

DEBRIS FLOW TORRENTS IN THE AUTONOMOUS PROVINCE OF BOLZANO

- GENERAL FEATURES
- MORPHOMETRY
- GEOLOGY AND GEOMORPHOLOGY
- LAND USE
- WATER DISCHARGES
- RECORDED DEBRIS FLOW EVENTS

Data sources:

“Ufficio Bacini Montani, Prov. Autonoma di Bolzano”,
for general information, hydrologic data and part of the geology;

“CARFRA project, Ufficio Geologia e Prove Materiali, Prov. Autonoma di Bolzano”,
for part of the geology and most of the recorded events;

CORINE database, for land use information;

First Intervention Squad reports (FI), newspapers and other, where specified.

General features

<i>Administrative code</i>	Nr.	1951
<i>Municipality</i>		Curon Venosta
<i>Stream name</i>		Calcara or Calce/ Kalcherbach
<i>Survey map</i>	1:10000	004 14
<i>Topographic Coordinates</i>	(outlet section)	E 1613.615
		N 5186034
<i>CARFRA Code</i>	Nr.	1648
<i>Collection drain</i>	Nr., name	1949, Rio Piz or Roja
<i>Next collection drain</i>	Nr., name	1944, Adige (upstream of Resia Lake)

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.20
<i>Basin Altitude</i>	- maximum	(m)	2763
	- mean	(m)	2379
	- minimum (fan top)	(m)	1820
	- confluence	(m)	1775
<i>Basin Slope</i>	- maximum	(°)	52.44
	- mean	(°)	23.08
	- minimum	(°)	0.51
<i>Average aspect</i>		(°)	121.39
<i>Channel lenght</i>		(km)	2.34
<i>Channel mean slope</i>		(°)	16.41
<i>Fan mean slope</i>		(°)	15.99

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss
<i>Medium reach</i>	Paragneiss with breccias, limestones, argilloschists and moraine
<i>Lower reach</i>	Alluvium mixed with talus
<i>notes</i>	

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	2.96
<i>Grasslands</i>	64.15
<i>Heath and shrub lands</i>	-

<i>Scattered vegetation cover</i>	32.89
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	
<i>Mean</i>	
<i>Minimum</i>	

Debris flow events

Date	Magnitude (m ³)
15 Sept. 1965	1000
<i>Notes</i> Debris flow triggered by heavy rainfall; the gravel blocked the road to Resia and the aquiduct	

Stream: Rio Cengles

General features

<i>Administrative code</i>	Nr.	2078
<i>Municipality</i>		Lasa
<i>Stream name</i>		Cengles / Tschengelserbach
<i>Survey map</i>	1:10000	011 16
<i>Topographic Coordinates</i>	(outlet section)	E 1625350
		N 5163273
<i>CARFRA Code</i>	Nr.	1607
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	10.53
<i>Basin Altitude</i>	- maximum	(m)	3366
	- mean	(m)	2286
	- minimum (fan top)	(m)	950
	- confluence	(m)	877
<i>Basin Slope</i>	- maximum	(°)	67.86
	- mean	(°)	33.94
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	185.41
<i>Channel lenght</i>		(km)	5.90
<i>Channel mean slope</i>		(°)	21.34
<i>Fan mean slope</i>		(°)	3.33

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Micaschists, paragneiss, talus debris, moraine and amphibolits
<i>Medium reach</i>	Micaschists, paragneiss and moraine
<i>Lower reach</i>	Alluvium and alluvial fans
<i>notes</i>	Steep catchment with diffused slope instabilities

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	27.53
<i>Grasslands</i>	18.08
<i>Heath and shrub lands</i>	6.33
<i>Scattered vegetation cover</i>	27.48
<i>Bare rocks</i>	20.17
<i>Other</i>	0.41

- Actual woodland upper limit (m) : 2100
- Potential woodland upper limit (m): 2200

Water discharges (m³s⁻¹)

<i>Maximum</i>	69.3
<i>Mean</i>	0.188

<i>Minimum</i>	0.075
----------------	-------

Debris flow events

Date	Magnitude (m ³)
10 July 1989	8.200
27 Aug. 1971	?
Summer 1992	3.000
<i>Notes</i> The 1971 event originated from a landslide which ended in the stream bed, then turning into a flow that flooded with logs and debris the town, destroying two bridges.	

FI n.90177 and 92121
Alto Adige, 28/8/71 and 11/7/89

Stream: Rio Chiesa

General features

<i>Administrative code</i>	Nr.	1725
<i>Municipality</i>		Naturno
<i>Stream name</i>		Chiesa / Kirchbach
<i>Survey map</i>	1:10000	013 09
<i>Topographic Coordinates</i>	(outlet section)	E 1653117
		N 5168770
<i>CARFRA Code</i>	Nr.	1663
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	2.36
<i>Basin Altitude</i>	- maximum	(m)	2918
	- mean	(m)	1733
	- minimum (fan top)	(m)	600
	- confluence	(m)	531
<i>Basin Slope</i>	- maximum	(°)	62.43
	- mean	(°)	36.11
	- minimum	(°)	0.51

<i>Average aspect</i>	(°)	172.51
<i>Channel lenght</i>	(km)	4.37
<i>Channel mean slope</i>	(°)	27.57
<i>Fan mean slope</i>	(°)	4.39

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micaschists, ortogneiss, granitic gneiss and moraine
<i>Medium reach</i>	Ortogneiss. Paragneiss, micaschists and moraine
<i>Lower reach</i>	Alluvial fans and alluvium
<i>notes</i>	Very steep and unstable catchment, poorly wooded, frequent events of solid transport with large boulder

Land use (%)

<i>Crops</i>	14.98
<i>Woodlands</i>	-
<i>Grasslands</i>	16.32
<i>Heath and shrub lands</i>	1.41
<i>Scattered vegetation cover</i>	60.84
<i>Bare rocks</i>	6.45
<i>Other</i>	-

- Actual woodland upper limit (m) : 1800-2100
- Potential woodland upper limit (m): 2150

Water discharges (m³s⁻¹)

<i>Maximum</i>	12.7
<i>Mean</i>	0.02
<i>Minimum</i>	0.008

Debris flow events

Date	Magnitude (m ³)
12 Aug. 1958	?
15 July 1988	7200

Summer 1994	1300
<i>Notes</i> The 1958 event, triggered by intense rainfall, caused three victims. In the 1988 the debris flow stopped upstream of the retention check-dam.	

