housing Projects 9. Reforestation 10. Livelihood Projects (Animal Dispersal) 11. Church Building 12. Other Infrastructure (Plaza, Brgy. Hall)

Community-Initiated Projects
1. Tree Planting 2. Reforestation 3. Farm Production, Vegetable Seed Collection 4. Health and Sanitation (Toilets) 5. Clean and Green Project 6. Micro-lending Projects (Grameen Bank)

Possible Community Projects
1. Community Organizing and Planning 2. "Bayanihan" System (Manpower-sharing) 3. Livelihood (Bamboo/Rattan Handicrafts, Livestock Raising) 4. Agriculture (Agro-forestry, Farm production improvement 5. Housing (labor-sharing) 6. Land Area Development of one's own land

7. Facilitate Micro-finance Loan Assistance 8. Animal Dispersal 9. Toilet Construction 10. Upland and Lowland Agriculture Production

8.0 Attachments

1 - Project Brief
2 - Program of Activities
3 - PCM Questionnaire
4 - Cause and Effect Analysis and Problem Tree Approach
5 - Attendance Sheet
6 – Photo Documentation

Study on Sabo and Flood Control for The Western River Basins of Mt. Pinatubo

Project Background

The project area is located in the western river basins (with a catchment area of 1,300 km^2) of Mt. Pinatubo in the middle-western part of Luzon. Luzon Island is situated in the active volcanic and earthquake zone between the Philippine Trench to the east, and the Philippine Castration to the west. In June 1991, Mount Pinatubo erupted and about 6.7 billion m^3 of pyroclastic material deposited around the mountain slopes of Mount Pinatubo. Among these deposited materials, it is presumed that about 4.7 billion m^3 deposited in the project area. The report issued by the Philippine Institute of Volcanology and Seismology (PHIVOLCS) presumes that the amount of pyroclastic material deposited in the respective basins of Bucao, Sto. Tomas and Maloma Rivers are about 2.8 billion m^3, 0.6 billion m^3 and less than 0.1 billion m^3, respectively. The deposited materials have flowed downstream as mudflow due to rainwater during the rainy season. Eleven years have passed since the eruption of Mount Pinatubo and the volcanic activity has been quieted. However, the lahar materials deposited on the mountain slope still flow with the occurrence of concentrated rainwater, resulting in secondary disasters including disaster due to mud flow, river bed rising and flood damage due to clogging of river channel.

The pyroclastic materials in the western slope of Mount Pinatubo flowed down and deposited mainly in the Bucao and Sto. Tomas river basin. Since these materials have high temperature, secondary eruption (small steam eruption) took place many times. Due to efflux of this secondary eruption, the river channel was closed and residential area and agricultural land were seriously damaged due to flood caused by river bed rising.

The Government of the Philippines (GOP) made a maximum effort to implement a rescue activity immediately after eruption of Mount Pinatubo, and organized the "Mount Pinatubo Commission (MPC)" to rescue about 600,000 affected inhabitants. Since then, this Commission has promoted job seeking for the affected people and also constructed residential facilities numbering about 34,000 houses. Meanwhile, the Department of Public Works and Highways (DPWH) has implemented mud disaster prevention facilities mainly by levee construction.

The Government of Japan (GOJ) has provided assistance for the establishment of a mudflow forecasting and warning system, supply of construction equipment and construction of sabo dams. However, since it was anticipated that a huge volume of the deposited materials has flowed down and induced secondary disasters, the GOP requested the donor countries for assistance to investigate and study the flood, and mud flow control plan. In response to the request of the GOP, the United States of America (USA) prepared a long-term flood and mudflow control plan for eight major rivers around Mount Pinatubo and the final report was issued in March 1994. However, due to the reason that a large-scale mudflow occurs, resulting in the topographical variation, and also priority of rehabilitation activity in the western part is relatively low compared with the eastern part, this long-term flood and mudflow control plan has not been realized in the western river basins of Mount Pinatubo.

