

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

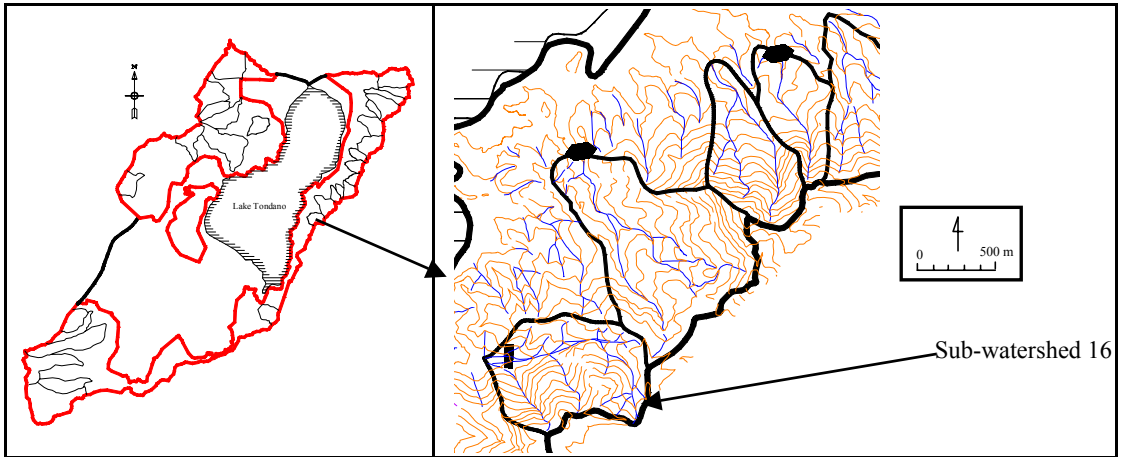
Sub-watershed - 16

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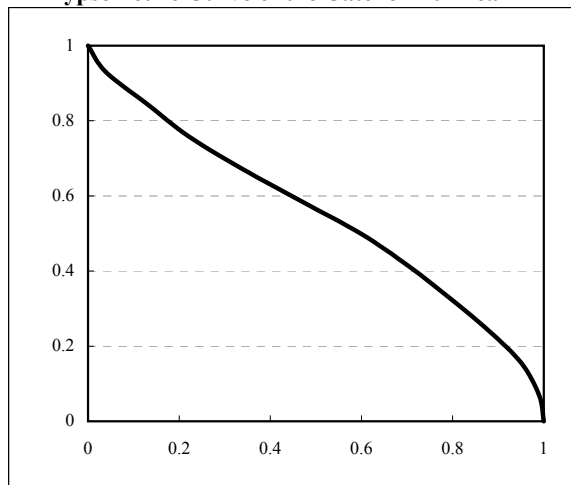
### 1) Catchment Area

Area	61	ha	Highest Point	995	m
Average Slope	46	%	Lowest Point	705	m
			Elevation Difference	290	m

Plan



**Hypsometric Curve of the Catchment Area**



**Land Use of Catchment Area**

Natural/Semi-natural Forest	7	%
Secondary Forest	0	%
Planted Forest	0	%
Estate	93	%
Mixture of Estate and Dry-farming Land	0	%
Dry Farming Land	0	%
Pasture Land	0	%
Paddy Field	0	%
Swamp	0	%
Water Body	0	%
Settlement & Othres	0	%

Source:  
1:50,000 Land Use Map prepared by JICA Study Team  
for Master Plan.

**The Study on Critical Land and Protection Forest  
Rehabilitation at Tondano Watershed  
in the Republic of Indonesia**

Japan International Cooperation Agency

**Figure HAT2.17**

**Characteristics of Sub-watershed 16 (1/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 16

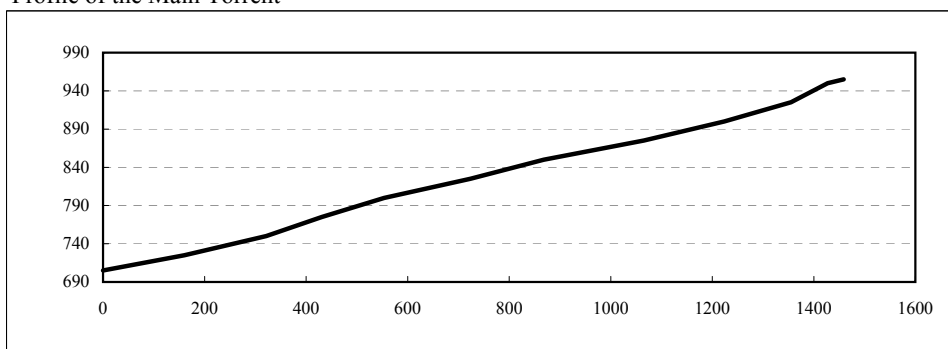
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### 2) Main Torrent