Proceedings of the workshop on “Upland hydraulics”, Bressanone, 8-13/10/84
FI n.89059 and 95027

Stream: Rio Gadoria

General features

<i>Administrative code</i>	Nr.	1821
<i>Municipality</i>		Silandro – Lasa
<i>Stream name</i>		Gadria or Allitz / Gadriabach or Allitzerbach
<i>Survey map</i>	1:10000	012 09 and 012 13
<i>Topographic Coordinates</i>	(outlet section)	E 1631502
		N 5165620
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	15.75
<i>Basin Altitude</i>	- maximum	(m)	3175
	- mean	(m)	2251
	- minimum (fan top)	(m)	1100
	- confluence	(m)	840
<i>Basin Slope</i>	- maximum	(°)	65.08
	- mean	(°)	31.14
	- minimum	(°)	0.51
<i>Average aspect</i>		(°)	177.11
<i>Channel lenght</i>		(km)	8.32
<i>Channel mean slope</i>		(°)	12.73
<i>Fan mean slope</i>		(°)	6.86

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Micaschists, moraine and talus debris
<i>Medium reach</i>	Micaschists, paragneiss, talus slopes, milonites

<i>Lower reach</i>	Alluvial fans
<i>notes</i>	The catchment is steep and unstable in its medium-upper part

Land use (%)

<i>Crops</i>	2.50
<i>Woodlands</i>	10.10
<i>Grasslands</i>	35.17
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	31.40
<i>Bare rocks</i>	20.83
<i>Other</i>	-

- Actual woodland upper limit (m) : 1900-2100
- Potential woodland upper limit (m): 2200

Water discharges (m³s⁻¹)

<i>Maximum</i>	100
<i>Mean</i>	0.17
<i>Minimum</i>	0.07

Debris flow events

Date	Magnitude (m ³)
25-26 July 1992	31000
<i>Notes</i>	

Alto Adige 27/7/92
FI n. 92154

Stream: Rio Graves

General features

<i>Administrative code</i>	Nr.	1515
<i>Municipality</i>		S. Leonardo in Passiria
<i>Stream name</i>		Graves / Grafelsbach
<i>Survey map</i>	1:10000	013 03
<i>Topographic Coordinates</i>	(outlet section)	E 1.669.783
		N 5.181.791
<i>CARFRA Code</i>	Nr.	1791
<i>Collection drain</i>	Nr., name	1469, Passirio
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	8.05
<i>Basin Altitude</i>	- maximum	(m)	2768
	- mean	(m)	1791
	- minimum (fan top)	(m)	620
	- confluence	(m)	540
<i>Basin Slope</i>	- maximum	(°)	68.45
	- mean	(°)	32.01
	- minimum	(°)	0.51
<i>Average aspect</i>		(°)	225.64
<i>Channel lenght</i>		(km)	6.29
<i>Channel mean slope</i>		(°)	16.40
<i>Fan mean slope</i>		(°)	11.53

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micascists, moraine and slope debris
<i>Medium reach</i>	Paragneiss, micascists, gneiss
<i>Lower reach</i>	alluvial fans
<i>notes</i>	Erosion areas in the upper part of the basin for local moraine deposits on the hillslopes

Land use (%)

<i>Crops</i>	0.24
<i>Woodlands</i>	56.69
<i>Grasslands</i>	22.80
<i>Heath and shrub lands</i>	-

<i>Scattered vegetation cover</i>	8.57
<i>Bare rocks</i>	11.70
<i>Other</i>	-

- Actual woodland upper limit (m) : 1950-2050
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	45.8
<i>Mean</i>	0.11
<i>Minimum</i>	0.044

Debris flow events

Date	Magnitude (m ³)
3 july 1940	10.000
<i>Notes</i> A landslide triggered the event by obstructing the stream; downstream 2 houses were destroyed with 8 victims.	

Stream: Rio Lana

General features

<i>Administrative code</i>	Nr.	1724
<i>Municipality</i>		Naturno
<i>Stream name</i>		Lana / Lahnbach
<i>Survey map</i>	1:10000	013 09
<i>Topographic Coordinates</i>	(outlet section)	E 1654478
		N 5169170
<i>CARFRA Code</i>	Nr.	1657
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	4.86
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	3065
	- <i>mean</i>	(m)	1892
	- <i>minimum (fan top)</i>	(m)	630
	- <i>confluence</i>	(m)	520
<i>Basin Slope</i>	- <i>maximum</i>	(°)	68.22
	- <i>mean</i>	(°)	39.78
	- <i>minimum</i>	(°)	0.00
<i>Average aspect</i>		(°)	162.93
<i>Channel lenght</i>		(km)	4.83
<i>Channel mean slope</i>		(°)	25.47
<i>Fan mean slope</i>		(°)	7.36

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Micaschists, paragneiss and granitic gneiss
<i>Medium reach</i>	Micaschists, paragneiss, ortogneiss and moraine
<i>Lower reach</i>	Alluvium and alluvial fans
<i>notes</i>	Very unstable catchment and steep torrent; moraine and talus at the slopes toes

Land use (%)

<i>Crops</i>	8.09
<i>Woodlands</i>	-
<i>Grasslands</i>	21.96
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	58.69
<i>Bare rocks</i>	7.36
<i>Other</i>	3.91

- Actual woodland upper limit (m) : 1800-2100
- Potential woodland upper limit (m): 2150

Water discharges (m³s⁻¹)

<i>Maximum</i>	26.9
<i>Mean</i>	0.043

<i>Minimum</i>	0.017
----------------	-------

Debris flow events

Date	Magnitude (m ³)
7 Aug. 1995	10000
<i>Notes</i> Caused by a big storm, the debris flow obstructed the underpass of the National Road n.38 and flooded the carriageway. The day after the phenomenon occurs again but in a lighter magnitude.	

FI n. 95116
 Alto Adige 8/8/95

Stream: Rio Lega

General features

<i>Administrative code</i>	Nr.	1526
<i>Municipality</i>		S. Leonardo in Passiria
<i>Stream name</i>		Lega or Clava / Kellitz or Kehltalbach
<i>Survey map</i>	1:10000	013 03 and 013 04
<i>Topographic Coordinates</i>	(outlet section)	E 1671407
		N 5184904
<i>CARFRA Code</i>	Nr.	1794
<i>Collection drain</i>	Nr., name	1496, Passirio
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.86
<i>Basin Altitude</i>	- maximum	(m)	2318
	- mean	(m)	1548
	- minimum (fan top)	(m)	830
	- confluence	(m)	615
<i>Basin Slope</i>	- maximum	(°)	67.46
	- mean	(°)	36.26
	- minimum	(°)	3.25
<i>Average aspect</i>		(°)	274.55
<i>Channel lenght</i>		(km)	2.25

<i>Channel mean slope</i>	(°)	32.85
<i>Fan mean slope</i>	(°)	14.28

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micaschists and gneiss
<i>Medium reach</i>	Paragneiss, micaschists and gneiss
<i>Lower reach</i>	Alluvial fans
<i>notes</i>	Extremely steep catchment; moraine deposits on the slopes; Bank erosion phenomena along the channel

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	56.23
<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	43.77
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) : 1750-2000
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	12.5
<i>Mean</i>	0.036
<i>Minimum</i>	0.015

Debris flow events

Date	Magnitude (m ³)
27 June 1998	95000
16 Aug. 1966	?
1950	?

Notes

The 1950 event caused 10 victims; the 1998 one was triggered by a storm initiated around 8 pm.

