

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 26

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### 1) Catchment Area

Area

48

ha

Highest Point

970

m

Average Slope

35

%

Lowest Point

698

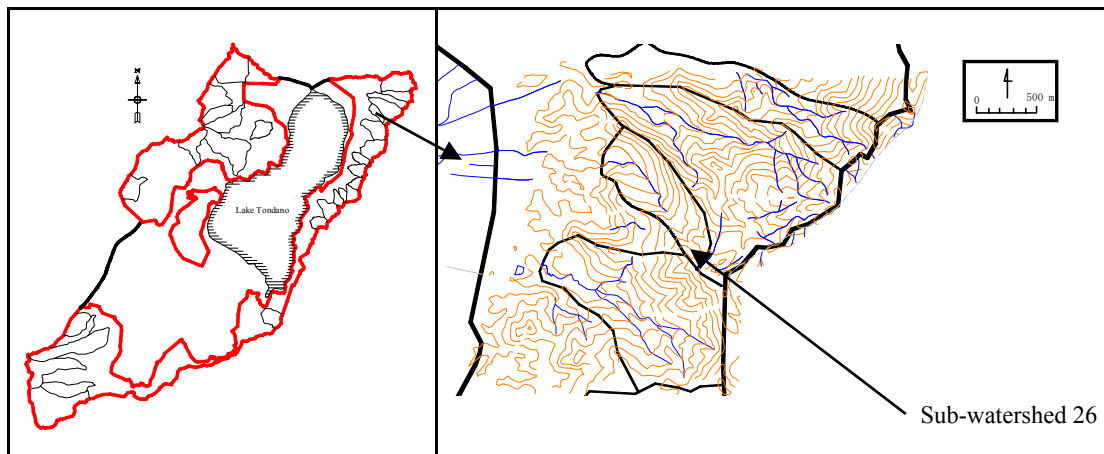
m

Elevation Difference

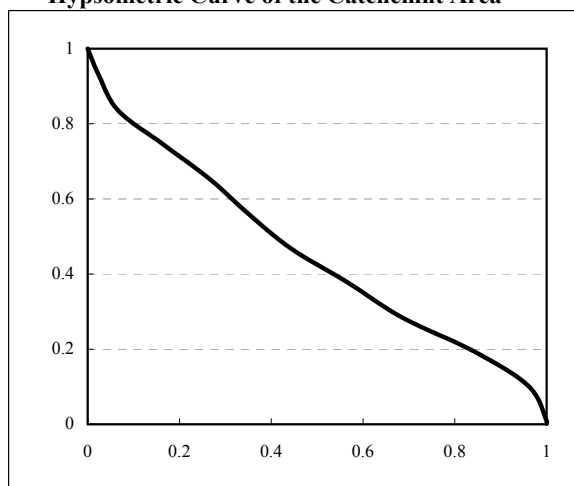
273

m

Plan



**Hypsometric Curve of the Catchment Area**



### Land Use of Catchment Area

|  |    |   |
|--|----|---|
| Natural/Semi-natural Forest            | 0  | % |
| Secondary Forest                       | 8  | % |
| Planted Forest                         | 0  | % |
| Estate                                 | 83 | % |
| Mixture of Estate and Dry-farming Land | 8  | % |
| 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 HAT2.27**