Objectives of the Project

Since a huge amount of the deposited materials remain in the western river basins even at present, it is presumed that a large-scale efflux of mudflow will continue in the future. To cope with these situations, the following three items are contemplated as major issues for flood and mudflow control works in the western river basins:

- Formulation of a flood and mudflow control plan in consideration of the financial situation of the executing agency,
- Introduction of a public involvement approach, combined with a regional development plan in formulating the flood and mudflow control plan, and
- Reinforcement of observation and forecasting system and community based evacuation system.

Project Locations

The sabo and flood control projects will be located at the following western river basins of Mt. Pinatubo:

- Bucao River,
- Maloma River, and
- Sto. Tomas River.

Table 1 Framework Plan for Bucao River

No.	ID No.	Name	Descriptions
1	BBR-1	Bucao Bridge (Existing)	Existing Bucao Bridge along National Highway is in critical condition. The bridge was constructed in 1939. After 1991, it was destroyed twice. The lahar flow occurred in 2001 which overflowed and passed over the bridge. Elevating and strengthening of both abutment of the bridge are urgently required. These two aspects are the top priority of regional disaster prevention.
2	BBR-2	Baquilan Bridge (Existing/ Submerged)	Baquilan Bridge was submerged by lahar due to deposition up to knee deep. So far it is still passable but the lahar level might increase through further deposition. Elevating the bridge is recommended for improvement of community transportation to the mountain areas.

No.	ID No.	Name	Descriptions
3	BBR-3 BBR-4	Balintawak Bridge Poonbato Bridge	Two bridges are also proposed for construction to improve the transportation in the mountain areas, particularly to Balin Baquero river basin. Poon bato Bridge was washed out in 1991 due to lahar, and the whole village was buried.
4	BCR-1	Community Road	Community road between Baquilan and the upstream area is proposed together with the community bridges. This route existed before eruption but washed out by lahar of 1991.
5	BCq-1	Channel Work	Channel work is considered at the confluence of Bucao and Balintawak Rivers. The Balintawak river-flow was blocked at confluence due to deposition of lahar produced by the Bucao River.
6	BCO-1-3	Consolidation dam	The objective of the consolidation dam is to protect further riverbed erosion on the upstream. The crest elevation of the dam will be set almost at the same level as the existing riverbed aimed to minimize the downstream sediment transport and to maintain the downstream river channel.
7	BCD-1	Check Dam No. l	Check dam No.l is proposed at Malomboy just downstream of BucaoBalin Baquero Confluence. The height of the check dam will be 5-10 m from the existing riverbed, which will provide sand pocket on the upstream to store / regulate lahar/sediment transported from upstream.
8	BCD-2-10	Check dams	Check dams are needed in almost all the tributary of Bucao River, from which remarkable lahar/sediment yield is expected. The height of crest is 5 to 10 m higher than the existing riverbed. No resettlement will be required due to construction of these check dams.
9	BSP-1	Spur Dike at Bucao River	A Spur Dike along the left bank of the Bucao River downstream from Baquilan will be quite effective to change the flood direction and to protect the existing dike. The spur dike shall be added on upstream/downstream to protect the left dike.