Report by “Ripartizione 30, Acque pubbliche e opere idrauliche, Lachmann S.”
 Report by “Ufficio Bacini montani ovest, Spagnolo M.”, 1/7/98
 Alto Adige 18/8/66
 Dolomiten 29/6/98

Stream: Marbetail

General features

<i>Administrative code</i>	Nr.	-
<i>Municipality</i>		Curon Venosta
<i>Stream name</i>		Marbetail
<i>Survey map</i>	1:10000	004 15
<i>Topographic Coordinates</i>	(outlet section)	E 1618655
		N 5184940
<i>CARFRA Code</i>	Nr.	1848
<i>Collection drain</i>	Nr., name	1901, Rio Carlino
<i>Next collection drain</i>	Nr., name	1944, Lago Resia

Morphometric characteristics

<i>Basin area</i>		(km ²)	0.55
<i>Basin Altitude</i>	- maximum	(m)	2584
	- mean	(m)	1974
	- minimum (fan top)	(m)	1570
	- confluence	(m)	1530
<i>Basin Slope</i>	- maximum	(°)	55.96
	- mean	(°)	34.75
	- minimum	(°)	1.60
<i>Average aspect</i>		(°)	233.52
<i>Channel lenght</i>		(km)	1.75
<i>Channel mean slope</i>		(°)	29.29
<i>Fan mean slope</i>		(°)	14.74

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Calceschists, dolomites and limestones
<i>Medium reach</i>	Ladinic dolomites and paragneiss
<i>Lower reach</i>	Talus slopes and alluvial fans

<i>notes</i>	
--------------	--

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	30.12
<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	35.55
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	34.33
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	
<i>Mean</i>	
<i>Minimum</i>	

Debris flow events

Date	Magnitude (m³)
6 July 1994	10000
<i>Notes</i> The event started around 6 pm after an intense hail storm initiated around 5 pm.	

Stream: Rio Masul

General features

<i>Administrative code</i>	Nr.	1492
<i>Municipality</i>		Scena
<i>Stream name</i>		Masul / Masulbach
<i>Survey map</i>	1:10000	013 07
<i>Topographic Coordinates</i>	(outlet section)	E 1668116
		N 5176482
<i>CARFRA Code</i>	Nr.	1435
<i>Collection drain</i>	Nr., name	1469, Passirio
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	15.90
<i>Basin Altitude</i>	- maximum	(m)	2676
	- mean	(m)	1700
	- minimum (fan top)	(m)	490
	- confluence	(m)	440
<i>Basin Slope</i>	- maximum	(°)	68.80
	- mean	(°)	34.30
	- minimum	(°)	0.51
<i>Average aspect</i>		(°)	221.63
<i>Channel lenght</i>		(km)	7.78
<i>Channel mean slope</i>		(°)	13.73
<i>Fan mean slope</i>		(°)	5.73

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Granite, limestones, paragneiss and micaschists
<i>Medium reach</i>	Paragneiss, micaschists and moraine
<i>Lower reach</i>	Recent alluvium and alluvial fans
<i>notes</i>	Highly unstable catchment, with large landslides, in the upper part; Talus and moraine with variable thickness are the covering deposits.

Land use (%)

<i>Crops</i>	7.19
<i>Woodlands</i>	57.62
<i>Grasslands</i>	4.61
<i>Heath and shrub lands</i>	-

<i>Scattered vegetation cover</i>	14.22
<i>Bare rocks</i>	16.36
<i>Other</i>	-

- Actual woodland upper limit (m) : 1850-2050
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	88.4
<i>Mean</i>	0.245
<i>Minimum</i>	0.098

Debris flow events

Date	Magnitude (m ³)
3 Aug. 1988	150000
<i>Notes</i> The debris flow was composed of fine sediments and logs.	

FI n. 8646

Stream: Rio Ramini

General features

<i>Administrative code</i>	Nr.	2147
<i>Municipality</i>		Laces
<i>Stream name</i>		Ramini / Ramining or Lengbach
<i>Survey map</i>	1:10000	012 14
<i>Topographic Coordinates</i>	(outlet section)	E 1642603
		N 5136317
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	11.55
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	2900
	- <i>mean</i>	(m)	1667
	- <i>minimum (fan top)</i>	(m)	690
	- <i>confluence</i>	(m)	640
<i>Basin Slope</i>	- <i>maximum</i>	(°)	66.11
	- <i>mean</i>	(°)	26.23
	- <i>minimum</i>	(°)	0.00
<i>Average aspect</i>		(°)	187.88
<i>Channel lenght</i>		(km)	6.33
<i>Channel mean slope</i>		(°)	15.25
<i>Fan mean slope</i>		(°)	1.59

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Quartziferous phyllite, talus, moraine and micaschists
<i>Medium reach</i>	Micaschists, moraine, ortogneiss and limestones
<i>Lower reach</i>	Alluvial fans
<i>notes</i>	Areas subject to landslides are present in the catchment

Land use (%)

<i>Crops</i>	1.35
<i>Woodlands</i>	51.00
<i>Grasslands</i>	11.55
<i>Heath and shrub lands</i>	3.23
<i>Scattered vegetation cover</i>	30.29
<i>Bare rocks</i>	2.58
<i>Other</i>	-

- Actual woodland upper limit (m) : 2050-2200
- Potential woodland upper limit (m): 2200

Water discharges (m³s⁻¹)

<i>Maximum</i>	37.8
<i>Mean</i>	0.16

<i>Minimum</i>	0.064
----------------	-------

Debris flow events

Date	Magnitude (m ³)
23 May 1983	50000
<i>Notes</i> 15000 m ³ settled upstream of the retention check-dam, as reported by the First Intervention Squad.	

FI n. 8644 and 8675

Stream: Tovo di Tel

General features

<i>Administrative code</i>	Nr.	1695
<i>Municipality</i>		Parcines - Lagundo
<i>Stream name</i>		Tovo di Tel / Töllgraben
<i>Survey map</i>	1:10000	013 05, 013 06 and 013 10
<i>Topographic Coordinates</i>	(outlet section)	E 1660743
		N 5171855
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	1, Adige
<i>Next collection drain</i>	Nr., name	-

Morphometric characteristics

<i>Basin area</i>		(km ²)	6.05
<i>Basin Altitude</i>	- maximum	(m)	2632
	- mean	(m)	1667
	- minimum (fan top)	(m)	-
	- confluence	(m)	418
<i>Basin Slope</i>	- maximum	(°)	66.41
	- mean	(°)	32.91
	- minimum	(°)	0.00

<i>Average aspect</i>	(°)	161.21
<i>Channel lenght</i>	(km)	5.80
<i>Channel mean slope</i>	(°)	19.47
<i>Fan mean slope</i>	(°)	-

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micaschists, granitic gneiss and moraine
<i>Medium reach</i>	Paragneiss, micaschists and moraine
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	Very unstable and degrading catchment

Land use (%)

<i>Crops</i>	12.60
<i>Woodlands</i>	42.03
<i>Grasslands</i>	21.65
<i>Heath and shrub lands</i>	4.18
<i>Scattered vegetation cover</i>	17.11
<i>Bare rocks</i>	2.42
<i>Other</i>	-

- Actual woodland upper limit (m) : 1850-1950
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	56.2
<i>Mean</i>	0.137
<i>Minimum</i>	0.055

Debris flow events

Date	Magnitude (m ³)
20 July 1987	2000

Notes	

FI n. 88079

Stream: Rio Viastrata

General features

<i>Administrative code</i>	Nr.	1530
<i>Municipality</i>		S. Leonardo in Passiria
<i>Stream name</i>		Viastrata / Pfistradbach
<i>Survey map</i>	1:10000	013 03 and 013 04
<i>Topographic Coordinates</i>	(outlet section)	E 1672044
		N 5187052
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	1529, Rio di Valtina
<i>Next collection drain</i>	Nr., name	1469, Passirio