**Characteristics of Sub-watershed 26 (1/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 26

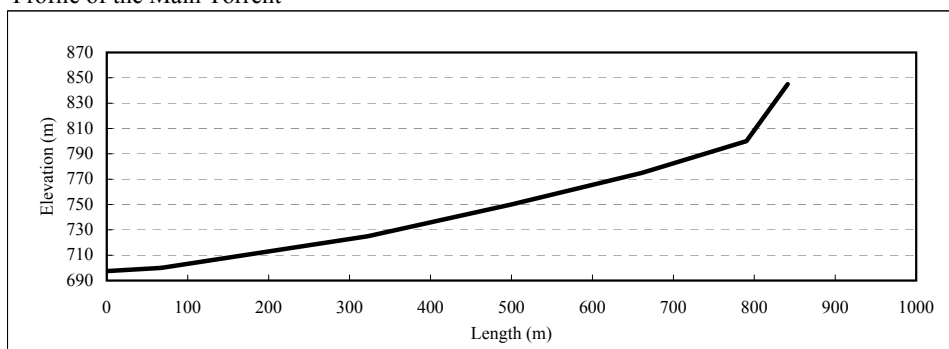
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### 2) Main Torrent

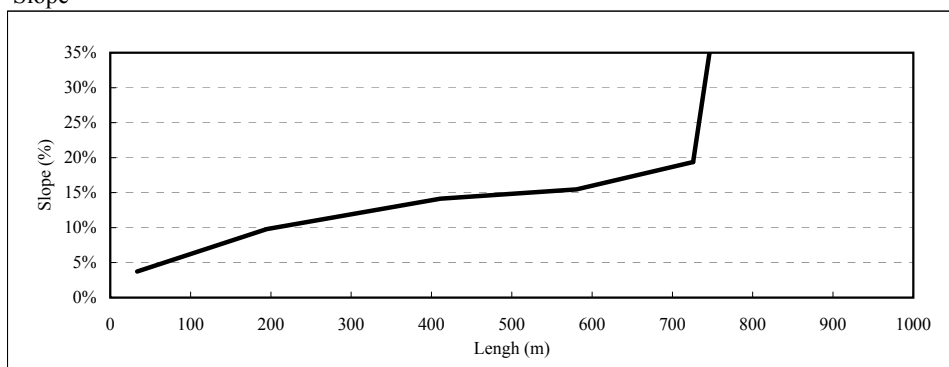
Mean Torrent Bed Gradient

22.3 %

Profile of the Main Torrent



Slope



### Torrent Condition

Survey Point

TD-28

Bed Width

2.0 m

Bank Height

0.5 m

Bank Slope

45°

Gravel Condition

Min

5 cm

Max

30 cm

Average

10 cm

Uniformity

Yes

Coverage Ratio

40 %

Amount of Deposition

0 -

Land Use of Surrounding Area

Forest

Water Depth at the Time of Measurement

0.1 m

Water Color

Gray and somewhat yellow-brown

Remarks

See Figure HAT2.32 for the survey point.