No.	ID No.	Name	Descriptions
10	BSP-2	Spur Dike at Balin Baquero River	Spur dikes along the left bank of Balin Baquero River are also considered to protect the left bank of the river, which is so far being used as a transportation route to the upstream villages.
11	BSU-1	Super Dike at Botolan Town	A Super dike is a wide dike. The top width is 50m to 100m which is sufficient protection from breaking even if the flood/lahar overflowed the dike. Existing dike width is about 10 m on top, will be strengthened through construction of Super Dike at the left side in Botolan. The particular section is always directly hit by the flood flow and may posed a threat for dike breakage. Land acquisition/ Resettlement will be required about 200m from the edge of the existing dike along the proposed Super Dike Section.
12	BSC	Series of Small Check dams	Series of small check dams are planned on the upstream gullies on the mountain area, which is the source of sediment/lahar area. They will mitigate/ protect erosion of gullies and minimized sediment yield. The work will be mainly by manpower using boulders, gabion net and piles and so on.
13	BCM	Community Disaster Prevention Projects	Community disaster prevention/rehabilitation is considered at all the villages located in the Mountain area. All the people there have been resettled to the downstream areas, but many of them have already returned to their original villages. Various kinds of small scale community rehabilitation and disaster prevention measures will be considered.
14	BIR	Rehabilitation of Irrigation System	Rehabilitation of irrigation system on the right side of Bucao River is considered, which has 900ha of irrigation area. So far 200ha was relabilitated but the rest 700 ha is not yet done.
15	BTO	Tourism Development	Tourism development is also considered as one of the regional development measures, a series of waterfalls along the Baquilan River, Crater Lake of Mt.Pinatubo and Hot Spring at Maraunot River can be part of the tourism development together with the existing tourism facilities along the beach.

Table 2 Framework Plan for Sto. Tomas River

No.	ID No.	Name	Descriptions
I	SBR-1	Maculcol Bridge (Existing)	The existing Maculcol Bridge along the National Highway is in critical condition. The clearance between the Bridge bottom and river bed is more or less 1 m, and every flooding hit the bridge girder directly. Elevating the bridge and river improvement works are required.
2	SBR-2	Umaya Bridge (New)	This bridge is considered to provide alternative route of the National Highway (NH7). In case of the Maculcol bridge which was destroyed due to Lahar flow, an alternative route between IBA and Olongapo will be needed.
3	SCO-1-4	Consolidation dam	The purpose of the consolidation dam is to protect further riverbed erosion on the upstream areas. The crest elevation of the dam will be set almost at the same level as the existing riverbed which is aimed to minimize the downstream transport of sediment and to maintain the downstream river channel.
4	SCH-1-5	Channel Work	The channel work consists of excavating the river channel with more or less 3 m to fix the river course. The flood changes its course on each incidence of flooding. Slope protection measures may be needed on both sides. Consolidation dam should be placed at the upstream end of the channel work as a mitigating measure for sediment transport.
5	SCD-1-4	Check dam	Check dams are proposed to provide sand pocket on the upstream river area, on which sediment/lahar produced on the upstream area will be stored and to reduce/regulate downstream sediment transport. Four sites of check dams are considered along the Marella River. Most probably Check Dam No. 1 will be constructed since it has the largest capacity of sand pocket. The crest elevation of the Check Dam may be 5 to 10 m higher than the existing river bed elevation.

No.	ID No.	Name	Descriptions
6	SSU-I	Super Dike	A Super dike is a wide dike. The top width is 50m to 100m enough to protect the dike from breakage even though there is overflowing flood/lahar. The existing dike width is about 10m on top, which will be strengthened through construction of the Super Dike at the upstream left side in San Marcellino. The river bed elevation in this section is about 7 to 8 m higher than the area protected by the dike. Land acquisition/ Resettlement will be required about 200m from the edge of the existing dike along the proposed Super Dike Section.
7	SDI-1-3	Dike Improvement	The existing dike needs to be improved by elevating and provision of slope protection works. The remaining clearance between the top of dike and the riverbed is 2 m to 5 m in these sections. An increase in height as well as protection measures will be needed to protect flood from overflowing.
8	STR-1	Training Dike	Training dike is considered to protect lahar flow from entering the Mapanuepe Lake. If SCD-1 is constructed, the elevation of the Sand Pocket will become higher than the existing riverbed, and lahar may flow towards the lake, which may cause clogging of the outlet of the Lake.
9	SSP-1	Spur Dike	Spur Dike will protect the existing dike from erosion due to flooding. Spur dike will change the flood course from the dike side to the center of the river. It is considered together with the Super Dike as the protection measure.
10	SSC	Series of Small Check dams	A series of small check dams are planned on the upstream gullies of the mountain area, which is the source of sediment/lahar. These will mitigate/protect erosion of gullies and minimize sediment yield. The work will be mainly done by laborers using boulders, abion net and piles and so on.
11	SIR	Rehabilitation of Irrigation System	Rehabilitation of irrigation system on the left side of Santo Tomas River is considered, which has 1,900ha of irrigation area. A Feasibility Study was conducted by NIA in 1996, which showed a high viability of the Project may be realized with more than 20% of EIRR.
12	STO	Tourism Development	Tourism development is also considered as the regional development measure such as beaches along Santo Tomas River, Mapanuepe Lake and Hot springs on the mountain area.