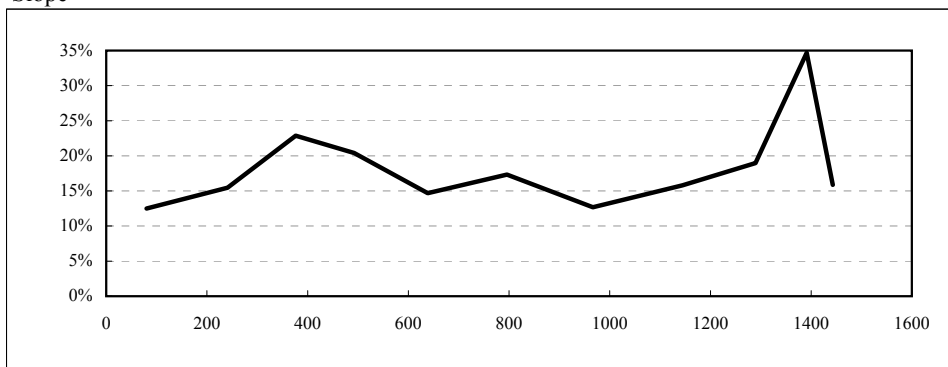
Mean Torrent Bed Gradient

45.5 %

Profile of the Main Torrent



Slope



### Torrent Condition

Survey Point

TD-18

Bed Width

2.0 m

Bank Height

1.0 m

Bank Slope

60°

Gravel Condition

Min

10 cm

Max

60 cm

Average

20 cm

Uniformity

No

Coverage Ratio

90 %

Amount of Deposition

0

Land Use of Surrounding Area

Forest/Paddy

Water Depth at the Time of Measurement

0.5 m

Water Color

Transparent and colorless

Remarks

See Figure HAT2.32 for the survey point.

