STEEP STREAMS

Solid Transport Evaluation and Efficiency in Prevention: Sustainable Techniques of Rational Engineering and Advanced Methods

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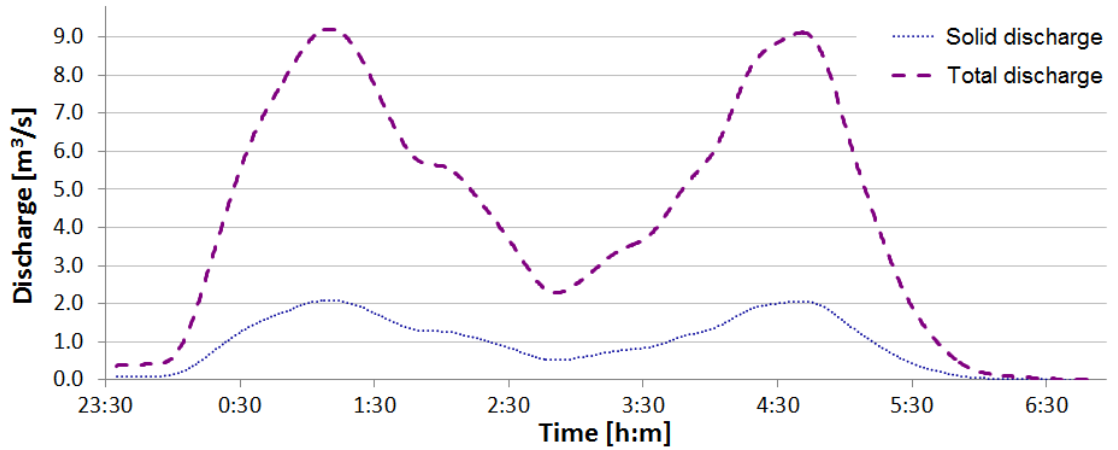
Why STEEP STREAMS ?

- ***Debris Flows are catastrophic events affecting small mountain basins, causing loss of lives and properties damage.***
- ***The total volumes and discharges mobilized*** *by debris flows are* ***several times larger that*** *that of the rainfall triggering the event.*

Why STEEP STREAMS ?



- *Their* ***triggering conditions*** *are* ***uncertain,*** *but very often these events* ***occurs after a long rain (even few days)*** *that which* ***saturates the soil,*** *followed by a* ***intense rain*** *that* ***induces the collapse.***

Why STEEP STREAMS?

Target 1 of STEEP STREAMS

The rainfall analysis shows that intensity and frequency of ***extreme events in small mountain catchment:***

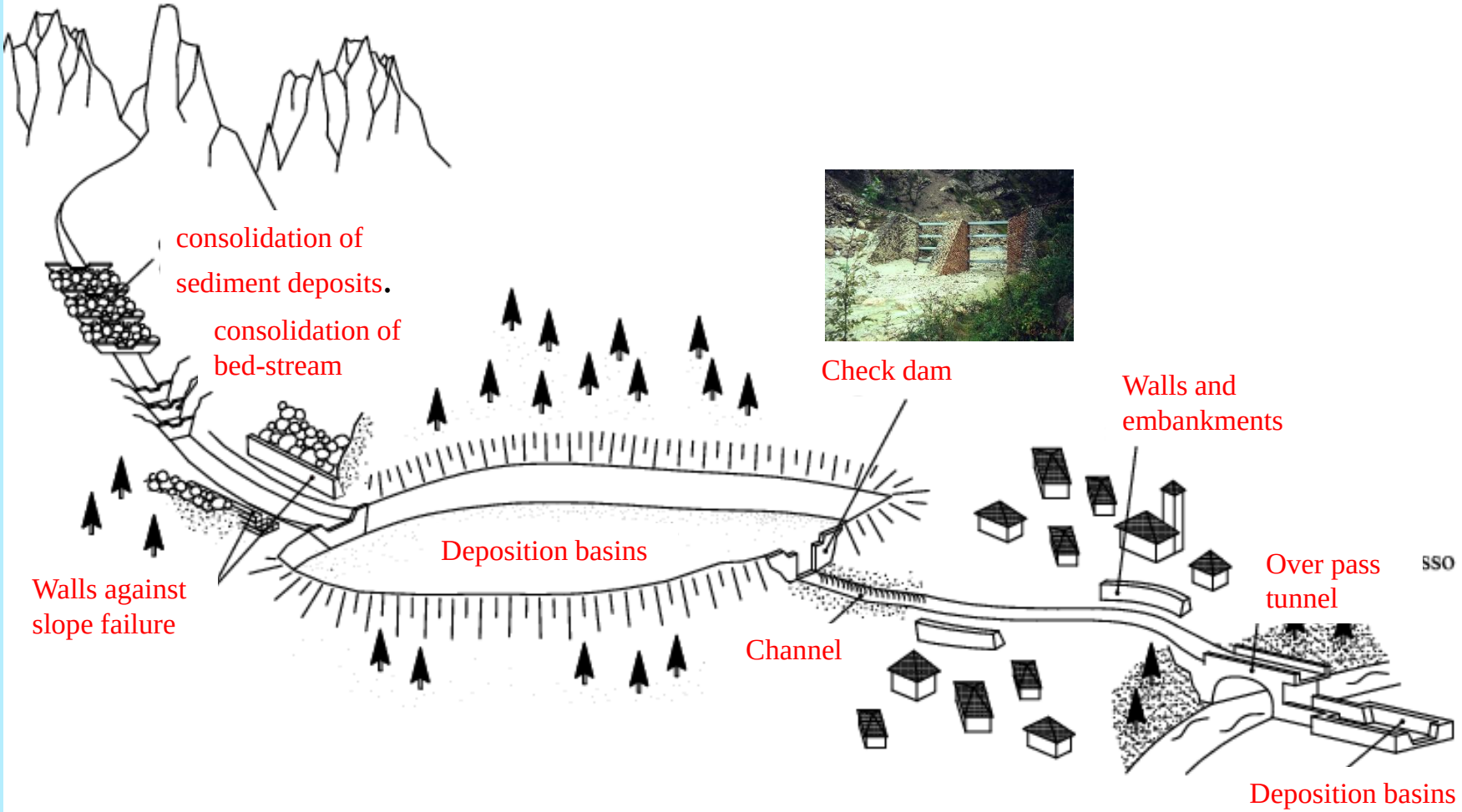
- ***new Hydrological models*** *able to account for this possible climate change are necessary*