Morphometric characteristics

<i>Basin area</i>		(km ²)	12.38
<i>Basin Altitude</i>	- maximum	(m)	2696
	- mean	(m)	1893
	- minimum (fan top)	(m)	-
	- confluence	(m)	761
<i>Basin Slope</i>	- maximum	(°)	71.28
	- mean	(°)	36.14
	- minimum	(°)	0.72
<i>Average aspect</i>		(°)	193.69
<i>Channel lenght</i>		(km)	6.79
<i>Channel mean slope</i>		(°)	13.09
<i>Fan mean slope</i>		(°)	-

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micaschists, moraine, gneiss, talus and recent alluvium
<i>Medium reach</i>	Paragneiss, micaschists, gneiss and talus

<i>Lower reach</i>	Moraine, paragneiss and micaschists
<i>notes</i>	Steep hillslopes

Land use (%)

<i>Crops</i>	0.60
<i>Woodlands</i>	30.64
<i>Grasslands</i>	20.79
<i>Heath and shrub lands</i>	8.72
<i>Scattered vegetation cover</i>	31.78
<i>Bare rocks</i>	7.47
<i>Other</i>	-

- Actual woodland upper limit (m) : 1700-2050
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	51.6
<i>Mean</i>	0.210
<i>Minimum</i>	0.084

Debris flow events

Date	Magnitude (m ³)
27 June 1998	30000
<i>Notes</i>	

Stream: Rio Bianco

General features

<i>Administrative code</i>	Nr.	951
<i>Municipality</i>		Fortezza
<i>Stream name</i>		Bianco / Weissenbach
<i>Survey map</i>	1:10000	007 16
<i>Topographic Coordinates</i>	(outlet section)	E 1697426
		N 5186589
<i>CARFRA Code</i>	Nr.	1217
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	6.44
<i>Basin Altitude</i>	- maximum	(m)	2113
	- mean	(m)	1640
	- minimum (fan top)	(m)	800
	- confluence	(m)	773
<i>Basin Slope</i>	- maximum	(°)	71.84
	- mean	(°)	33.64
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	185.97
<i>Channel lenght</i>		(km)	3.84
<i>Channel mean slope</i>		(°)	16.40
<i>Fan mean slope</i>		(°)	7.80

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Granite
<i>Medium reach</i>	Granite
<i>Lower reach</i>	Talus slopes and alluvial fan
<i>notes</i>	Straight long valley on a tectonic line; it receives debris from degrading lateral valleys; on its left side (less steep) sediments accumulate and then are transported downstream by debris flow

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	64.36
<i>Grasslands</i>	14.31
<i>Heath and shrub lands</i>	1.45

<i>Scattered vegetation cover</i>	19.83
<i>Bare rocks</i>	-
<i>Other</i>	0.05

- Actual woodland upper limit (m) : 2000
- Potential woodland upper limit (m): 2000

Water discharges (m³s⁻¹)

<i>Maximum</i>	29.30
<i>Mean</i>	0.16
<i>Minimum</i>	0.051

Debris flow events

Date	Magnitude (m ³)
14 Aug. 1998	3000
6 Aug. 1985	7000
<i>Notes</i> The 1985 event consisted of large boulder and logs in a sandy matrix; it flooded the central part of the alluvial fan, eroded the stream bed, blocked the road bridge and invaded the carriageway.	

Marchi and Tecca (1996) Magnitudo delle colate detritiche nelle Alpi Orientali italiane, GEAM-Geoingegneria Ambientale e Mineraria, Giugno-Settembre;

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;

Report by "Ripartizione 30, Ufficio Acque Pubbliche e Opere Idrauliche, Lachmann S."

Stream: Rio Boccia

General features

<i>Administrative code</i>	Nr.	-
<i>Municipality</i>		Fortezza
<i>Stream name</i>		Rio Boccia / Gupfental or Kupferbach
<i>Survey map</i>	1:10000	007 15 and 014 03
<i>Topographic Coordinates</i>	(outlet section)	E 1696135
		N 5186717
<i>CARFRA Code</i>	Nr.	1850
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	0.41
<i>Basin Altitude</i>	- maximum	(m)	1768
	- mean	(m)	1245
	- minimum (fan top)	(m)	875
	- confluence	(m)	801
<i>Basin Slope</i>	- maximum	(°)	70.85
	- mean	(°)	35.58
	- minimum	(°)	1.01
<i>Average aspect</i>		(°)	88.94
<i>Channel lenght</i>		(km)	1.10
<i>Channel mean slope</i>		(°)	31.26
<i>Fan mean slope</i>		(°)	9.74

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Biotitic granite fading to granodiorite
<i>Medium reach</i>	Biotitic granite fading to granodiorite
<i>Lower reach</i>	Talus slope
<i>notes</i>	Very steep and small valley

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	96.25
<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	3.75
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	
<i>Mean</i>	

<i>Minimum</i>	
----------------	--

Debris flow events

Date	Magnitude (m ³)
14 Aug. 1998	3000
Summer 1997	?
6 Aug. 1985	?
<i>Notes</i> In 1997 fine sediment filled up the retention basin for the protection of the railway.	

Report by "Ripartizione 30, Ufficio Acque Pubbliche e Opere Idrauliche, Lachmann S."

Stream: Rio Cornale

General features

<i>Administrative code</i>	Nr.	249
<i>Municipality</i>		Bressanone
<i>Stream name</i>		Cornale / Karnolbach
<i>Survey map</i>	1:10000	015 05 and 015 09
<i>Topographic Coordinates</i>	(outlet section)	E 1704190
		N 5176886
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	248, Rienza
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	2.61
<i>Basin Altitude</i>	- maximum	(m)	1991
	- mean	(m)	1240
	- minimum (fan top)	(m)	700
	- confluence	(m)	550
<i>Basin Slope</i>	- maximum	(°)	60.19
	- mean	(°)	24.80
	- minimum	(°)	0.72
<i>Average aspect</i>		(°)	280.63
<i>Channel lenght</i>		(km)	3.57

<i>Channel mean slope</i>	(°)	17.69
<i>Fan mean slope</i>	(°)	15.00

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Quartziferous phyllite
<i>Medium reach</i>	Quartziferous phyllite
<i>Lower reach</i>	Quartziferous phyllite and talus
<i>notes</i>	

Land use (%)

<i>Crops</i>	28.45
<i>Woodlands</i>	71.55
<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	
<i>Mean</i>	
<i>Minimum</i>	

Debris flow events

Date	Magnitude (m ³)
1994	1000

<i>Notes</i>

Stream: Rio Eores

General features

<i>Administrative code</i>	Nr.	232
<i>Municipality</i>		Bressanone and Funes
<i>Stream name</i>		Eores / Afererbach
<i>Survey map</i>	1:10000	014 12 and 015 09
<i>Topographic Coordinates</i>	(outlet section)	E 1701385
		N 5172544
<i>CARFRA Code</i>	Nr.	
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	31.65
<i>Basin Altitude</i>	- maximum	(m)	2650
	- mean	(m)	1661
	- minimum (fan top)	(m)	615
	- confluence	(m)	545
<i>Basin Slope</i>	- maximum	(°)	76.37
	- mean	(°)	26.45
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	199.82
<i>Channel lenght</i>		(km)	14.79
<i>Channel mean slope</i>		(°)	7.14
<i>Fan mean slope</i>		(°)	4.00

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Limestones, Gardena sandstones and quartziferous phyllite
<i>Medium reach</i>	Quartziferous phyllite and talus
<i>Lower reach</i>	Quartziferous phyllite, moraine and alluvial fan

