Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of the Environment,
Transport, Energy and Communications DETEC

Federal Office for the Environment FOEN
Hazard Prevention Division

Protection forest management in Switzerland

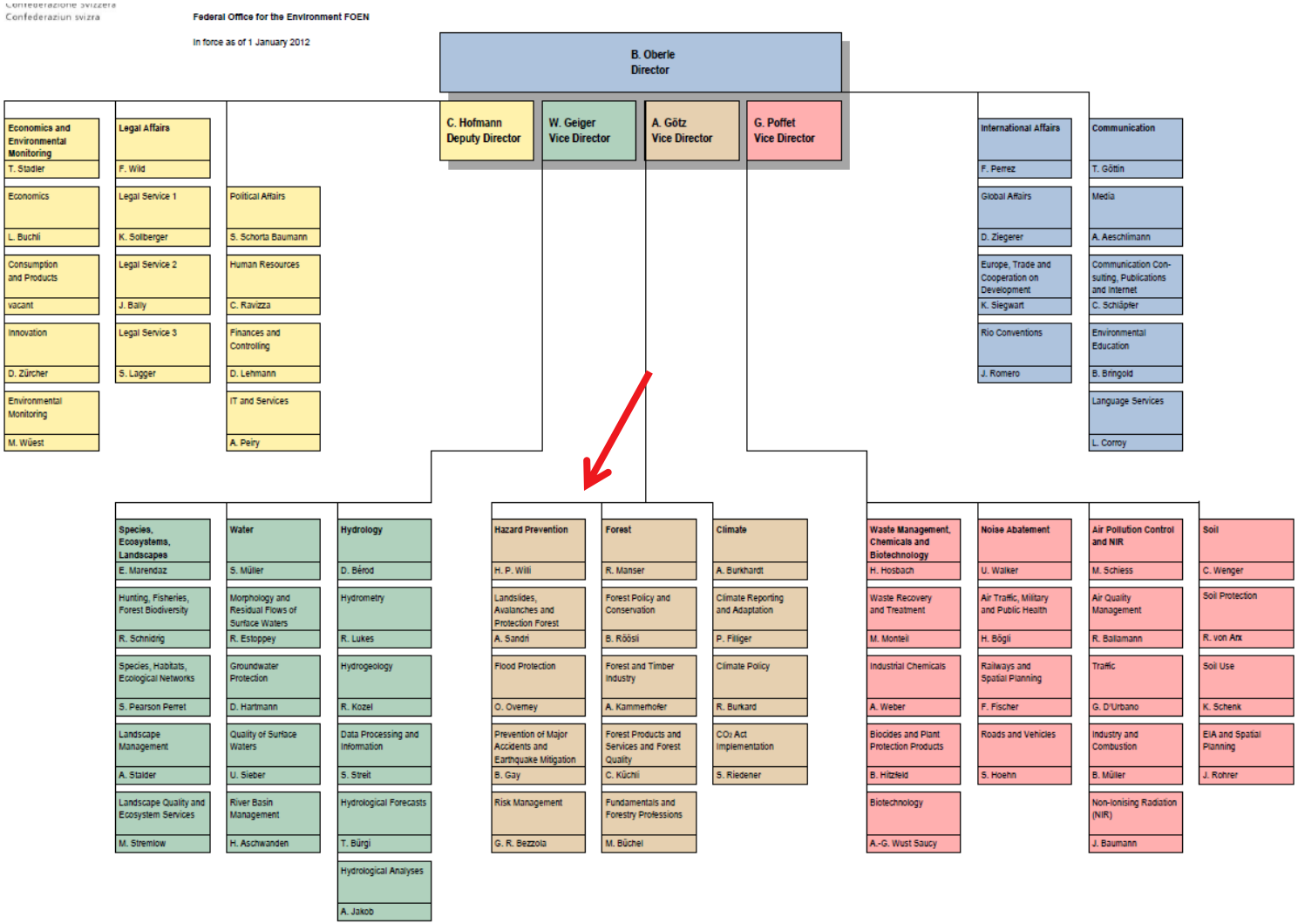
Stéphane Losey, 12 april 2012

Agenda

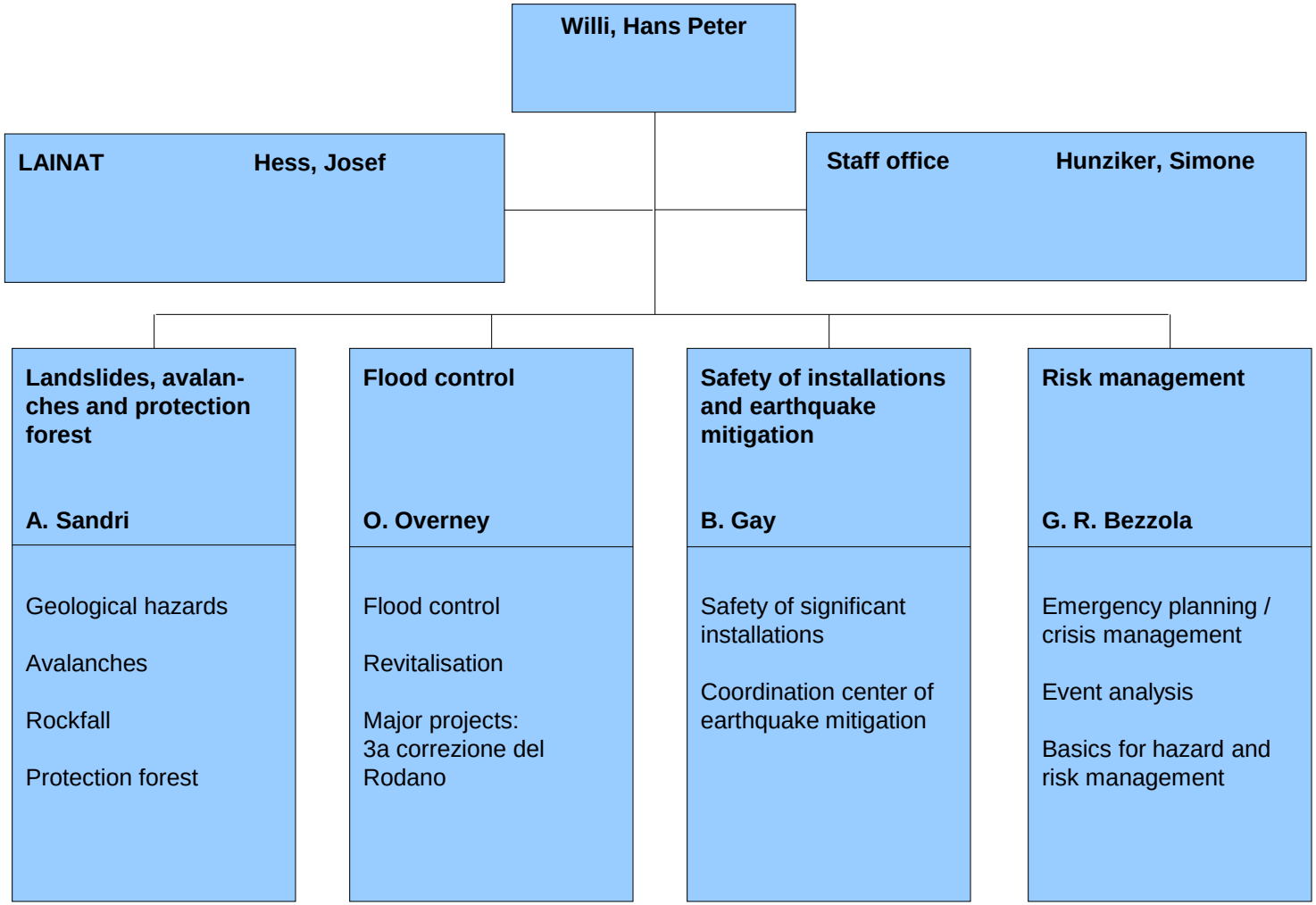
- Introduction
- Definition of protection forests
- Delimitation of protection forests
  - SilvaProtect-CH
  - Torrent related processes
    (modeling of indirect protection forest)
  - Standardized criteria for the delimitation
  - Implementation in the Cantons
  - Scenarios
- Management of protection forests
  - Silvicultural measures
  - Provision of financial subsidies for measures
  - Monitoring