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**Figure HAT2.27**

**Characteristics of Sub-watershed 26 (2/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 27

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### 1) Catchment Area

Area

160

ha

Highest Point

1,060

m

Average Slope

35

%

Lowest Point

698

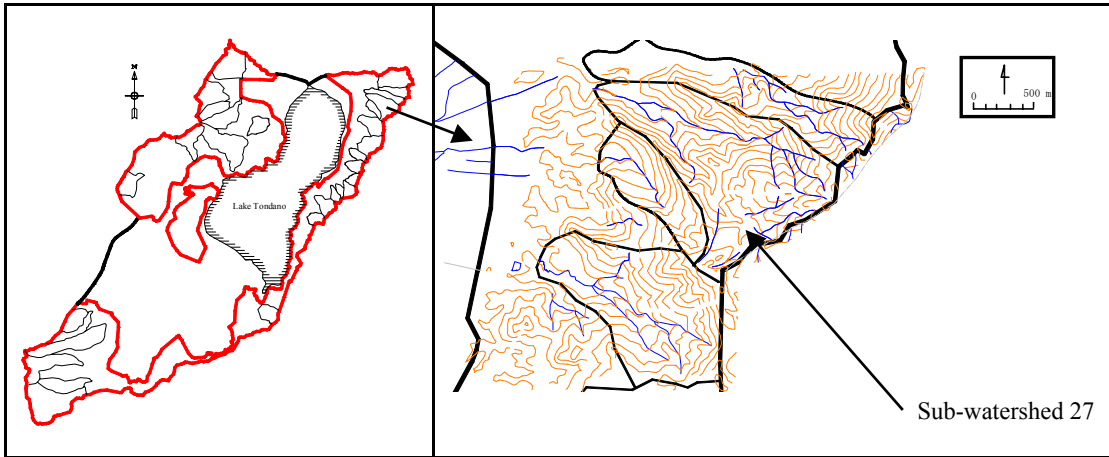
m

Elevation Difference

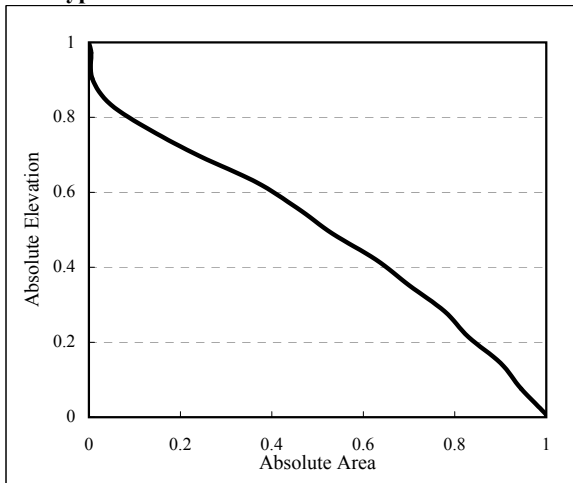
363

m

Plan



### Hypsometric Curve of the Catchment Area



### Land Use of Catchment Area

|  |    |   |
|--|----|---|
| Natural/Semi-natural Forest            | 13 | % |
| Secondary Forest                       | 48 | % |
| Planted Forest                         | 0  | % |
| Estate                                 | 38 | % |
| Mixture of Estate and Dry-farming Land | 3  | % |
| 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.

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**Figure HAT2.28**

**Characteristics of Sub-watershed 27 (1/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 27

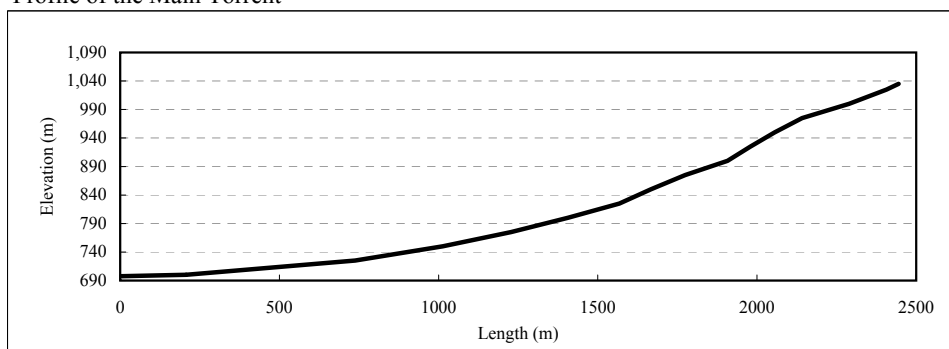
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### 2) Main Torrent