Why STEEP STREAMS ?

Defence structures *against debris flows are based on the possible reduction of pick of sediments discharge and operates trough:*

1) ***Deposition basins;***
2) *Distribute retention structures (**grid-type open check dams);***

Why STEEP STREAMS ?



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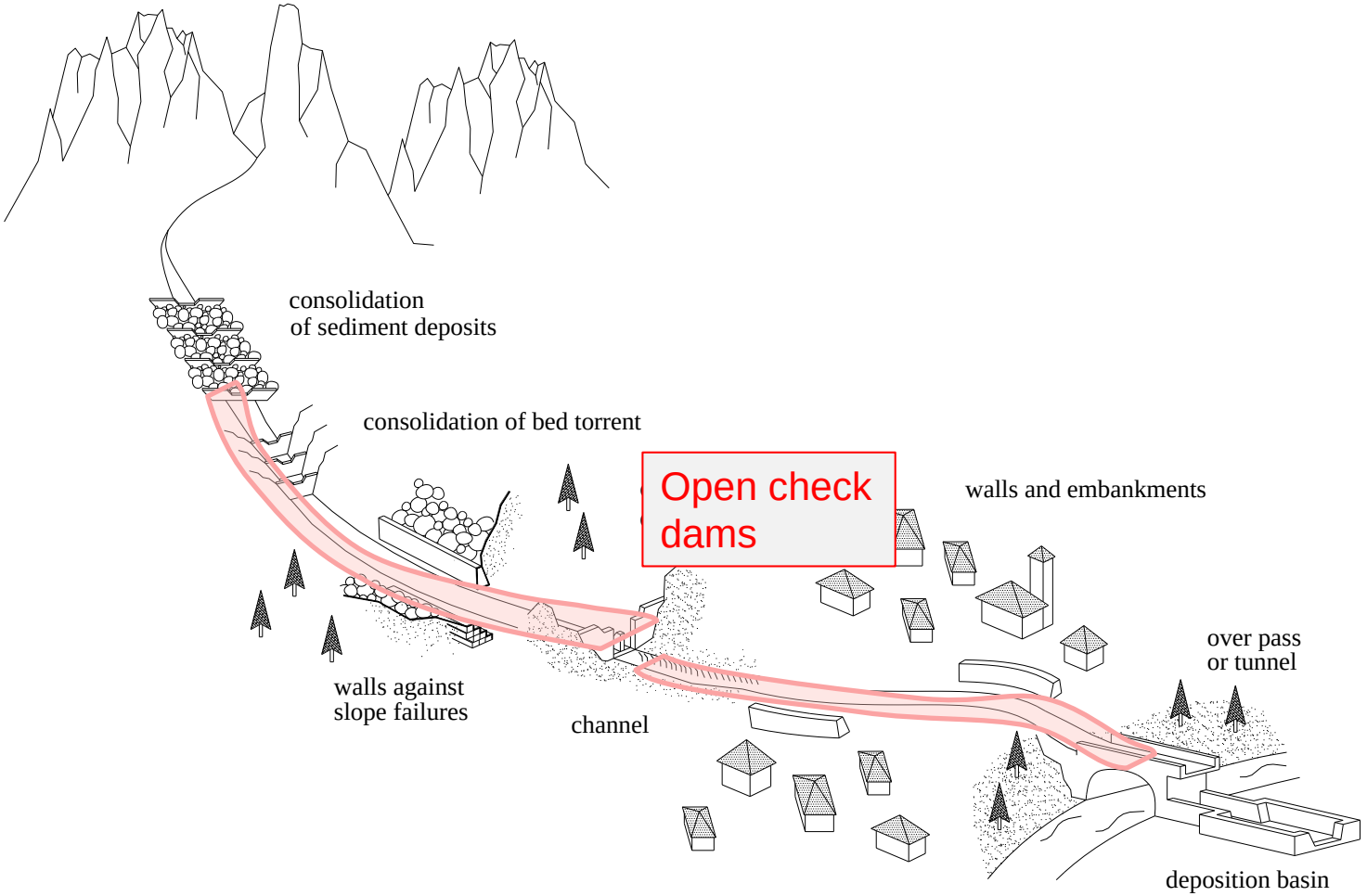