Organisational chart

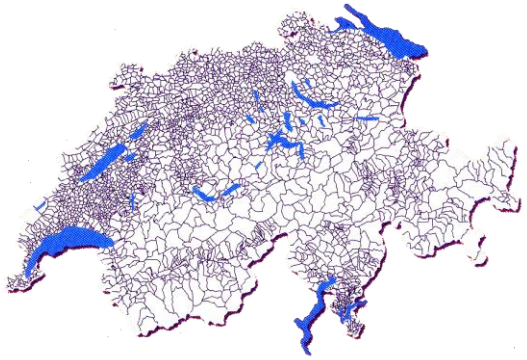
Federal Office for the Environment FOEN



Organisation of Hazard prevention division



CH is a federalistic organized country



Federal Government
- Conceptual work and legislation
- Strategic management

Cantons (26)
- Operational management

Municipalities (< 3000)
- Practical implementation

Federal legislation

Federal Constitution of the Swiss Confederation

Art. 77 Forests

[1] The Confederation shall ensure that the forests are able to fulfill their protective, commercial and public amenity functions.

[2] It shall lay down principles on the protection of the forests.

[3] It shall encourage measures for the conservation of the forests.

Definition of protection forests

“A protection forest is a forest, which protects an acknowledged damage potential against a natural hazard or reduces the involved risks.”

Project SilvaProtect-CH

Phase I goals

- Basis for an objective distribution frame over whole Switzerland.
  → **Protection forest index**

Phase II goals

- Development of standardized criteria for the delimitation of protection forest.
  → **Delimitation by the cantons**

SilvaProtect-CH: Phase I: Approach

Requested:

- **Maximal objectivity**
- **Dynamic data management**

>> level of detail: hazard index map

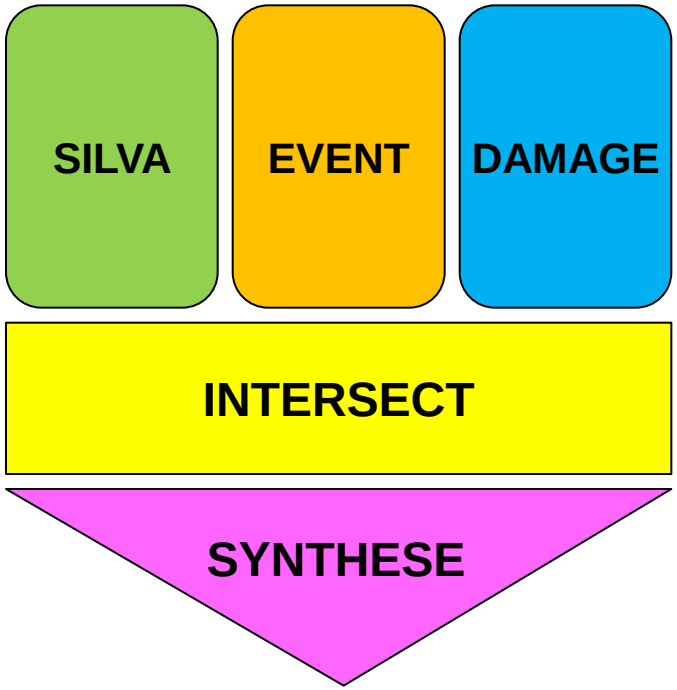
>> computer based modeling

>> modular project implemented in a geographic information system (GIS)