<i>notes</i>	The upper part of the catchment is unstable
--------------	---

Land use (%)

<i>Crops</i>	10.33
<i>Woodlands</i>	62.42
<i>Grasslands</i>	14.93
<i>Heath and shrub lands</i>	6.34
<i>Scattered vegetation cover</i>	2.63
<i>Bare rocks</i>	3.34
<i>Other</i>	-

- Actual woodland upper limit (m): 1950
- Potential woodland upper limit (m): 2000

Water discharges (m³s⁻¹)

<i>Maximum</i>	64.60
<i>Mean</i>	0.714
<i>Minimum</i>	0.228

Debris flow events

Date	Magnitude (m ³)
26 July 1992	50000
6 Aug. 1906	?
<i>Notes</i> In 1906 the alluvial fan was flooded and the Brennero railway was interrupted	

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;

Stream: Rio Inferno

General features

<i>Administrative code</i>	Nr.	-
<i>Municipality</i>		Fortezza
<i>Stream name</i>		Inferno / Holleffluchtbach
<i>Survey map</i>	1:10000	007 15
<i>Topographic Coordinates</i>	(outlet section)	E 1695589
		N 5187593
<i>CARFRA Code</i>	Nr.	1224
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	0.68
<i>Basin Altitude</i>	- maximum	(m)	1976
	- mean	(m)	1518
	- minimum (fan top)	(m)	900
	- confluence	(m)	820
<i>Basin Slope</i>	- maximum	(°)	64.30
	- mean	(°)	40.64
	- minimum	(°)	1.52
<i>Average aspect</i>		(°)	200.71
<i>Channel lenght</i>		(km)	1.58
<i>Channel mean slope</i>		(°)	32.83
<i>Fan mean slope</i>		(°)	10.86

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Granite
<i>Medium reach</i>	Granite
<i>Lower reach</i>	Talus and alluvial fan
<i>notes</i>	Medium and upper reaches very steep in friable rock; on the left side the valley is very incised with large amount of accumulated debris

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	26.30
<i>Grasslands</i>	6.54
<i>Heath and shrub lands</i>	-

<i>Scattered vegetation cover</i>	67.16
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) : 1950
- Potential woodland upper limit (m): 1950

Water discharges (m³s⁻¹)

<i>Maximum</i>	4.88
<i>Mean</i>	0.066
<i>Minimum</i>	0.017

Debris flow events

Date	Magnitude (m ³)
14 Aug. 1998	5000
6 Aug. 1985	700
3 Aug. 1969	500
4 Nov. 1966	35000
27 July 1962	500
6 Sept. 1960	300
28 June 1959	2500
9-10 Aug. 1957	1000
26 July 1953	1000

Report by "Ripartizione 30, Ufficio Acque Pubbliche e Opere Idrauliche, Lachmann S."

Marchi and Tecca (1996) Magnitudo delle colate detritiche nelle Alpi Orientali italiane, GEAM-Geoingegneria Ambientale e Mineraria, Giugno-Settembre;

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;

Stream: Rio Lasanca

General features

<i>Administrative code</i>	Nr.	252
<i>Municipality</i>		Luson
<i>Stream name</i>		Lasanca or Luson / Lüsnerbach
<i>Survey map</i>	1:10000	015 01
<i>Topographic Coordinates</i>	(outlet section)	E 1705807
		N 5180946
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	248, Rienza
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	92.66
<i>Basin Altitude</i>	- maximum	(m)	2804
	- mean	(m)	1724
	- minimum (fan top)	(m)	-
	- confluence	(m)	593
<i>Basin Slope</i>	- maximum	(°)	79.68
	- mean	(°)	27.62
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	188.32
<i>Channel lenght</i>		(km)	19.57
<i>Channel mean slope</i>		(°)	5.71
<i>Fan mean slope</i>		(°)	-

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Limestone, quartziferous phyllite and diorite
<i>Medium reach</i>	quartziferous phyllite and talus
<i>Lower reach</i>	quartziferous phyllite
<i>notes</i>	Talus and lateral landsliding in the upper part; the lower part consists mainly in a creek

Land use (%)

<i>Crops</i>	7.34
<i>Woodlands</i>	62.13
<i>Grasslands</i>	23.93
<i>Heath and shrub lands</i>	1.22
<i>Scattered vegetation cover</i>	3.34
<i>Bare rocks</i>	1.77
<i>Other</i>	0.27

- Actual woodland upper limit (m): 1950
- Potential woodland upper limit (m): 2000

Water discharges (m³s⁻¹)

<i>Maximum</i>	120
<i>Mean</i>	1.93

<i>Minimum</i>	0.615
----------------	-------

Debris flow events

Date	Magnitude (m ³)
26 July 1992	30000
<i>Notes</i> The debris flow originated in a sub-basin, then flowed along the Rio Lasanca down to the confluence with the Rienza	

Stream: Rio Mezzaselva

General features

<i>Administrative code</i>	Nr.	952
<i>Municipality</i>		Fortezza
<i>Stream name</i>		Mezzaselva / Schachertalbach
<i>Survey map</i>	1:10000	007 15
<i>Topographic Coordinates</i>	(outlet section)	E 1694691
		N 5187858
<i>CARFRA Code</i>	Nr.	1228
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.04
<i>Basin Altitude</i>	- maximum	(m)	2084
	- mean	(m)	1552
	- minimum (fan top)	(m)	900
	- confluence	(m)	822
<i>Basin Slope</i>	- maximum	(°)	73.08
	- mean	(°)	42.08
	- minimum	(°)	1.01

<i>Average aspect</i>	(°)	199.30
<i>Channel lenght</i>	(km)	1.88
<i>Channel mean slope</i>	(°)	28.72
<i>Fan mean slope</i>	(°)	10.49

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Biotitic granite and granodiorite
<i>Medium reach</i>	Biotitic granite and granodiorite
<i>Lower reach</i>	Talus
<i>notes</i>	Very steep non-symmetric valley, like the neighbouring ones on this side of the Isarco valley.

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	24.49
<i>Grasslands</i>	11.17
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	64.35
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	
<i>Mean</i>	
<i>Minimum</i>	

Debris flow events

Date	Magnitude (m ³)
14 Aug. 1998	10000
25 July 1991	?
13 July 1991	?

6 Aug. 1985	35000
<i>Notes</i> 1985: the debris flow covered the fan with a debris layer up to 3 m-thick, flooded the road and obstructed the Isarco temporarily. 25/7/1991: boulders up to 10 m³ were carried down, the national road, the motorway and the railway were blocked because the obstruction of the Isarco. 25/7/1991: the debris flow flooded a 150 m-long stretch of the motorway. 1998: a large amount of debris filled up the retention basin without any damages.	