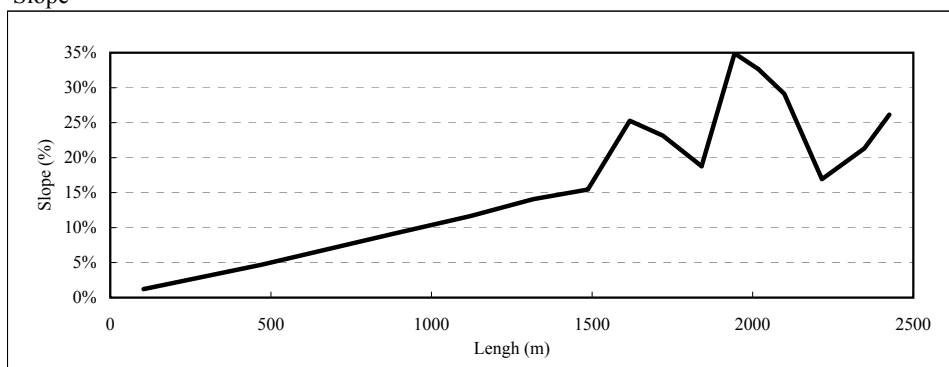
Mean Torrent Bed Gradient

27.4 %

Profile of the Main Torrent



Slope



### Torrent Condition

Survey Point

TD-29

Bed Width

2.0 m

Bank Height

0.5 m

Bank Slope

70 -

Gravel Condition

Min

5 cm

Max

20 cm

Average

10 cm

Uniformity

Yes

Coverage Ratio

60 %

Amount of Deposition

0 -

Land Use of Surrounding Area

Forest/Grassland

Water Depth at the Time of Measurement

0.1 m

Water Color

Transparent and colorless

Remarks

See Figure HAT2.32 for the survey point.

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**Figure HAT2.28**

**Characteristics of Sub-watershed 27 (2/2)**

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

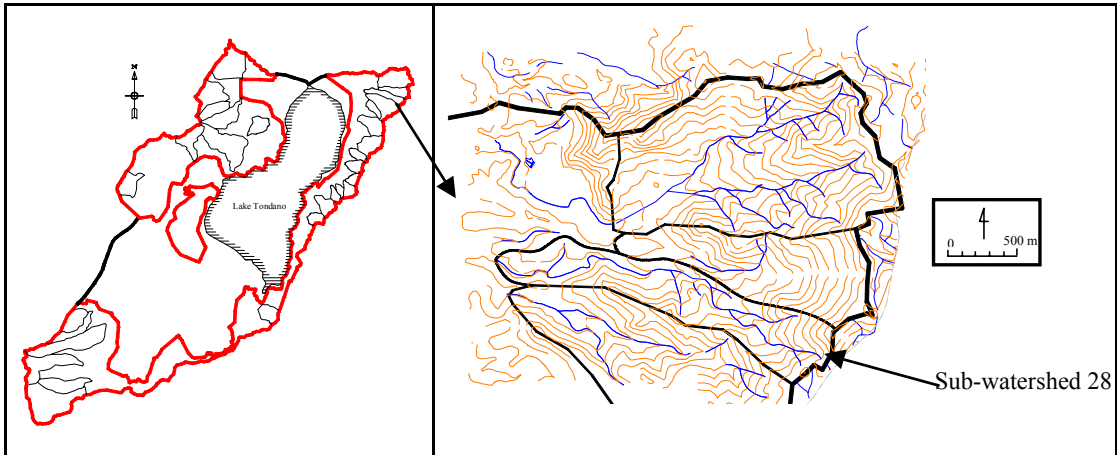
Sub-watershed - 28

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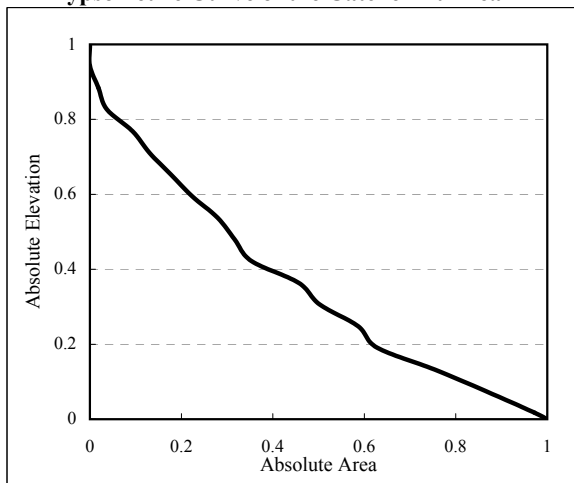
### 1) Catchment Area

|               |       |                      |         |
|---------------|-------|----------------------|---------|
| Area          | 86 ha | Highest Point        | 1,125 m |
| Average Slope | 33 %  | Lowest Point         | 693 m   |
|               |       | Elevation Difference | 433 m   |