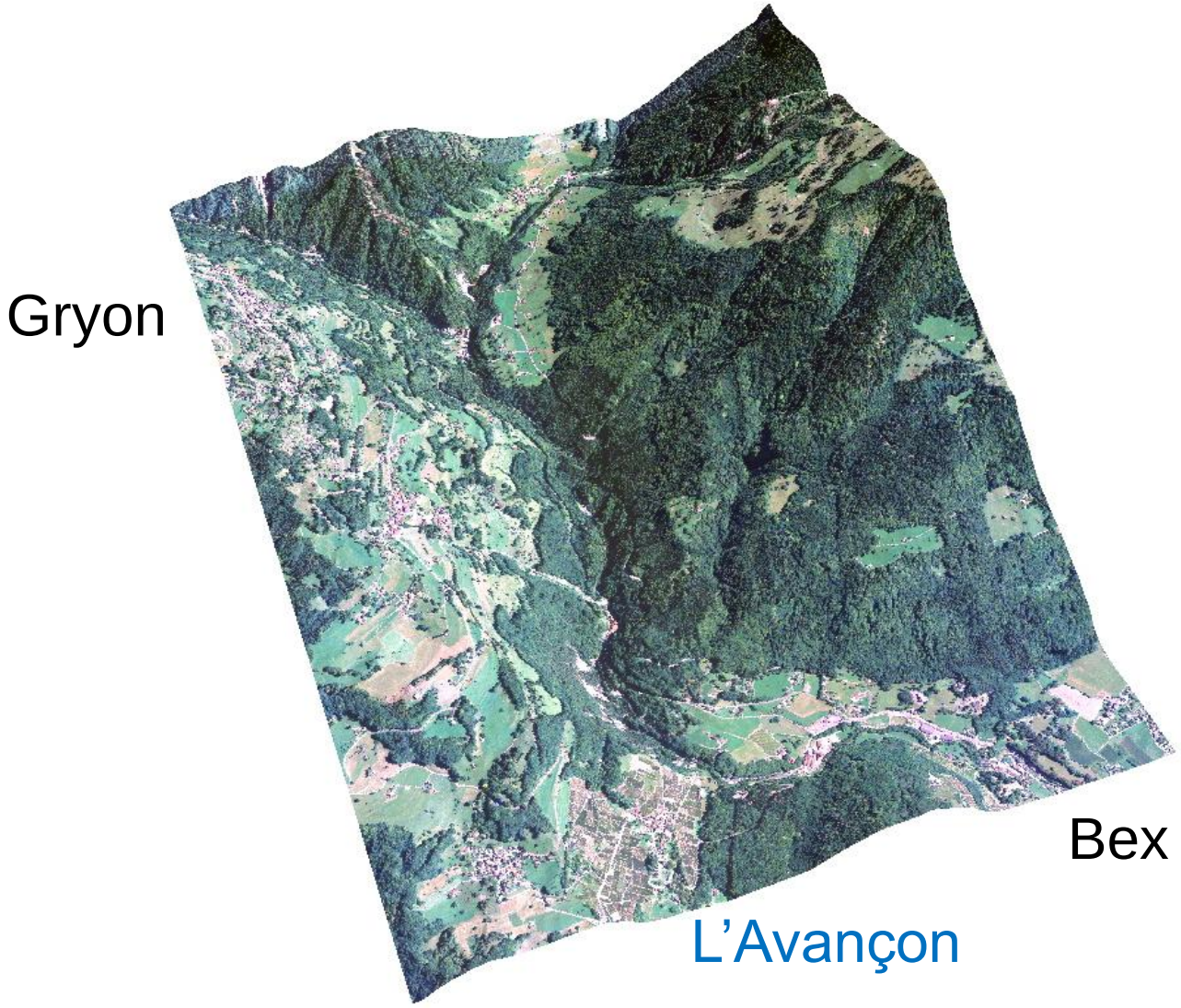
Data compilation

Data model

Data analysis



SilvaProtect-CH: Phase I: Modeling



SilvaProtect-CH Phase I: Module

EVENT

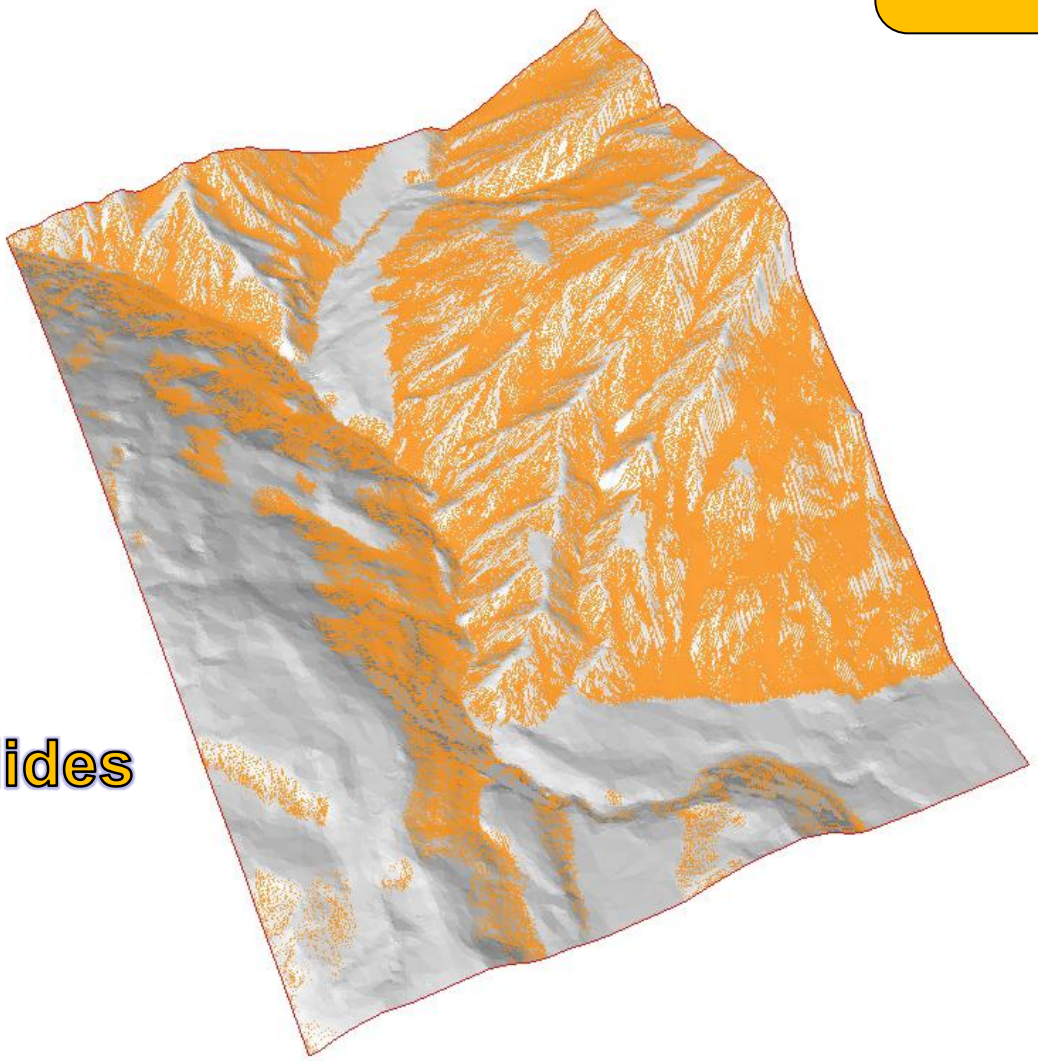
- ***Process-specific modeling*** of the hazard perimeters over whole Switzerland (no field data used, level of detail: hazard index map)

- ***Processes*** considered:
  - ✓ Snow avalanches
  - ✓ Rockfall
  - ✓ Shallow landslides/slope-type debris flow
  - ✓ Torrent related processes