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;
Alto Adige 7/8/85 and 14/7/91

Stream: Rio Tinne

General features

<i>Administrative code</i>	Nr.	1207
<i>Municipality</i>		Chiusa, Velturmo and Vilandro
<i>Stream name</i>		Tinne / Tinnebach
<i>Survey map</i>	1:10000	014 011
<i>Topographic Coordinates</i>	(outlet section)	E 1696307
		N 5168056
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	25, Isarco
<i>Next collection drain</i>	Nr., name	1, Adige

Morphometric characteristics

<i>Basin area</i>		(km ²)	55.83
<i>Basin Altitude</i>	- maximum	(m)	2573
	- mean	(m)	1699
	- minimum (fan top)	(m)	-
	- confluence	(m)	511
<i>Basin Slope</i>	- maximum	(°)	74.41
	- mean	(°)	23.44
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	160.92
<i>Channel lenght</i>		(km)	14.73
<i>Channel mean slope</i>		(°)	6.25
<i>Fan mean slope</i>		(°)	-

Geologic and geomorphologic characteristics

<i>Upper reach</i>	“Chiusa” diorite, quartziferous phyllite and moraine
<i>Medium reach</i>	“Chiusa” diorite, paragneiss and quartziferous phyllite
<i>Lower reach</i>	“Chiusa” diorite, paragneiss
<i>notes</i>	

Land use (%)

<i>Crops</i>	12.99
<i>Woodlands</i>	36.89
<i>Grasslands</i>	28.29
<i>Heath and shrub lands</i>	7.93
<i>Scattered vegetation cover</i>	11.08
<i>Bare rocks</i>	2.72
<i>Other</i>	0.10

- Actual woodland upper limit (m): 1800
- Potential woodland upper limit (m): 1900

Water discharges (m³s⁻¹)

<i>Maximum</i>	70.89
<i>Mean</i>	1.046
<i>Minimum</i>	0.335

Debris flow events

Date	Magnitude (m³)
9 Aug. 1921	500000
Autumn 1993	15600
<i>Notes</i> The 1921 event was triggered by a very violent storm localised only on half the catchment; the town of Chiusa was flooded with 4 victims.	

Marchi and Tecca (1996) Magnitudo delle colate detritiche nelle Alpi Orientali italiane, GEAM-Geoingegneria Ambientale e Mineraria, Giugno-Settembre;

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;

Stream: Rio Cor

General features

<i>Administrative code</i>	Nr.	386
<i>Municipality</i>		S.Martino in Badia
<i>Stream name</i>		Cor / Corbach or Ciansbach / Rü de Cor
<i>Survey map</i>	1:10000	015 011 and 015 12
<i>Topographic Coordinates</i>	(outlet section)	E 1722058
		N 5174170
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	281, Rio Gadera
<i>Next collection drain</i>	Nr., name	248, Rienza

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.10
<i>Basin Altitude</i>	- maximum	(m)	1869
	- mean	(m)	1533
	- minimum (fan top)	(m)	1140
	- confluence	(m)	1088
<i>Basin Slope</i>	- maximum	(°)	55.57
	- mean	(°)	31.07
	- minimum	(°)	1.13
<i>Average aspect</i>		(°)	249.43
<i>Channel lenght</i>		(km)	1.60
<i>Channel mean slope</i>		(°)	20.45
<i>Fan mean slope</i>		(°)	15.31

Geologic and geomorphologic characteristics

<i>Upper reach</i>	"ValGardena" sandstone
<i>Medium reach</i>	"ValGardena" sandstone
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	Steep upper part with deep gullies

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	100

<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	6.50
<i>Mean</i>	0.023
<i>Minimum</i>	0.007

Debris flow events

Date	Magnitude (m³)
Summer 1988	3000
<i>Notes</i>	

Stream: Rio di Croda Rossa

General features

<i>Administrative code</i>	Nr.	598
<i>Municipality</i>		Rasun Anterselva
<i>Stream name</i>		Croda Rossa / Rotwandbach
<i>Survey map</i>	1:10000	009 10
<i>Topographic Coordinates</i>	(outlet section)	E 1741271
		N 5196961

<i>CARFRA Code</i>	Nr.	1001
<i>Collection drain</i>	Nr., name	584, Rio di Anterselva
<i>Next collection drain</i>	Nr., name	248, Rienza

Morphometric characteristics

<i>Basin area</i>		(km ²)	2.71
<i>Basin Altitude</i>	- maximum	(m)	2814
	- mean	(m)	2214
	- minimum (fan top)	(m)	1750
	- confluence	(m)	1638
<i>Basin Slope</i>	- maximum	(°)	70.97
	- mean	(°)	35.64
	- minimum	(°)	0.50
<i>Average aspect</i>		(°)	220.77
<i>Channel lenght</i>		(km)	3.02
<i>Channel mean slope</i>		(°)	16.58
<i>Fan mean slope</i>		(°)	8.88

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss, micaschists and talus
<i>Medium reach</i>	Paragneiss and talus
<i>Lower reach</i>	
<i>notes</i>	The rocky slopes are intensely degraded and the debris accumulates along the channel

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	30.39
<i>Grasslands</i>	9.43
<i>Heath and shrub lands</i>	2.91
<i>Scattered vegetation cover</i>	29.89
<i>Bare rocks</i>	27.39
<i>Other</i>	-

- Actual woodland upper limit (m): 2100
- Potential woodland upper limit (m): -

Water discharges (m³s⁻¹)

<i>Maximum</i>	9.40
<i>Mean</i>	0.025
<i>Minimum</i>	0.008

Debris flow events

Date	Magnitude (m³)
6 July 1994	8000
<i>Notes</i>	

Stream: Rio di Fossadura**General features**

<i>Administrative code</i>	Nr.	409
<i>Municipality</i>		S. Vigilio di Marebbe
<i>Stream name</i>		Fossadura / Hochalmbach
<i>Survey map</i>	1:10000	015 08 and 015 12
<i>Topographic Coordinates</i>	(outlet section)	E 1725285
		N 5175661
<i>CARFRA Code</i>	Nr.	1580
<i>Collection drain</i>	Nr., name	389, Rio di S.Vigilio
<i>Next collection drain</i>	Nr., name	281, Rio Gadera

Morphometric characteristics

<i>Basin area</i>		(km ²)	5.15
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	2484
	- <i>mean</i>	(m)	1943
	- <i>minimum (fan top)</i>	(m)	1305
	- <i>confluence</i>	(m)	1203

<i>Basin Slope</i>	- maximum	(°)	66.70
	- mean	(°)	30.53
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	224.79
<i>Channel lenght</i>		(km)	4.55
<i>Channel mean slope</i>		(°)	12.45
<i>Fan mean slope</i>		(°)	6.01

Geologic and geomorphologic characteristics

<i>Upper reach</i>	“Sciliar” dolomite and talus
<i>Medium reach</i>	“Werfen” and “Bellerophon” formations, “Dark” limestones
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	Local moraine deposits and debris mounds (boulder in a fine matrix) are present on the lower part of the slopes

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	31.22
<i>Grasslands</i>	13.67
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	49.88
<i>Bare rocks</i>	5.14
<i>Other</i>	-

- Actual woodland upper limit (m) : 2000
- Potential woodland upper limit (m): -

Water discharges (m³s⁻¹)

<i>Maximum</i>	13.50
<i>Mean</i>	0.07
<i>Minimum</i>	0.023

Debris flow events

Date	Magnitude (m³)
27 July 1995	?

Summer 1990	3000
July 1945	?
25 July 1937	?
1934	?
1882	?
<i>Notes</i> 27 July 1995: a hailstorm bursted about 7 pm around Piz de Peres and Monte Parcaccia, at 8 pm the debris flow fell down (it lasted for about half an hour) and obstructed the Rio di S.Vigilio channel. The “Ciamur” area was flooded with mud and stones. 1945: the channel bed was elevated by 1 m for the debris and brushwood aggradation.	