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**Figure HAT2.17**

**Characteristics of Sub-watershed 16 (2/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 17

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### 1) Catchment Area

Area

100

ha

Highest Point

1,068

m

Average Slope

35

%

Lowest Point

700

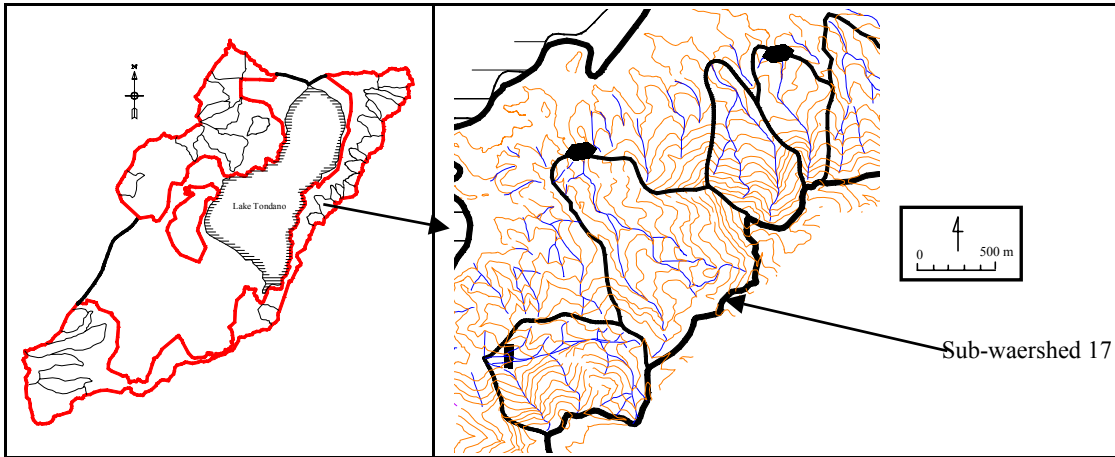
m

Elevation Difference

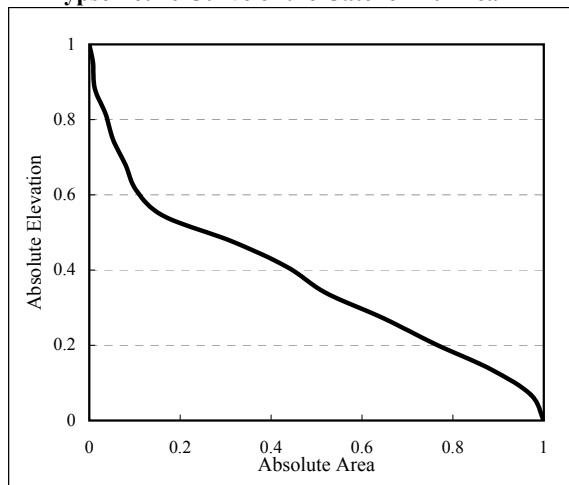
368

m

Plan



**Hypsometric Curve of the Catchment Area**



### Land Use of Catchment Area

Natural/Semi-natural Forest  
 Secondary Forest  
 Planted Forest  
 Estate  
 Mixture of Estate and Dry-farming Land  
 Dry Farming Land  
 Pasture Land  
 Paddy Field  
 Swamp  
 Water Body  
 Settlement & Othres

11	%
0	%
0	%
82	%
4	%
4	%
0	%
0	%
0	%
0	%
0	%

Source:

1:50,000 Land Use Map prepared by JICA Study Team for Master Plan.

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**Figure HAT2.18**

**Characteristics of Sub-watershed 17 (1/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 17

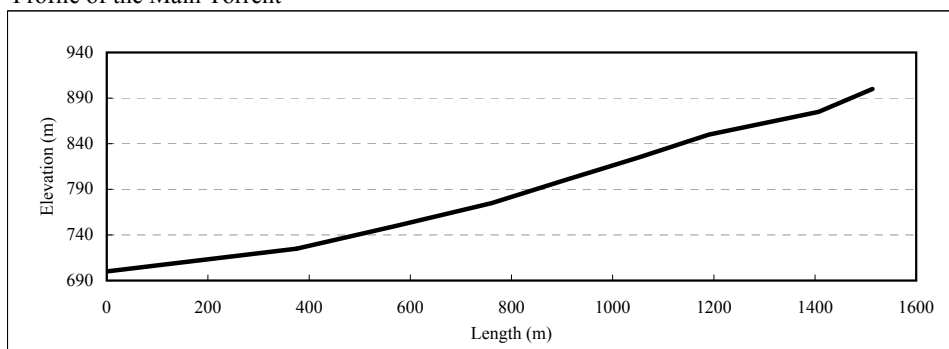
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### 2) Main Torrent

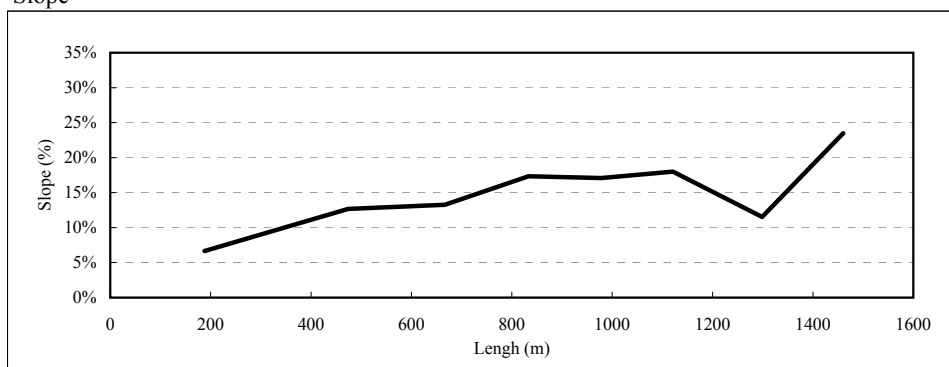
Mean Torrent Bed Gradient

22.0 %

Profile of the Main Torrent



Slope



### Torrent Condition

Survey Point

TD-19

TD-20

Bed Width

1.0 m

3.0 m

Bank Height

1.5 m

2.0 m

Bank Slope

70 -

60 -

Gravel Condition

Min

5 cm

10 cm

Max

30 cm

150 cm

Average

10 cm

30 cm

Uniformity

No

No

Coverage Ratio

70 %

90 %

Amount of Deposition

0 -

0 -

Land Use of Surrounding Area

Estate/Arable Upland

Estate

Water Depth at the Time of Measurement

0.1 m

0.05 m

Water Color

Transparent and colorless

Transparent and colorless

Remarks

See Figure HAT2.32 for the survey point.

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**Figure HAT2.18**

**Characteristics of Sub-watershed 17 (2/2)**