- Parametrisation & validation on ***test perimeters***

SilvaProtect-CH Phase I: Module

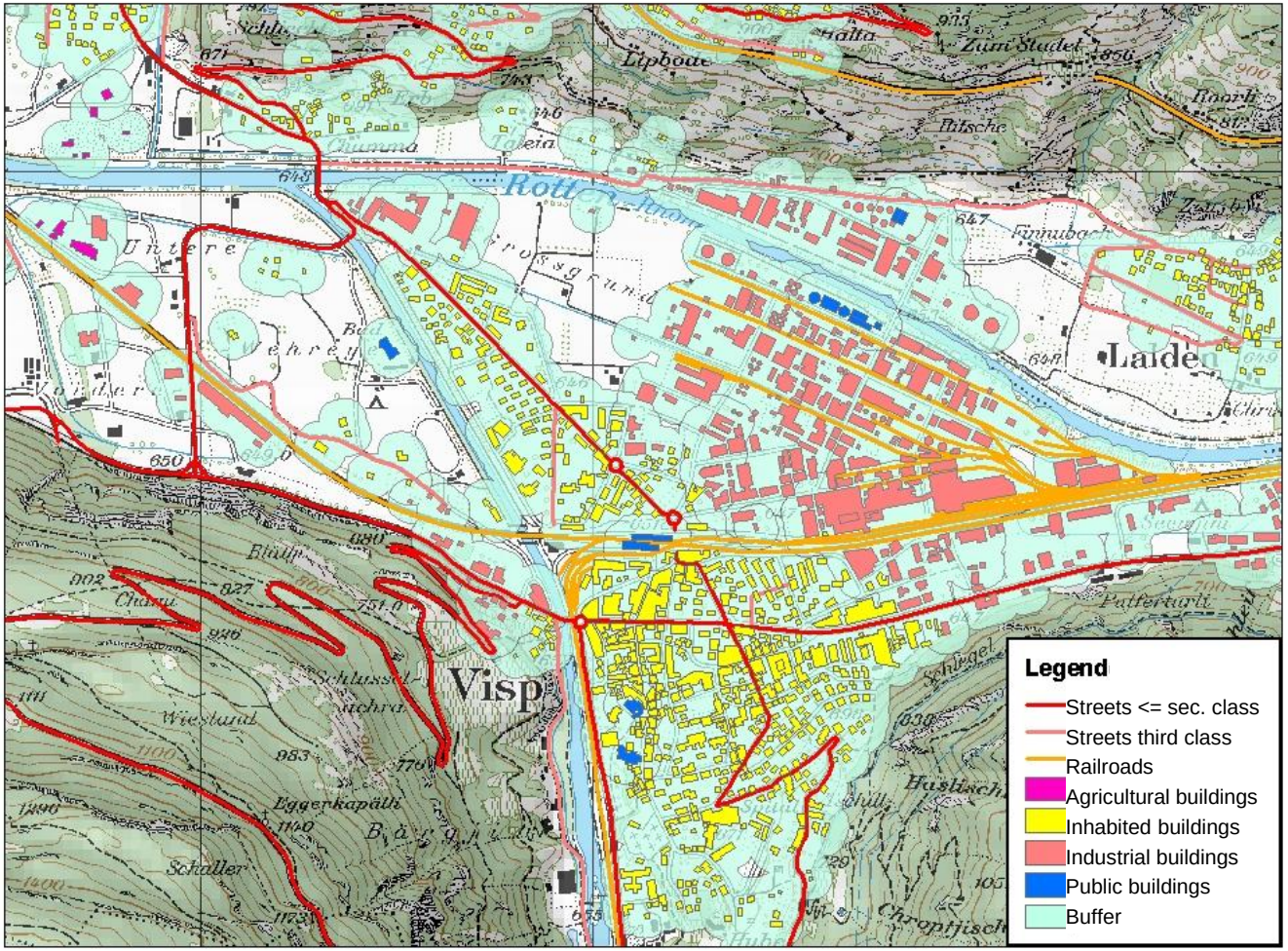
EVENT



Process: Landslides

SilvaProtect-CH Phase I: Module

DAMAGE



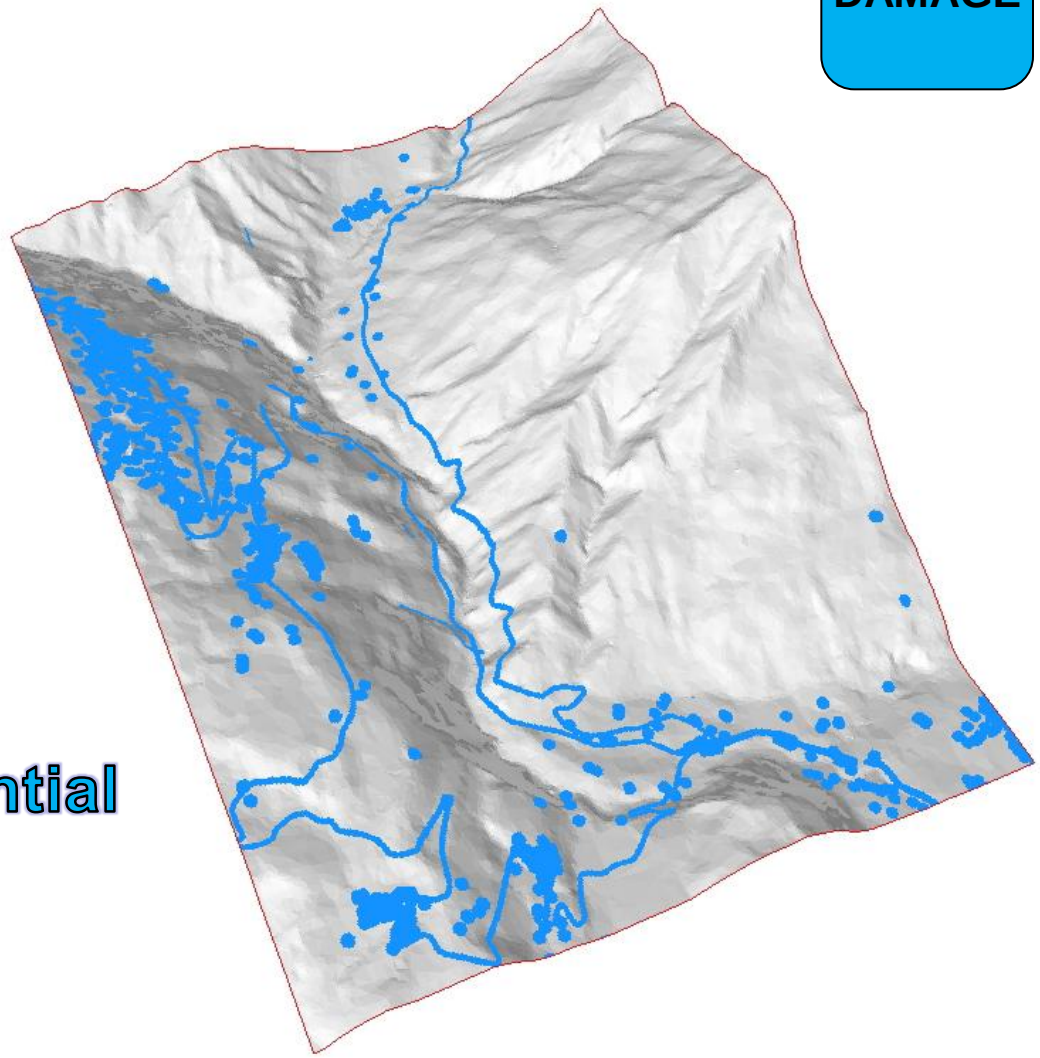
SilvaProtect-CH Phase I: Module

DAMAGE

Type	Objects
Street	Highways
	…
	Streets second class
	Streets third class with services
Railroad	Lines for trains with goods
	…
Buildings	Inhabitated buildings (yearly)
	Inhabitated buildings (temporary)
	Industrial buildings
	Agricultural buildings (main farm buildings)
	…
	Hospital
Tourism infrastructure	~~Historical railways~~
	…
	Objects that should be included in the list but for which there is no data. They will be added as soon as data become available. They were not considered for the protection forest index.
~~Objects crossed~~	Objects that shouldn't be included.