THE STUDY ON SABO AND FLOOD CONTROL FOR WESTERN RIVER BASINS OF MT. PINATUBO
CONSULTATION WORKSHOP ON SOCIAL DEVELOPMENT PROJECTS
Bucao Resettlement Centers, Botolan, Zambales
25 January 2003

PROGRAM

TIME	ACTIVITY/TOPICS	PRESENTOR/FACILITATOR
8:30 – 9:00	Registration	Technical Assistants
9:01 – 9:15	Prayer and National Anthem	Participants
9:16 – 9:30	Welcome Remarks	Mayor Rogelio B. Yap
9:31 – 9:45	General Introduction of Participants	Ms. Lyn Galang, Workshop Facilitator
9:46 – 10:15 10:16 – 10:30	Inputs: • JICA Study Team: Overview of Project Background and Objectives • Workshop Objectives and Design	Mr. Ken Nishino, Co-Team Leader, JICA Study Team Ms. Lyn Galang
10:31 – 11:30	Participant Survey (Snacks)	Facilitators
11:31 – 11:45	Introduction to the Small Group Workshop and grouping	Ms. Lyn Galang
11:46 – 12:45	*L U N C H B R E A K*	
12:46 – 2:30	Small-Group Workshops (5)	Facilitators
2:31 – 3:15	Presentation of Small Group Workshop Outputs (Snacks)	Participants
3:16 – 3:45	Input: Overview of the Social Development Component and Presentation of Proposed Community Development Activities	Mr. Jake Cruz, Social Development Specialist
3:46 – 4:30	Open Forum	Ms. Lyn Galang
4:31 – 4:45	Synthesis	Ms. Lyn Galang
4:46 – 5:00	Closing Remarks	Mr. Ken Nishino

THE STUDY ON SABO AND FLOOD CONTROL ON THE WESTERN RIVER BASINS OF MT. PINATUBO

Questionnaire on PCM Workshop
No. 1 – For Resettlement Center in Botolan Municipality
25 January 2003

Kindly provide the required information below. The collated data from all the participants will be useful for processing the Workshop outcome.

Name: _____
Age: _____ Gender: _____
Present Address: _____
Original Barangay: _____
Ethnic Origin: _____
Educational Attainment: _____
Sector(s) Represented _____

1.0 Resettlement Status (*Please check*):

1.1 ( ) All family members are permanently resettled in the Center
1.2 ( ) Some of the family members returned to the original Barangay
1.3 ( ) All family members returned permanently to the original Barangay

For Questions 1.2 & 1.3, please write below the reasons for returning to the Original Barangay.

_____

2.0 Family Structure and Economic Status

2.1 Family Members

Name	Age	Relation to Respondent	Occupation	Estimated Annual Income (P)

Other sources of family income not stated above:

Other sources of family income	Estimated Annual Family Income (P)
1.	
2.	
3.	

D1-14

2.2 Three Major Expenses of the Family

Item	Expenses per month (or otherwise specify period e.g. yearly or every 2 months)
1.	
2.	
3.	