Biscuola Elena, Studio del debris flow della valle di Fossadura. Tesi di Laurea in Scienze geologiche, Univ. Ferrara
Stream: Rio Grigio

General features

<i>Administrative code</i>	Nr.	481
<i>Municipality</i>		Villabassa
<i>Stream name</i>		Grigio / Graubach
<i>Survey map</i>	1:10000	016 06
<i>Topographic Coordinates</i>	(outlet section)	E 1742872
		N 5180295
<i>CARFRA Code</i>	Nr.	
<i>Collection drain</i>	Nr., name	248, Rienza
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	3.53
<i>Basin Altitude</i>	- maximum	(m)	2372
	- mean	(m)	1654
	- minimum (fan top)	(m)	1205
	- confluence	(m)	1158
<i>Basin Slope</i>	- maximum	(°)	71.71
	- mean	(°)	27.68
	- minimum	(°)	0.50
<i>Average aspect</i>		(°)	184.93
<i>Channel lenght</i>		(km)	4.41
<i>Channel mean slope</i>		(°)	13.82
<i>Fan mean slope</i>		(°)	4.73

Geologic and geomorphologic characteristics

<i>Upper reach</i>	“Mendola” dolomite, “Dark” limestones, “Werfen” and “Bellerophon” formations
<i>Medium reach</i>	“ValGardena” sandstone, “Verrucano” and quartziferous phyllite
<i>Lower reach</i>	Moraine and ancient alluvium
<i>notes</i>	The upper part is steep but rather stable and wooded

Land use (%)

<i>Crops</i>	0.79
<i>Woodlands</i>	94.43
<i>Grasslands</i>	-
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	4.78
<i>Other</i>	-

- Actual woodland upper limit (m) : 2000
- Potential woodland upper limit (m): -

Water discharges (m³s⁻¹)

<i>Maximum</i>	12.50
<i>Mean</i>	0.55
<i>Minimum</i>	0.018

Debris flow events

Date	Magnitude (m ³)
26-27 July 1998	15000
<i>Notes</i>	

Stream: Rio Molino

General features

<i>Administrative code</i>	Nr.	567
<i>Municipality</i>		Val Casies
<i>Stream name</i>		Molino / Mühlbach
<i>Survey map</i>	1:10000	009 14, 009 15, 016 02 and 016 03
<i>Topographic Coordinates</i>	(outlet section)	E 1743950
		N 5186378
<i>CARFRA Code</i>	Nr.	1290
<i>Collection drain</i>	Nr., name	531, Rio di Casies/Pudio
<i>Next collection drain</i>	Nr., name	248, Rienza

Morphometric characteristics

<i>Basin area</i>		(km ²)	3.07
<i>Basin Altitude</i>	- maximum	(m)	2472
	- mean	(m)	1936
	- minimum (fan top)	(m)	1300
	- confluence	(m)	1228
<i>Basin Slope</i>	- maximum	(°)	62.40
	- mean	(°)	28.61
	- minimum	(°)	0.50
<i>Average aspect</i>		(°)	127.11
<i>Channel lenght</i>		(km)	3.58
<i>Channel mean slope</i>		(°)	15.38
<i>Fan mean slope</i>		(°)	4.83

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Ortogneiss and moraine
<i>Medium reach</i>	Ortogneiss
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	The upper part presents many incisions and degrading areas, the medium part is a mainly rocky.

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	54.93

<i>Grasslands</i>	23.94
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	6.64
<i>Bare rocks</i>	14.48
<i>Other</i>	-

- Actual woodland upper limit (m) : 2000
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	13.50
<i>Mean</i>	0.052
<i>Minimum</i>	0.018

Debris flow events

Date	Magnitude (m ³)
1-2 June 1962	4000
<i>Notes</i> A 80m-long (2000 m²) wooded slope slid for about 40 m into a right-side tributary, along which the sediments reached the main channel and then the valley bottom, at “Colle di Dentro”. Several check-dams have been subsequently built along the channel, for the large number of erosion areas and shallow landslides on the left-side slope.	

Stream: Rio Petzl

General features

<i>Administrative code</i>	Nr.	594
<i>Municipality</i>		Rasun / Anterselva
<i>Stream name</i>		Petzl / Pötzelbach
<i>Survey map</i>	1:10000	009 10
<i>Topographic Coordinates</i>	(outlet section)	E 1783529
		N 5195456

<i>CARFRA Code</i>	Nr.	
<i>Collection drain</i>	Nr., name	584, Rio Anterselva
<i>Next collection drain</i>	Nr., name	248, Rienza

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.92
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	2528
	- <i>mean</i>	(m)	2037
	- <i>minimum (fan top)</i>	(m)	1520
	- <i>confluence</i>	(m)	1298
<i>Basin Slope</i>	- <i>maximum</i>	(°)	73.50
	- <i>mean</i>	(°)	32.81
	- <i>minimum</i>	(°)	0.00
<i>Average aspect</i>		(°)	230.03
<i>Channel lenght</i>		(km)	2.25
<i>Channel mean slope</i>		(°)	22.26
<i>Fan mean slope</i>		(°)	9.87

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Paragneiss and moraine
<i>Medium reach</i>	Paragneiss
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	The medium-upper part is steep and mainly rocky

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	49.52
<i>Grasslands</i>	24.15
<i>Heath and shrub lands</i>	0.10
<i>Scattered vegetation cover</i>	26.24
<i>Bare rocks</i>	-
<i>Other</i>	-

- Actual woodland upper limit (m) : 2100
- Potential woodland upper limit (m): -

Water discharges (m³s⁻¹)

<i>Maximum</i>	8.50
<i>Mean</i>	0.035
<i>Minimum</i>	0.013

Debris flow events

Date	Magnitude (m³)
6 July 1997	4000
<i>Notes</i>	

Stream: Rio Riscione**General features**

<i>Administrative code</i>	Nr.	428
<i>Municipality</i>		Brunico
<i>Stream name</i>		Riscione / Reischacherbach
<i>Survey map</i>	1:10000	019 04
<i>Topographic Coordinates</i>	(outlet section)	E 1724431
		N 5186667
<i>CARFRA Code</i>	Nr.	-
<i>Collection drain</i>	Nr., name	248, Rienza
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	4.01
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	2255
	- <i>mean</i>	(m)	1321
	- <i>minimum (fan top)</i>	(m)	-
	- <i>confluence</i>	(m)	829

<i>Basin Slope</i>	- maximum	(°)	59.30
	- mean	(°)	18.54
	- minimum	(°)	0.00
<i>Average aspect</i>		(°)	215.19
<i>Channel lenght</i>		(km)	6.01
<i>Channel mean slope</i>		(°)	10.19
<i>Fan mean slope</i>		(°)	-

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Quartziferous phyllite
<i>Medium reach</i>	Quartziferous phyllite
<i>Lower reach</i>	Alluvial terraces
<i>notes</i>	Small erosions in the upper part

Land use (%)

<i>Crops</i>	35.83
<i>Woodlands</i>	61.04
<i>Grasslands</i>	2.45
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	-
<i>Other</i>	0.68

- Actual woodland upper limit (m) : 1900
- Potential woodland upper limit (m): 2000

Water discharges (m³s⁻¹)