SilvaProtect-CH: Phase I: Module

DAMAGE

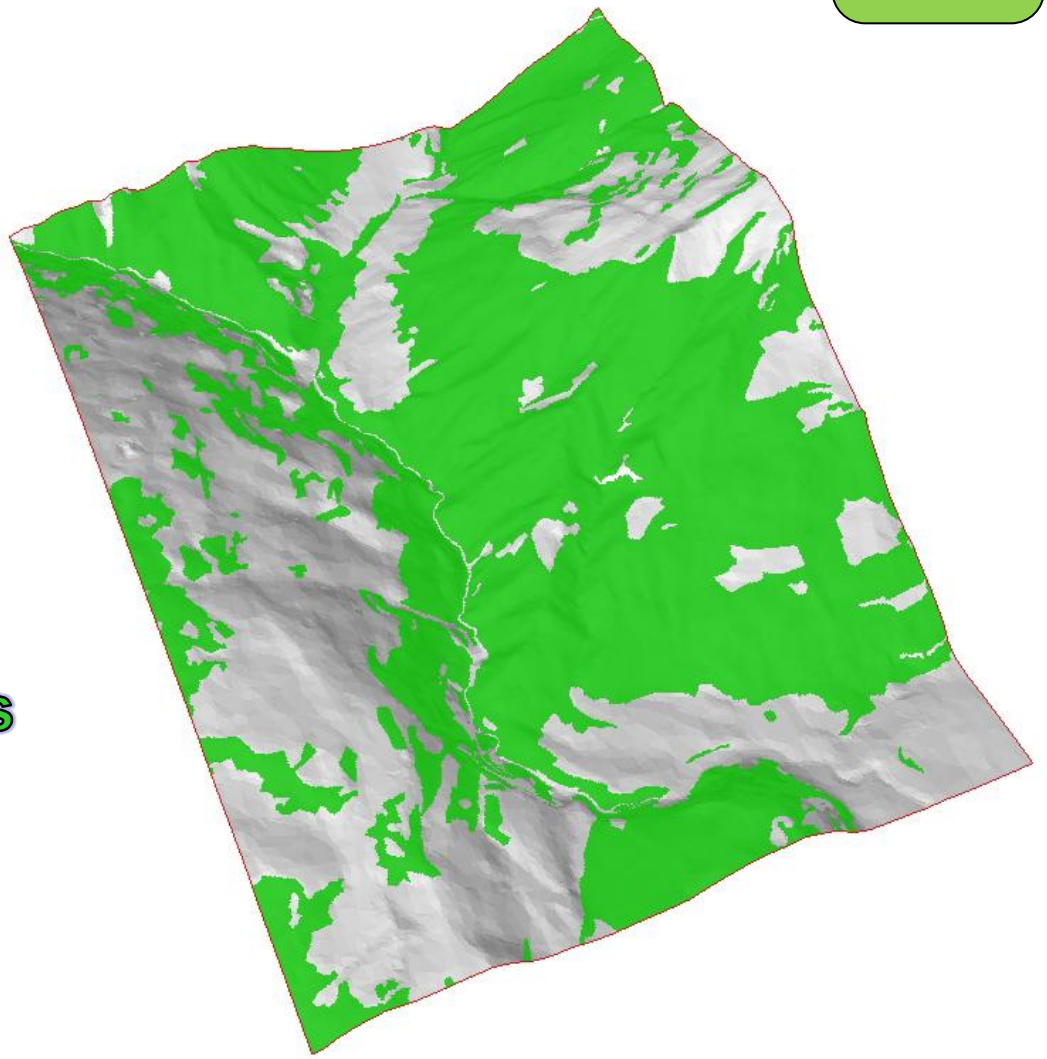


Damage potential

SilvaProtect-CH Phase I: Module

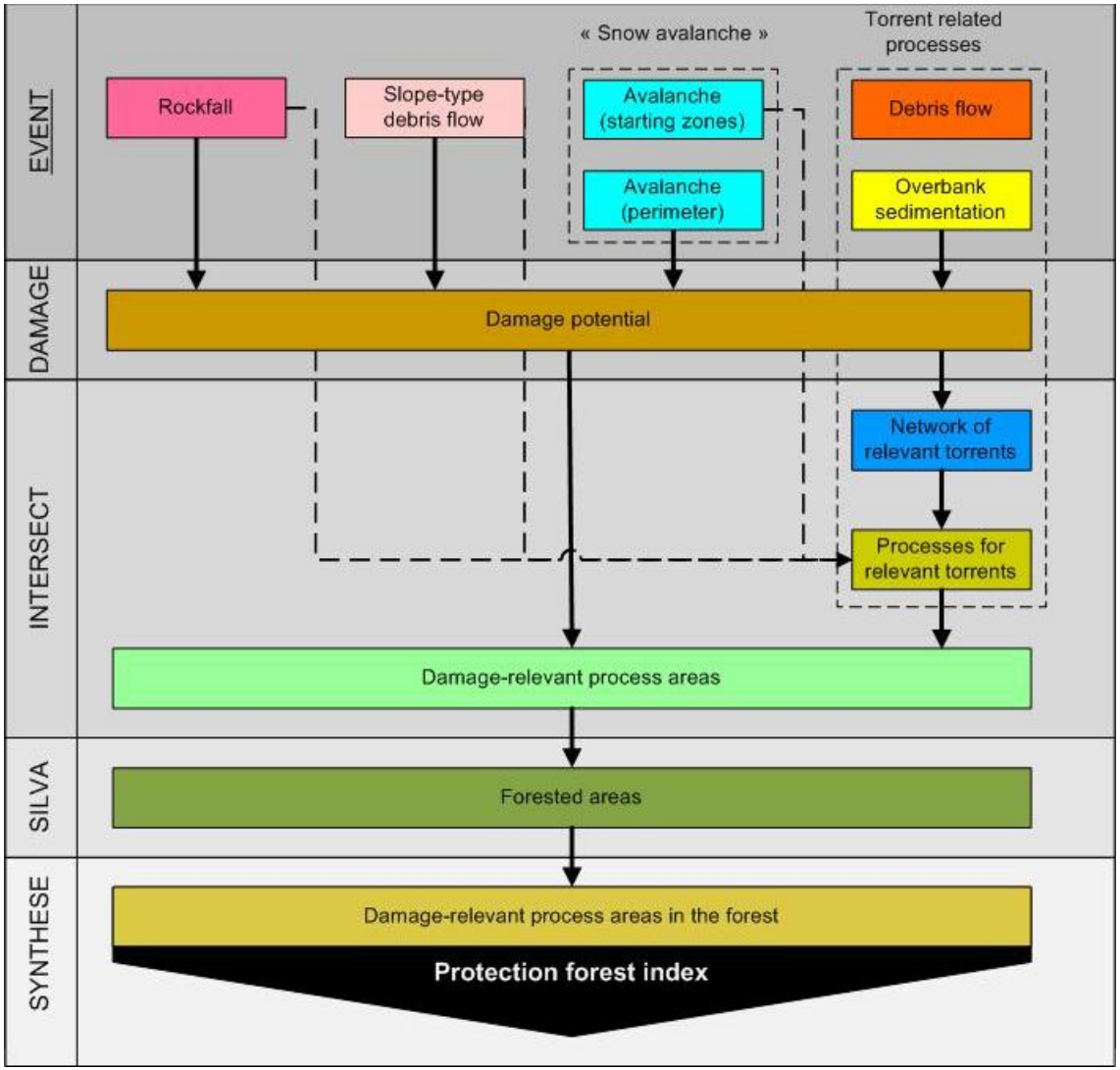
SILVA

Forested areas



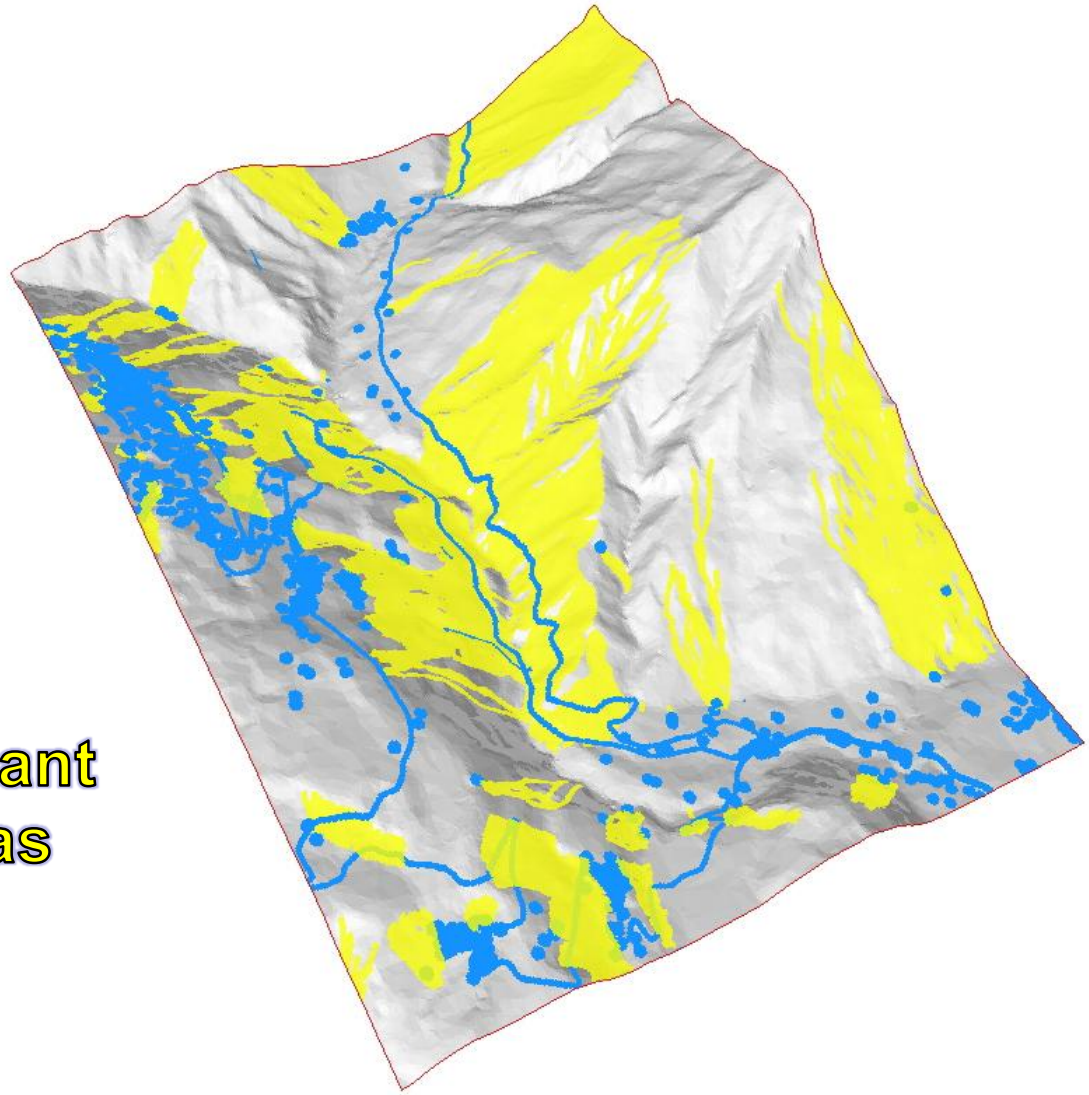
SilvaProtect-CH Phase I: Module