Why STEEP STREAMS?

- *During the events the efficiency of open check dams is very low because very often* ***considerable amount of vegetal material and driftwood blocks the opening****.*
- *The* ***filtering structure*** *loses its capacity to reduce the solid discharge peak, and the open check dam starts to act as a closed dam, thus increasing the natural hazard of the event.*

Why STEEP STREAMS ?

STEEP STREAMS:

STEEP STREAMS aims to develop ***rational criteria*** *for the design of* ***defense structures against debris flows and driftwood*** *able to manage separately sediments and wood.*

STEEP STREAMS Objectives:

OBJECTIVES
O1. Development of a methodology to calculate the **return period** of weather events triggering debris flows in a scenario of **climate change**
O2. A new **2DH two-phase flow numerical model of debris flows**, containing a well-founded rheology and the **driftwood.**
O3. A more precise **procedure to map the debris flow risk**, **taking into account** also the **driftwood**.
O4. A calculation procedure for the **design** of **retention structures** for debris flows.
O5. **New devices to trap vegetal material and wood** without interfering with the lamination of the sediment transport discharge.
O.6 Dissemination.

CONSORTIUM DESCRIPTION

ACRONYM	TOPIC	Coordination	Partners
STEEP STREAMS	**3**		 
Solid Transport Evaluation and Efficiency in Prevention: sustainable techniques of rational engineering and advanced methods		**climate change; mountain basins; debris flows; driftwood; torrent protection works; experimental basins**	

PRINCIPAL INVESTIGATOR	INSTITUTION	COUNTRY
Aronne Armanini	**Università degli Studi di Trento**	**Italy**
Giuliano Di Baldassarre	Uppsala University	Sweden
Antonio Heleno Cardoso	CEris, IST-ID, Universidade de Lisboa	Portugal

STEEP STREAMS' Work Plan:

WP Number	WP Title	Trento	Uppsala	Lisboa
WP1	Project Coordination & Management	L	P	P
WP2	Climate change and hydrology	P	L	P
WP3	Mathematical models	L	P	P
WP4	Defence structure against sediments	L	P	P
WP5	Defence structure against driftwood	P	P	L
WP6	Design of the works in experimental basin	L	P	P
WP7	Dissemination	L	P	P

MANAGEMENT STRUCTURE

A unique governing body, (the **Coordination Team = CT)**, consisting of one representative for each partner, forms the management structure of STEEP STREAMS

Other Teams and Responsibles:

- The **Project Administrative Manager**
- The **Work Package Leaders** (WPL)
- The **Risks Leader** (RL)
- **The Advisory Board,** appointed by the CT.

EXPECTED IMPACTS

The results of the STEEP STREAMS will provide:

1. *New insight in the different aspects of the field;*
2. ***Rational design criteria* of defence structures** *against debris flows and driftwood;*
3. ***Decision support tools for designers;***
4. ***Costs reduction of the structures***
5. *More effective* ***risk mitigation.***

The Strengths of STEEP STEAMS

Operative methodology:

- *Multidisciplinary approach,*
- *Overcoming of the fragmentation, that still exists in the way of treating debris flows and especially in the definition of the protection and prevention strategies;*
- ***Inter-disciplinary** approach, namely cooperation among experts of different scientific areas to pursue the objectives of the project;*