3.0 Comparison of Living Conditions Before and After Resettlement

Item	**Original Barangay**		**Resettlement Center**	
1. House size (sq. m)				
2. House lot size (sq. m.)				
3. Number of rooms				
4. Primary source of income				
5. Estimated yearly income (P)				
6. Area of Farmland (Has)				
7. School (Level: primary, intermediate, high school))				
(Please check)	AVAILABLE	NONE	AVAILABLE	NONE
8. Electricity				
9. Irrigation				
10. Church				
11. Health Clinic/Centers				
12. Market				

Problem Prioritization and the Construction of the Problem Tree

Rationale

There are several problems mentioned and some of these problems are inter-related. One relationship is that of cause and effect. So in prioritization of the problems, perhaps the main problem could be identified as well as the main cause. Normally, there is a debate in the group as to which is the main problem. The decision as to the main problem could be made easier by doing the cause-effect analysis that is, by pairing two problems and asking/scoring whether this problem is the cause of the other problem. Once the hierarchy of problems is established, a problem tree could be easily constructed.

The cause-effect relationship is diagrammed in the problem tree. The problem tree, at one glance, enables people to identify and prioritize problems together. This shows why a problem tree is a very useful analytical tool. For better usefulness, the problems mentioned in the problem tree must also be described quantitative.

Steps to be done:

a. List the problems mentioned horizontally on one page, likewise list the problem vertically and make a matrix.

Example:

	Low Education	Unemployment	Big Family
Low Education			
Unemployment			
Big Family			

b. Focus attention on the horizontal list and pair it with the problem in the vertical list. Ask the question – is low education the cause of low education? This could be left blank. But is low education the cause of unemployment, the answer is yes. For yes, put an x mark on the box corresponding to the intersection of this tree problem. If the answer is no, do not put any mark.

	Low Education	Unemployment	Big Family	
Low Education		x	x	2
Unemployment	x		x	2
Big Family	x			
	2	1	2	

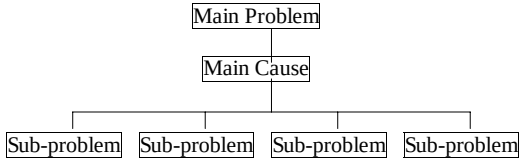
c. Count the number of x on the horizontal row for a particular problem. Then count the correspond to the magnitude of it being an effect of so many causes. This signifies the main problem.

d. Count the number of x in the vertical column and this could signify the causes.

e. The highest score on the horizontal side is the main problem, the highest score on the vertical side signify the main cause/causes. In case of tied scores, redo the cause-effect analysis again for those problems that have very similar scores.

f. Make a problem tree from these results using this configuration.

THE PROBLEM TREE



Sometimes there could be several causes.

g. Use the meta-cards for problems in constructing the problem tree.

h. After the problem tree has been constructed, examine it thoroughly to check whether it agrees with the intuitive feel of the interrelationships of the problems in the given area. Reconfigure the Problem Tree accordingly if necessary.

i. Recall from the Alternative Analysis the different causes for the problems and link these causes to the problems cited.

j. Write a narrative description of the Problem Tree.

Sample Output

A. Cause-Effect Analysis

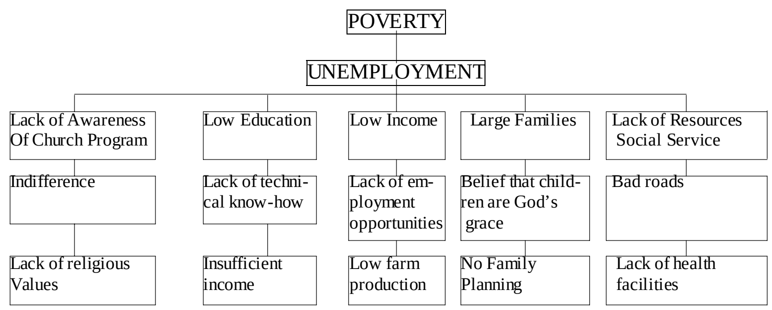
The result of the cause-effect analysis is shown below:

CAUSE-EFFECT ANALYSIS

Is this the Cause of	Low Education	Unemploy-ment	Big Family	Low Income	Poverty	Health Problem Malnutrition	Gamble/ Addiction	Lack of Resources	Lack of Skills	Low Awareness of Church Program	EFFECTS
Low Education		X	X	X	X	X					5
Unemployment	X		X	X	X			X	X		6
Big Family	X	X		X	X	X		X		X	7
Low Income	X	X			X		X	X	X		6
Poverty	X	X	X	X		X	X	X	X		8
Health Problem Malnutrition		X	X	X		X		X			5
Gamble/ Addiction	X	X								X	3
Lack of Resources			X		X						2
Lack of Skills	X	X	X	X	X						5
Low Awareness of Church Program											
Causes 6		7	6	6	7	3	2	5	3	2	

B. The Problem Tree

THE PROBLEM TREE



Narrative Description

The cause-effect analysis shows the problem that is the effect of so many causes could thus be interpreted as the main problem. In the example, it is poverty. It is caused by several causes (which have very similar scores) such as low education, big family, lack of moral foundation (if gambling / addiction and lack of church program awareness is concerned), and lack of facilities / resources such as roads and health facilities. The other problems are treated as related to other problems such as low income and unemployment.

Although poverty is analyzed here as mainly caused by unemployment, there are so many sub-causes that also contribute towards poverty. Lack of awareness of the church teachings breeds indifference and lack of religious values which predisposes better off parishioners to be unmindful of their Christian duties or predisposes citizens to vices such as gambling and drug addiction which drains resources from the family to wasteful expenditures. Lack of religious values also corrupt the social institutions such as the government that denies the rights of the people to basic social services such as roads and health facilities.

Low education is caused by insufficient incomes to send children to school and also to deprive of access to educational opportunities that could have enabled the parishioners to earn better employment or learn farming technologies that could boast their agricultural production.

Expenditures are also drained in the large families supported by the parishioners. In many cases, the conservative teachings of the church regarding family planning are being blamed and the fatalistic attitude that rationalizes their lack of control of having too many children are part of the common values of the people.

Study on Sabo and Flood Control Project for Western River Basins of Mt. Pinatubo in the Republic of the Philippines

Social Development Study

Consultation Workshop

South Central Elementary School, Botolan, Zambales

2003/1/25.

