Driftwood management in South Tyrol

Workshop Woody Debris – questions and answers
Salzburg, 2016 May 11th-13th

Sandro Gius
South Tyrol - Südtirol

- 40% area > 2,000 m o.s.l.
- 50% area covered by forests
- 116 municipalities
- 520,000 Inhabitants

- 86% of the population lives and works in 6% of the total area
Isarco torrent 04/05 August 2012
Isarco torrent 04/05 August 2012
Città di Termeno
July 15, 2016
1) Inspection program of water courses
2) Management plan of riparian wood stands and mountain torrents
3) The catchment management plans
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South Tyrol, Italy

July 15, 2016
Legal framework - Province law 35/75

Art. 15
It is forbidden to deposit and abandon material of any kind on hydraulic public domain, both on the river band and on the banks.......

(2) The prohibition is extended to the bordering properties on a stripe of 5,00 m on both river banks, except for agricultural and silvicultural necessities.

Art. 26

h) Everyone who with own act or omission originates or carries on the risk of overflowing, of inundation, of weakening or breaking of an hydraulic protection work or structure, is subject to an administrative sanction .........
 Flooding events

Example case: city of Brunico

Dolomiten 24.08.1966

Dolomiten 19.08.1966

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Civita in the year 1882

Destruction of 17 houses, several rural buildings, most of the bridges and of the bank protection structures

Drift wood

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Evolution of the river after 1882

- natural deepening of the river, caused in part by the intensive stabilisation activity in the tributary torrents
- development of riparian stands
- completion of the hydroelectric catchment lake in Monguelfo in 1959
- interruption of the sediment transport river downside
- deepening and narrowing of the river bed
- increase of the riparian stands area

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What happen in the case of bridge clogging by woody debris?
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The driftwood has to be retained above the city of Bruneck.

ESTIMATION OF THE DRIFTWOOD POTENTIAL
DESIGN OF A RESTRAINING SYSTEM
Libera Università di Bolzano (Prof. Francesco Comiti - Faculty of Natural Sciences and Technology)
Università di Padova (Prof. Vincenzo D’Agostino - Dep. Territory and agro-forestal systems)

EXECUTIVE PROJECT DRIFTWOOD GRILL CHECK DAM
Mountain torrent regulation office – East (Martin Moser, For.Eng.)
Office for dam management (Jürgen Schäfer, P. Eng.)

EXECUTIVE PROJECT CABLE FILTER CHECK DAM
Engineer team Bergmeister GmbH – Brixen/Bressanone

EXECUTION
Special company for the regulation of water courses and land defense

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ESTIMATION OF THE DRIFTWOOD POTENTIAL

Catchment area: 207 of 633 km²

tributaries

artificial basin of Welsberg

river band

landsides

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### Wood mass in the river band

Estimation of the volume according to height classes tables

<table>
<thead>
<tr>
<th>Classi H</th>
<th>Dm</th>
<th>N</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5 - 10</td>
<td>4</td>
<td>14000</td>
<td>45</td>
</tr>
<tr>
<td>10 - 15</td>
<td>10</td>
<td>3184</td>
<td>110</td>
</tr>
<tr>
<td>15 - 20</td>
<td>13</td>
<td>2866</td>
<td>215</td>
</tr>
<tr>
<td>20 - 25</td>
<td>20</td>
<td>1338</td>
<td>340</td>
</tr>
<tr>
<td>25 - 30</td>
<td>24</td>
<td>1185</td>
<td>600</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>34</td>
<td>605</td>
<td>780</td>
</tr>
</tbody>
</table>

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Wood mass in the river band

In the valley bottom it will be estimated an average wood mass (H>5m) of:

4.500 m³ / 35 ha  =>  130 m³ / ha

How could this volume evolve in 300 years?

outcome

150 m³ / ha  =>  5.200 m³

200 m³ / ha  =>  7.000 m³

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Wood mass moving from unstable slopes

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Wood mass moving from unstable slopes along the tributaries

<table>
<thead>
<tr>
<th>Torrente</th>
<th>Scenario 1 Volume (m³)</th>
<th>Scenario 2 Volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aderer</td>
<td>211</td>
<td>894</td>
</tr>
<tr>
<td>Kaser</td>
<td>215</td>
<td>419</td>
</tr>
<tr>
<td>Wielen</td>
<td>251</td>
<td>843</td>
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<tr>
<td>Litsch</td>
<td>465</td>
<td>1162</td>
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<tr>
<td>Nasen</td>
<td>3</td>
<td>210</td>
</tr>
<tr>
<td>Schartl</td>
<td>5</td>
<td>84</td>
</tr>
<tr>
<td>Furkel</td>
<td>498</td>
<td>1664</td>
</tr>
<tr>
<td>Antholzer</td>
<td>1002</td>
<td>6000</td>
</tr>
<tr>
<td>Bruns</td>
<td>548</td>
<td>1572</td>
</tr>
</tbody>
</table>

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Total wood mass

<table>
<thead>
<tr>
<th>Abschnitt</th>
<th>$V_C$ (m$^3$)</th>
<th>$V_V$ (m$^3$)</th>
<th>$V_A$ (m$^3$)</th>
<th>$V_T$ (m$^3$)</th>
<th>$V_T$ cum (m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1150</td>
<td>400</td>
<td>100</td>
<td>1650</td>
<td>6895</td>
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<td>2</td>
<td>1725</td>
<td>40</td>
<td>0</td>
<td>1765</td>
<td>5245</td>
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<tr>
<td>3</td>
<td>920</td>
<td>205</td>
<td>100</td>
<td>1225</td>
<td>3480</td>
</tr>
<tr>
<td>4</td>
<td>851</td>
<td>80</td>
<td>50</td>
<td>981</td>
<td>2255</td>
</tr>
<tr>
<td>5</td>
<td>368</td>
<td>135</td>
<td>200</td>
<td>703</td>
<td>1274</td>
</tr>
<tr>
<td>6</td>
<td>161</td>
<td>410</td>
<td>0</td>
<td>571</td>
<td>571</td>
</tr>
</tbody>
</table>

$V_C$ (corridor)

$V_V$ (slope)

$V_t$ (tributaries)
Wood mass: other sources

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Preliminary considerations for the selection of the location and type of constructions

- Spatial separation between the protection structure and the risk area
- Separation between driftwood and sediment
- Sufficient retention volume to guarantee the correct functioning of the construction
- Modular system to guarantee the flexibility
- Eco-friendliness, fish migration, respect to the water frame directive (no worsening)
Position 1
Open retention check dam with an inclined grid
- Grid height: 6,5 m
- Total height on the shoulders: 12,0 m
- Width of the central aperture: approx. 30 m
- Total width: 64,00 m
- 2,200 m³ concrete
- Armature steel 210 t
- Total weight of the grid 74 t
Position 2
Cable filter check dam
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Technical data

Project: Studio Bergmeister 2010
Building time: 04.2012 – 06.2013
Length/height: 50 m / 8 m
Diameter cables: 31 – 95 mm
n°./length/tens. cables: Nr. 9 / 50 m / 240 – 5500 KN
Anchorages: Nr. 2x18 pz., 21m / 11 m
free length / Ø 75 mm
Pretensioning forces: 2000kN
Total cost: 1.500.000,00 €
Other retention constructions for driftwood
Tinne torrent / Chiusa
September 2009
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July 15, 2016
Thank you for your attention and patience!
Danke für die Aufmerksamkeit und Geduld!