INTERSECT



SilvaProtect-CH Phase I: Module

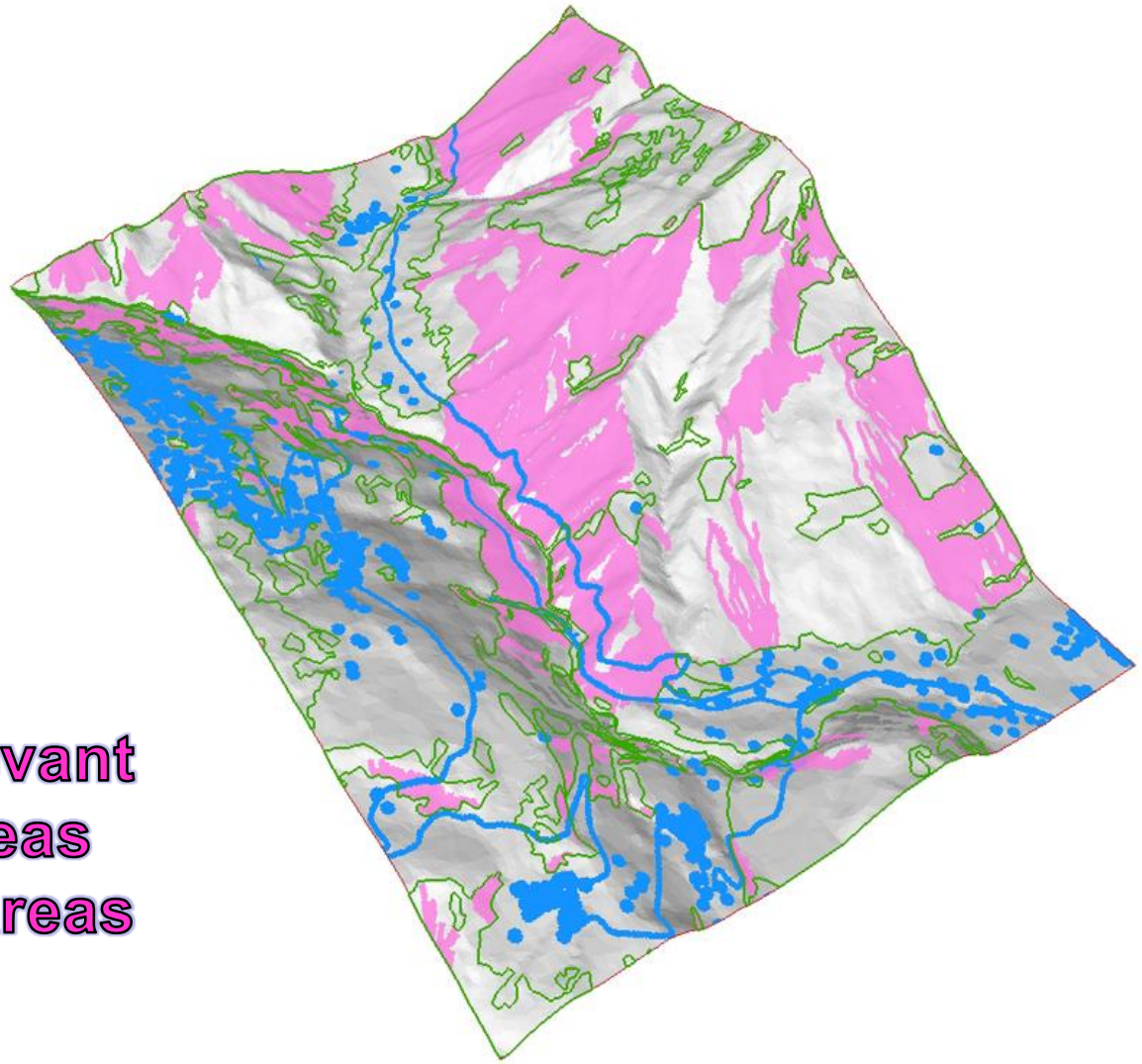
INTERSECT



Damage-relevant process areas

SilvaProtect-CH Phase I: Module

SYNTHESE

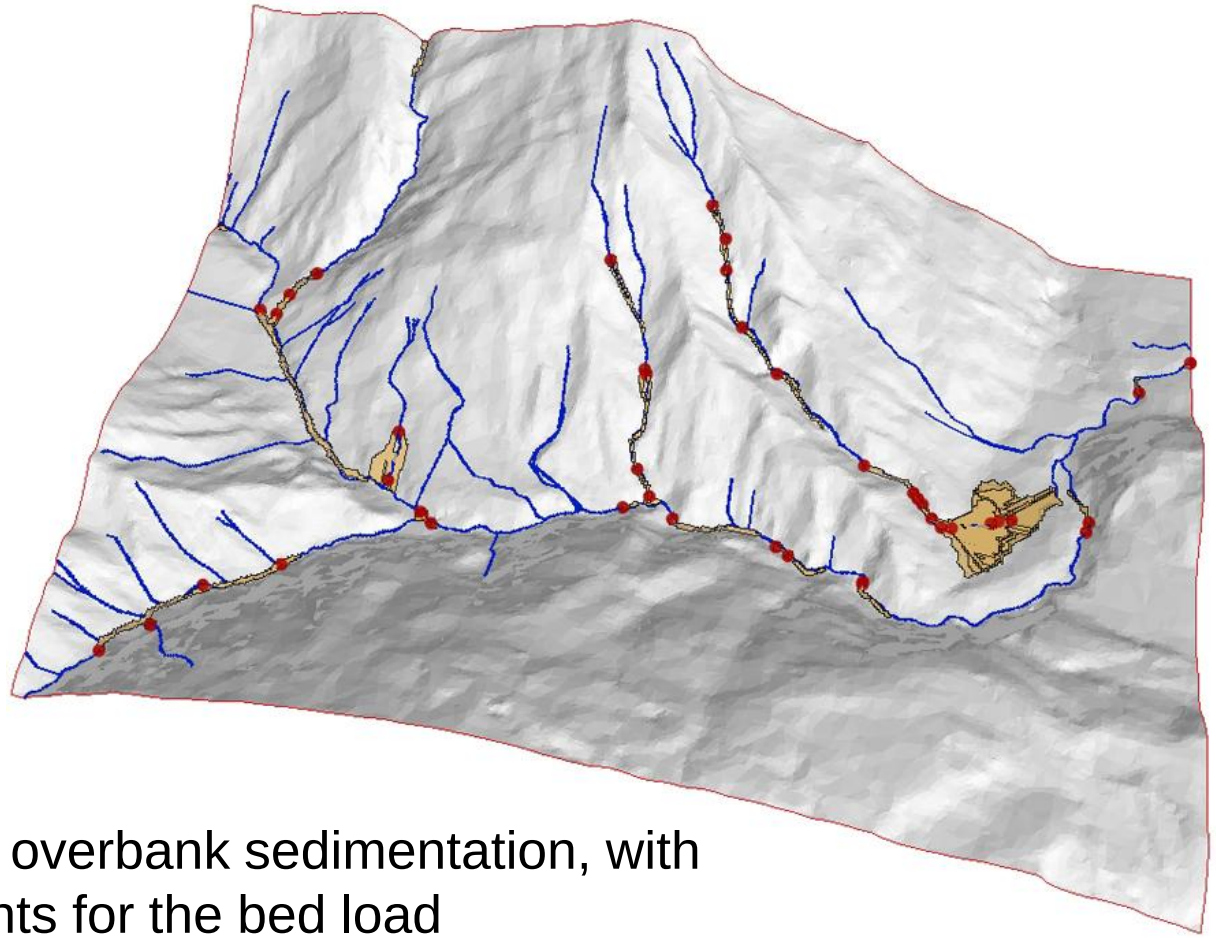


Damage-relevant process areas in forested areas

Torrent related processes