Plan



Hypsometric Curve of the Catchment Area



### Land Use of Catchment Area

|  |      |
|--|------|
| Natural/Semi-natural Forest            | 18 % |
| Secondary Forest                       | 0 %  |
| Planted Forest                         | 0 %  |
| Estate                                 | 68 % |
| Mixture of Estate and Dry-farming Land | 14 % |
| 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.

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Figure HAT2.29

Characteristics of Sub-watershed 28 (1/2)

## Characteristics of Sub-watershed in the Intensive Area

Sub-watershed No.

Sub-watershed - 28

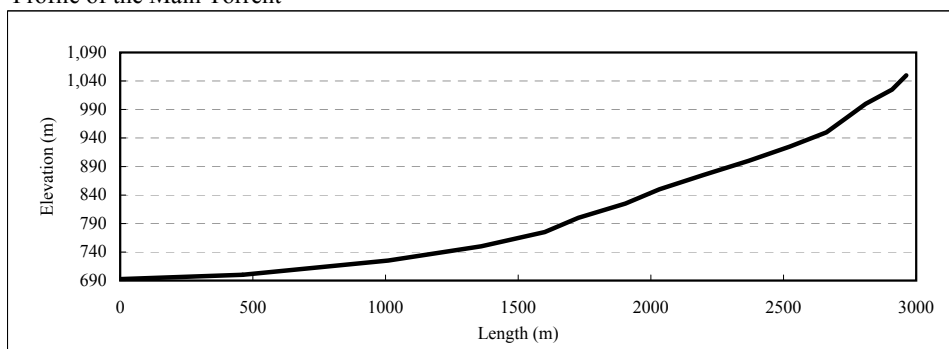
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### 2) Main Torrent

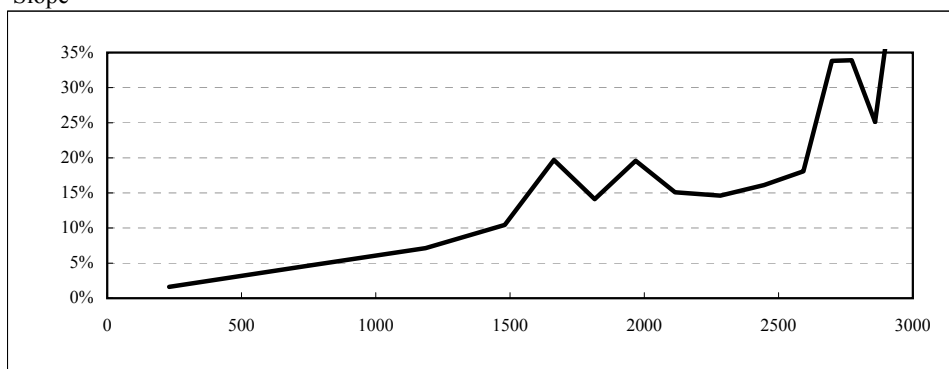
Mean Torrent Bed Gradient

22.3 %

Profile of the Main Torrent



Slope



### Torrent Condition

Survey Point

TD-30

Bed Width

1.7 m

Bank Height

1.0 m

Bank Slope

70°

Gravel Condition

Min

5 cm

Max

5 cm

Average

5 cm

Uniformity

Yes

Coverage Ratio

10 %

Amount of Deposition

0 -

Land Use of Surrounding Area

Arable Upland/Grassland

Water Depth at the Time of Measurement

0.35 m

Water Color

Gray and somewhat yellow-brown

Remarks

See Figure HAT2.32 for the survey point.

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**Figure HAT2.29**

**Characteristics of Sub-watershed 28 (2/2)**