DEBRIS MANAGEMENT
Torrent maintenance
Filter constructions
Practical experience
Problem

• Communities or cooperatives are responsible for inspection of torrents and protection measures
• Communities or cooperatives are often overchallenged
• WLV can offer assistance
  ▪ training
  ▪ support
Why torrent inspection?

Inspection of protection structures and clearing of runof obstacles is one of the most efficient means for disaster prevention

Forestact regulates mandatory torrent inspections
– Every community with torrents is obliged to inspect the torrent at least once a year
– Elimination of found obstacles has to be arranged immediately
– Community has to report the results of the inspection and the success of counter measures to the authorities.

ONR 24803 regulates standards concerning monitoring and inspection of protection measures
Torrent maintenance - partners

Community

die.Wildbach

Estate Owner

Local Gov. Salzburg

District Authority
Tasks

• Torrent inspection
• Documentation of run of obstacles and defects on protection measures
• Collection estate owner info and perpetrator
• Recommendations for clearing obstacles
• Cost assessment
• Organisation of clearing measures
• Determination inspection tracks and dates
• Priority list
• Clarification of possible funding
• Handling of Funding
• Accounting
Woody debris
Vegetation/Plant cover
Damages protection measures
Damages protection measures
Debris deposits
Obstructive installations
Waterpipes in/out
Inspection results Tyrol

- Holzablagerungen im Hochwasserabflussbereich
- Ablagerung sonst. abflusshemmender Gegenstände
- Holzbewuchs im Hochwasserabflussbereich
- Schäden an Regulierungsbaumen
- Abflussbehindernde Einbauten
- Wasseraus- und -einleitungen

24% 24% 30% 14% 6% 2%
Woody debris retention
Filterconstructions of WLV
Practical experience

Woody debris
reasons – source - origin
Woody debris retention
Filterconstructions of WLV
Practical experience


## Type of woody debris transport

ONR 24800

<table>
<thead>
<tr>
<th>Verlagerungstyp</th>
<th>Hochwasser</th>
<th>Mure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verlagerungsart</td>
<td>fluviatil</td>
<td>murartig</td>
</tr>
<tr>
<td>Terninus</td>
<td>Hochwasser</td>
<td>fluviatier Feststofftransport</td>
</tr>
<tr>
<td>Prozeistyp</td>
<td>Reinwasserabfluss</td>
<td>schwach</td>
</tr>
<tr>
<td>Fließverhalten</td>
<td>newtonisch</td>
<td>newtonisch</td>
</tr>
<tr>
<td>Vol.-Feststoffkonzentration (ca. Bereich)</td>
<td>Promillebereich</td>
<td>0 – 20 %</td>
</tr>
<tr>
<td>Größtkorn</td>
<td>mm – cm</td>
<td>– dm</td>
</tr>
<tr>
<td>Dichte (ca. Bereich)</td>
<td>1.000 kg/m³</td>
<td>&lt; 1.300 kg/m³</td>
</tr>
<tr>
<td>maßgeblich wirkende Kräfte</td>
<td>Turbulenz, Schleppspannung</td>
<td>Turbulenz, Schleppspannung</td>
</tr>
<tr>
<td>Verteilung der Feststoffe im Querschnitt</td>
<td>Feststoffe schlannah (rollend, hüpfend, springend) und Schwab verteilt im Querschnitt</td>
<td>Feststoffe schlannah (rollend, hüpfend, springend) und Schwab verteilt im Querschnitt</td>
</tr>
<tr>
<td>Schaden durch</td>
<td>Wasser und Schwab</td>
<td>Wasser, Schwab und Geschlebe</td>
</tr>
</tbody>
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**Technical Service for torrent and avalanche control**
Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
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History:
Starting from checkdams with big slots requiring great maintenance effort – constant removal of debris- 50 years ago the first filter checkdams with open spillways were developed:

dam with slot

with bars

or grill
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By observation and analysis of flood disasters effects and disadvantages of dams with slots and bars are evident
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Small scale tests, done by a master thesis at the prove the results of the practical experience

Filtering of woody debris along with ongoing normal debris flow on the long run is best done by using dams with a grill
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model tests have been carried out 1986
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Tests showed the automatic clearing at the base as a result of the emerging tractive force.
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Different types of dams have been developed depending on flow type, process type and type of catchment

Fluvial discharge
with low debris transport rate
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Fluviatile discharge
with high debris transport rate
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Debris flow like discharge
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Especially with debris flow like discharge or debris flows the „chain of function“ has to be considered
The torrent Reiterbach proved this during a recent disaster!

Debris flow breaker
in hm 16,67
Filter construction
For a debris flow-like discharge in hm 12.88
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And a
last Filter
construction
in hm 10,83
Examples of dam types in Function:
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Torrent Hubalpsbach in Hüttschlag:
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For the characteristics of a debrisflow like discharge massive constructions with a massive steelgrill are best suitable
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Woody debris retention
Filterconstructions of WLV
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With fluvial discharge and a low debris transportation rate constructions using different material combinations are used:
Concrete slabs
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Or
pure
steel grill
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Both can have the required effect:
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The angle of the waterside construction parts is important on two levels (similar to a tyrolean weir):

• At the solebase:
  drains the transported woody debris during the starting discharge wave by raising it either using the flow energy or by ist

• Level of the spillway (discharge section):
  woody debris is drained into the underlying hollow body therefore reducing the risk of spilling the woody debris over the dam due to the loss of tactive force.
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Important note:

Buildings must have a safe access road in order To secure maintenance and Accessability during disaster events
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