ATTENDANCE SHEET

No.	Name	Barangay	Designation	Occupation
1	Luis Laxamana	Baquilan	Brgy. Captain	Farmer
2	Delia Sabian	Baquilan	Kagawad	Buy and Sell
3	Conrado Cariño	Baquilan	Chieftain	Farmer
4	Lucia Soleran	Baquilan	Kagawad	Farmer
5	Ester Calinog	Baquilan	Kagawad	Farmer
6	Tessie Dimaano	Baquilan	Kagawad	Farmer
7	Freddie de Vera	Baquilan	Chieftain	Farmer
8	Lorna Dumangs	Baquilan	Secretary	Farmer
9	Jocelyn Bonus	Baquilan	Kagawad	Farmer
10	Salvador Tiburcio	Baquilan	Kagawad	Farmer
11	Gonzalo Marino	Baquilan	Kagawad	Farmer
12	Marites Bulatao	Baquilan	Brgy. Captain	Farmer
13	Lyn dela Peña	Baquilan	Kagawad	Farmer
14	Cristina Lugo	Baquilan	Treasurer	Farmer
15	James Ravelo	Baquilan	Kagawad	Farmer
16	Joey Famularcano	Loob-Bunga	Kagawad	Farmer
17	Nick Dioyan	Loob-Bunga	Brgy.Captain	Farmer
18	Anita Manalaysay	Loob-Bunga	Kagawad	Farmer
19	Jose Famularcano	Loob-Bunga	Kagawad	Farmer
20	Amparo Fabra	Loob-Bunga	Kagawad	Farmer
21	Dolores Candule	Loob-Bunga	Resident	Housekeeper
22	Lolita Famularcano	Loob-Bunga	Kagawad	Farmer
23	Danilo Gatung	Loob-Bunga	Kagawad	Farmer
24	Arnold dela Cruz	Loob-Bunga	Chieftain	Farmer
25	Rodrigo dela Cruz	Loob-Bunga	Brgy. Captain	Farmer
26	Alfredo Daria	Loob-Bunga	Brgy. Captain	Farmer
27	Ceferino Abulag	Loob-Bunga	Kagawad	Farmer
28	Espiridion Ignacio	Loob-Bunga	Kagawad	Farmer
29	Lino dela Cruz	Loob-Bunga	Kagawad	Farmer
30	Marina Cruzado	Loob-Bunga	Kagawad	Farmer
31	Rodante Cruz	Loob-Bunga	Brgy.Captain	Farmer
32	Agnes Cruzado	Loob-Bunga	Kagawad	Farmer
33	Dianesto Bulatao	Loob-Bunga	Kagawad	Farmer
34	Alberto Juan	Loob-Bunga	Brgy. Police	Farmer
35	Eurika Manalo	Loob-Bunga	SKP Adviser	Farmer
36	Edwardo Badar	Loob-Bunga	SKP	Farmer
37	Efren Badar	Loob-Bunga	SKP Auditor	Farmer
No.	**Name**	**Barangay**	**Designation**	**Occupation**
38	Juanillo Francisco	Loob-Bunga	SKP Chairman	Farmer
39	Benigno de San Juan	Loob-Bunga	Secretary	Farmer
40	Pedro Dumlao	Loob-Bunga	Kagawad	Farmer
41	Gregorio Cabalic	Loob-Bunga	Brgy. Captain	Farmer
42	Ben Atanacio	Loob-Bunga	PASS	Farmer
43	Willy Bulanhigan	Loob-Bunga	Brgy. Captain	Farmer
44	Bernesto Balintay	Loob-Bunga	Kagawad	Farmer
45	Felipe Candule	Loob-Bunga	Kagawad	Farmer
46	Arleen Bulanhigan	Loob-Bunga	Secretary	Farmer
47	Nick Cebrian	Loob-Bunga	Secretary	Farmer
48	Lito dela Cruz	Loob-Bunga		Farmer
49	Rufino Manalaysay	Loob-Bunga	Kagawad	Farmer
50	Warlito Basa	Loob-Bunga	Kagawad	Farmer
51	Diego dela Cruz	Loob-Bunga	Kagawad	Farmer
52	Arlito Daes	Taugtog	Brgy. Captain	Farmer
53	Rafael Dequiña	Taugtog	Kagawad	Farmer
54	Susan Daes	Taugtog	Kababaihan (President)	Housekeeper
55	Ofelia Cabanlig		MPC	Secretary
56	Precilia Docuyanan		HUDCC	Site Manager
57	Edwina Sibug		MSWDO Botolan	
58	Celsa Velasco		Municipal Council	Councelor
59	Jesus Averilla		DPWH	Environmentalist
60	Lilia Dagsaan		NCIP	Nurse
61	Corazon Juguilas		PPDO Iba	
62	Erlin Rico		Municipal Administrator	
63	E. Moslar		PNP Botolan	Deputy COP
64	Jun Gonzales		NCIP Botolan	
65	Myrna Encinares		NCIP Botolan	
66	Maro Encarnacion		ARPT	
67	Charlito Samonte		DENR	
68	Rodolfo delos Reyes		MPDC	
69	Yuka Karatani		DRI	Researcher
70	Hirozumi Takesue		Kyoto University	Student
71	Masayuki Watanabe		JICA	Senior Advisor
72	Yoshiaki Kawata		Kyoto University	Professor
73	Fernando Igrobay		MHO	
74	Haruo Hayashi		Kyoto University	Professor
75	Fey Gallarin		DSWD	
76	Candelaria Requino		Dep. Ed.	
77	Kazuhiro Kumasaka		JICA Study Team	
78	Candida Cabinta		NCIP Iba	
79	Vicky Echen		HUDCC PPMCO	