(modeling of forest of indirect protection)

1. Identification of relevant torrents

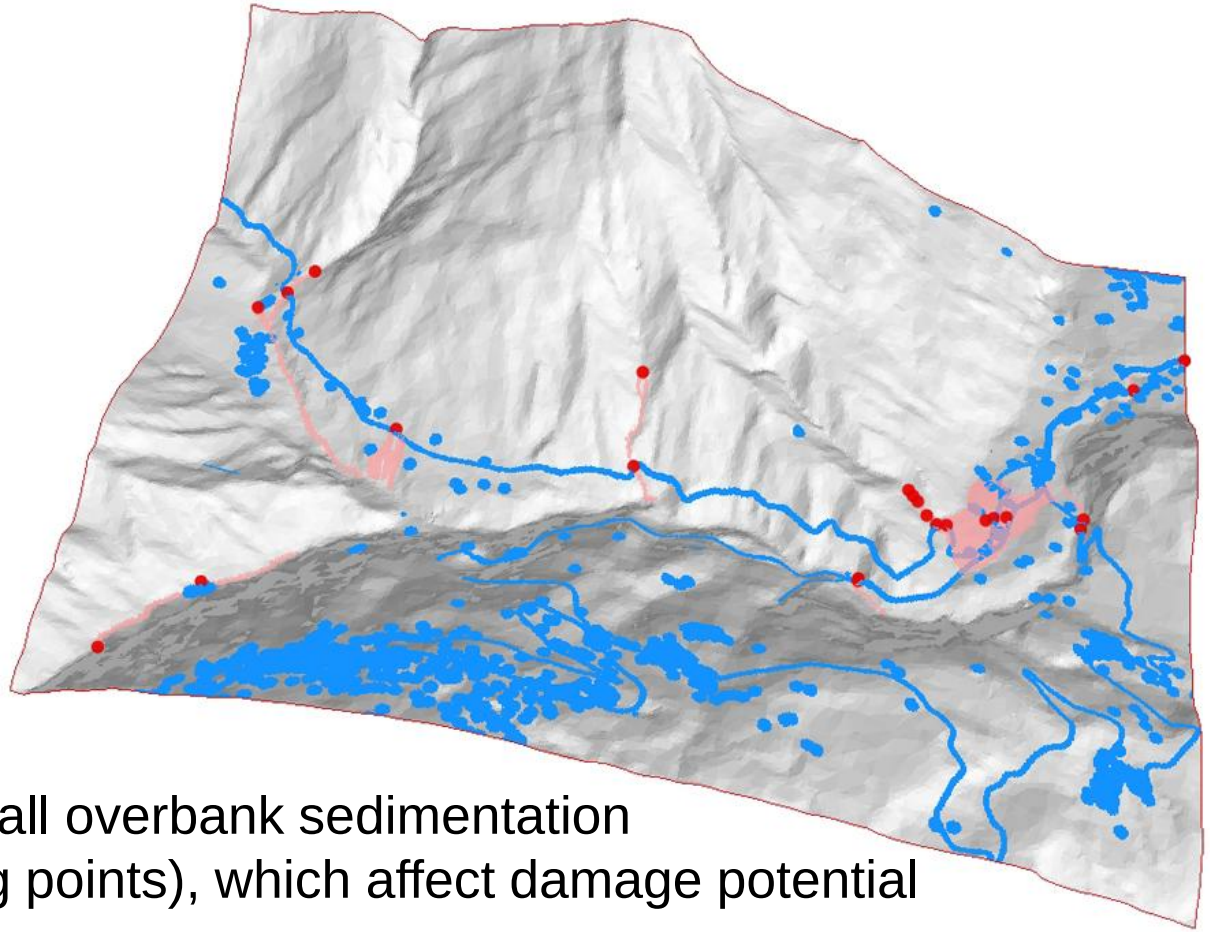


- Modeling of overbank sedimentation, with starting points for the bed load

Torrent related processes

(modeling of forest of indirect protection)