<i>Maximum</i>	9.50
<i>Mean</i>	0.048
<i>Minimum</i>	0.015

Debris flow events

Date	Magnitude (m³)
-------------	----------------------------------

Summer 1991	3000
Notes	

Stream: Rio Rosso

General features

<i>Administrative code</i>	Nr.	774
<i>Municipality</i>		Valle Aurina
<i>Stream name</i>		Rosso / Rotbach
<i>Survey map</i>	1:10000	002 15, 008 03 and 008 04
<i>Topographic Coordinates</i>	(outlet section)	E 1722495
		N 5205998
<i>CARFRA Code</i>	Nr.	1246
<i>Collection drain</i>	Nr., name	630, Aurino
<i>Next collection drain</i>	Nr., name	248, Rienza

Morphometric characteristics

<i>Basin area</i>		(km ²)	7.02
<i>Basin Altitude</i>	- maximum	(m)	3318
	- mean	(m)	2107
	- minimum (fan top)	(m)	1040
	- confluence	(m)	995
<i>Basin Slope</i>	- maximum	(°)	64.45
	- mean	(°)	33.90
	- minimum	(°)	0.50
<i>Average aspect</i>		(°)	128.32
<i>Channel lenght</i>		(km)	5.12
<i>Channel mean slope</i>		(°)	16.50
<i>Fan mean slope</i>		(°)	5.77

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Granitic and aplitic gneiss, moraine
<i>Medium reach</i>	Granitic and aplitic gneiss, moraine
<i>Lower reach</i>	Granitic and aplitic gneiss, moraine
<i>notes</i>	Moraine deposits with debris at the confluence, talus at the slope toes; Downstream the small glaciers a wide degrading area is present and its sediments tend to accumulate between 1900 and 1600 m a.s.l.. From this point the debris moves down during very intense rainfalls.

Land use (%)

<i>Crops</i>	5.08
<i>Woodlands</i>	10.50
<i>Grasslands</i>	4.19
<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	42.73
<i>Bare rocks</i>	32.05
<i>Other</i>	5.46

- Actual woodland upper limit (m) : 1700-1900
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	19.50
<i>Mean</i>	0.120
<i>Minimum</i>	0.043

Debris flow events

Date	Magnitude (m³)
6 Aug. 1985	3500
29 June 1959	?
Autumn 1928	?
17 Aug. 1878	?
<i>Notes</i> 6/8/1985: Slope failures in the upper part, deposition in the lower reach at the retention check-dams. 17/8/1878: After intense rainfall and sudden snow melting the debris flow obstructed the Aurino channel, flooding the town of S.Martino. 29/6/1959: Rio Rosso with the other neighbouring torrents forced the Aurino stream to move its channel to the left side.	

Mortara, Sorzana and Villi (1986) L'evento alluvionale del 6 agosto 1985 nella vallata del fiume Isarco..., Memorie di Scienze Geologiche, Vol.XXXVIII, Padova, dicembre, 427,457;

Stream: Rio di Troghe

General features

<i>Administrative code</i>	Nr.	485
<i>Municipality</i>		Dobbiaco
<i>Stream name</i>		Troghe / Trogerbach
<i>Survey map</i>	1:10000	016 07
<i>Topographic Coordinates</i>	(outlet section)	E 1745643
		N 5177933
<i>CARFRA Code</i>	Nr.	1035
<i>Collection drain</i>	Nr., name	248, Rienza
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	1.18
<i>Basin Altitude</i>	- maximum	(m)	2378
	- mean	(m)	1715
	- minimum (fan top)	(m)	1350
	- confluence	(m)	1254
<i>Basin Slope</i>	- maximum	(°)	70.11
	- mean	(°)	31.59
	- minimum	(°)	0.50
<i>Average aspect</i>		(°)	120.81
<i>Channel lenght</i>		(km)	2.32
<i>Channel mean slope</i>		(°)	23.24
<i>Fan mean slope</i>		(°)	6.03

Geologic and geomorphologic characteristics

<i>Upper reach</i>	“Mendola dolomite”, “Werfen” formation
<i>Medium reach</i>	“Werfen” formation (clayey sandstone)
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	Debris is produced by intense rock degradation in the upper part, it accumulates at the cliffs’ toes, moving downstream during intense rainfall events; the alluvial fan originated the Dobbiaco Lake.

Land use (%)

<i>Crops</i>	-
<i>Woodlands</i>	71.66
<i>Grasslands</i>	-

<i>Heath and shrub lands</i>	-
<i>Scattered vegetation cover</i>	-
<i>Bare rocks</i>	28.34
<i>Other</i>	-

- Actual woodland upper limit (m) :
- Potential woodland upper limit (m):

Water discharges (m³s⁻¹)

<i>Maximum</i>	7.20
<i>Mean</i>	0.025
<i>Minimum</i>	0.007

Debris flow events

Date	Magnitude (m ³)
6 July 1994	30000
25 July 1992	30000
Aug. 1991	30000
July 1983	?
Autumn 1966	?
<i>Notes</i> The 1994 event covered a 100m-wide area. In 1991 the Rio di Troghe and the Rio Kuntschir flooded a camping site placed downstream.	

Stream: Rio Cisles

General features

<i>Administrative code</i>	Nr.	160
<i>Municipality</i>		S. Cristina-Selva (Gardena)
<i>Stream name</i>		Cisles / Cislesbach
<i>Survey map</i>	1:10000	028 01
<i>Topographic Coordinates</i>	(outlet section)	E 1708991
		N 5159499

<i>CARFRA Code</i>	Nr.	1060
<i>Collection drain</i>	Nr., name	129, Rio Gardena
<i>Next collection drain</i>	Nr., name	25, Isarco

Morphometric characteristics

<i>Basin area</i>		(km ²)	17.52
<i>Basin Altitude</i>	- <i>maximum</i>	(m)	3000
	- <i>mean</i>	(m)	2171
	- <i>minimum (fan top)</i>	(m)	1434
	- <i>confluence</i>	(m)	1395
<i>Basin Slope</i>	- <i>maximum</i>	(°)	76.49
	- <i>mean</i>	(°)	24.75
	- <i>minimum</i>	(°)	0.00
<i>Average aspect</i>		(°)	185.15
<i>Channel lenght</i>		(km)	8.68
<i>Channel mean slope</i>		(°)	9.42
<i>Fan mean slope</i>		(°)	6.69

Geologic and geomorphologic characteristics

<i>Upper reach</i>	Moraine, dolomite and talus
<i>Medium reach</i>	Marls, sandstones ("S. Cassiano" and "Werfen" formations), alluvium, moraine
<i>Lower reach</i>	Alluvial fan
<i>notes</i>	Tectonically very disturbed catchment

Land use (%)

<i>Crops</i>	5.08
<i>Woodlands</i>	14.34
<i>Grasslands</i>	37.77
<i>Heath and shrub lands</i>	2.24
<i>Scattered vegetation cover</i>	9.19
<i>Bare rocks</i>	30.24
<i>Other</i>	1.15

- Actual woodland upper limit (m) : 2050
- Potential woodland upper limit (m): 2100

Water discharges (m³s⁻¹)

<i>Maximum</i>	37.05
<i>Mean</i>	0.257
<i>Minimum</i>	0.086

Debris flow events

Date	Magnitude (m³)
24 March 1951	1000000
<i>Notes</i> A large landslide moved from the Piz Cudcena into the channel where it was fluidified. During the first days it moved at about 60 meters/hour, then it stopped for the temperature drop. In the first days of April the debris moved again for the temperature rise and reached the Rio Gardena.	

Alto Adige 25/3/51