1. Identification of relevant torrents

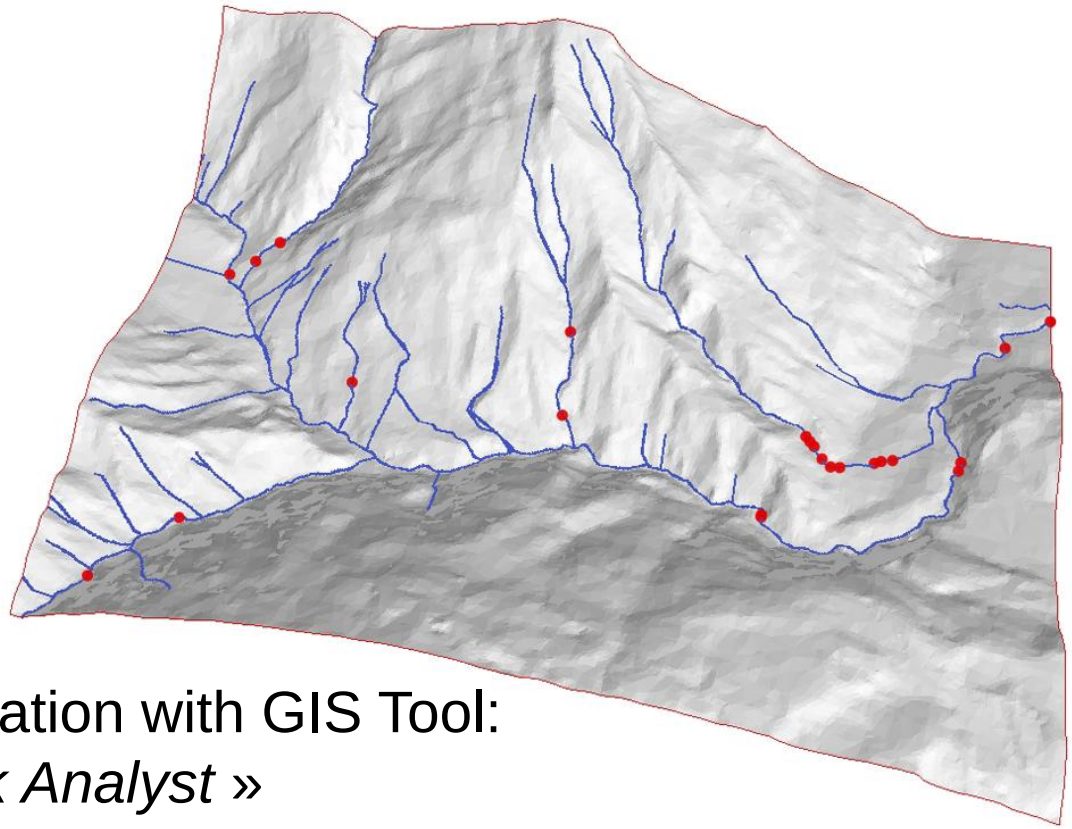


- Selection of all overbank sedimentation (with starting points), which affect damage potential

Torrent related processes

(modeling of forest of indirect protection)

1. Identification of relevant torrents

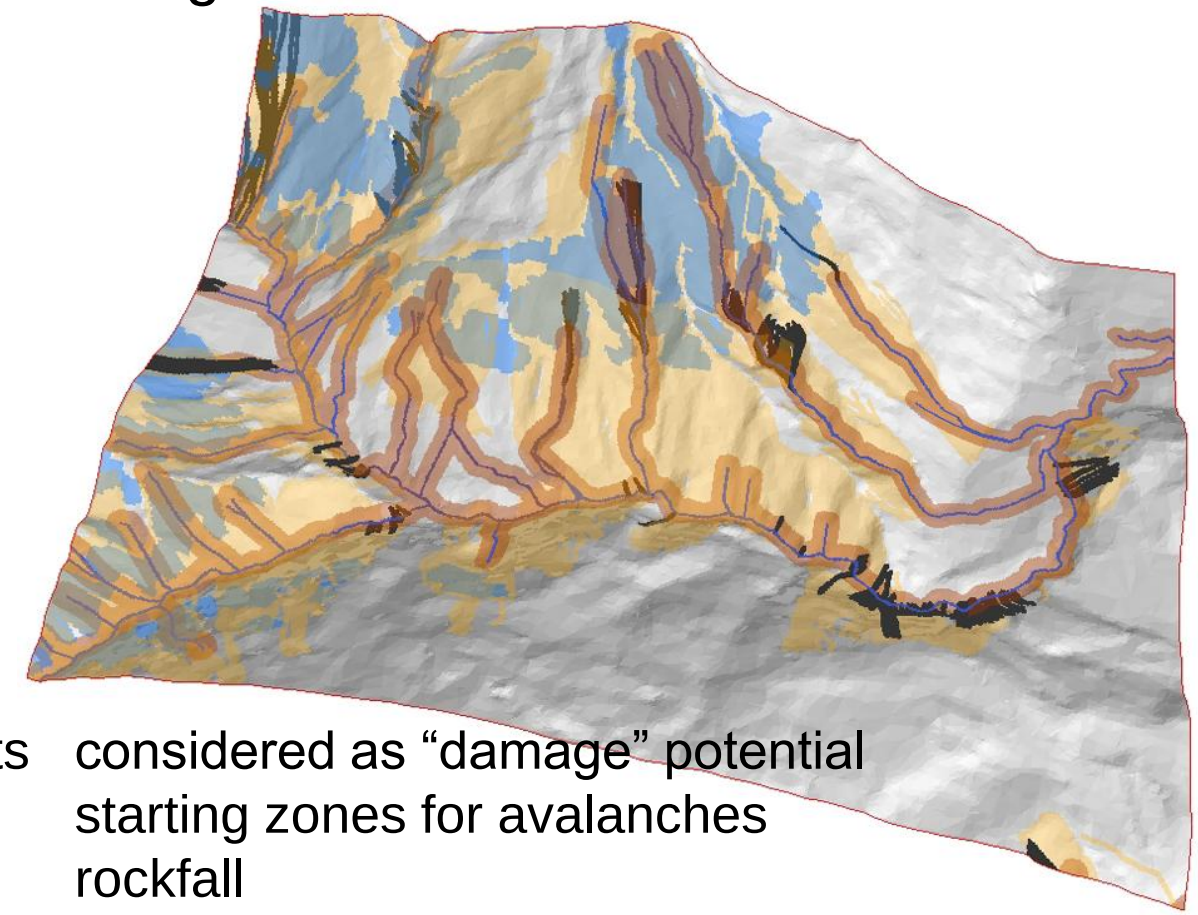


- Manual identification with GIS Tool:
  « *Utility Network Analyst* »
- Conservative method → example
- **Controlling of the relevant torrents by the cantons**

Torrent related processes

(modeling of forest of indirect protection)

2. Processes modeling



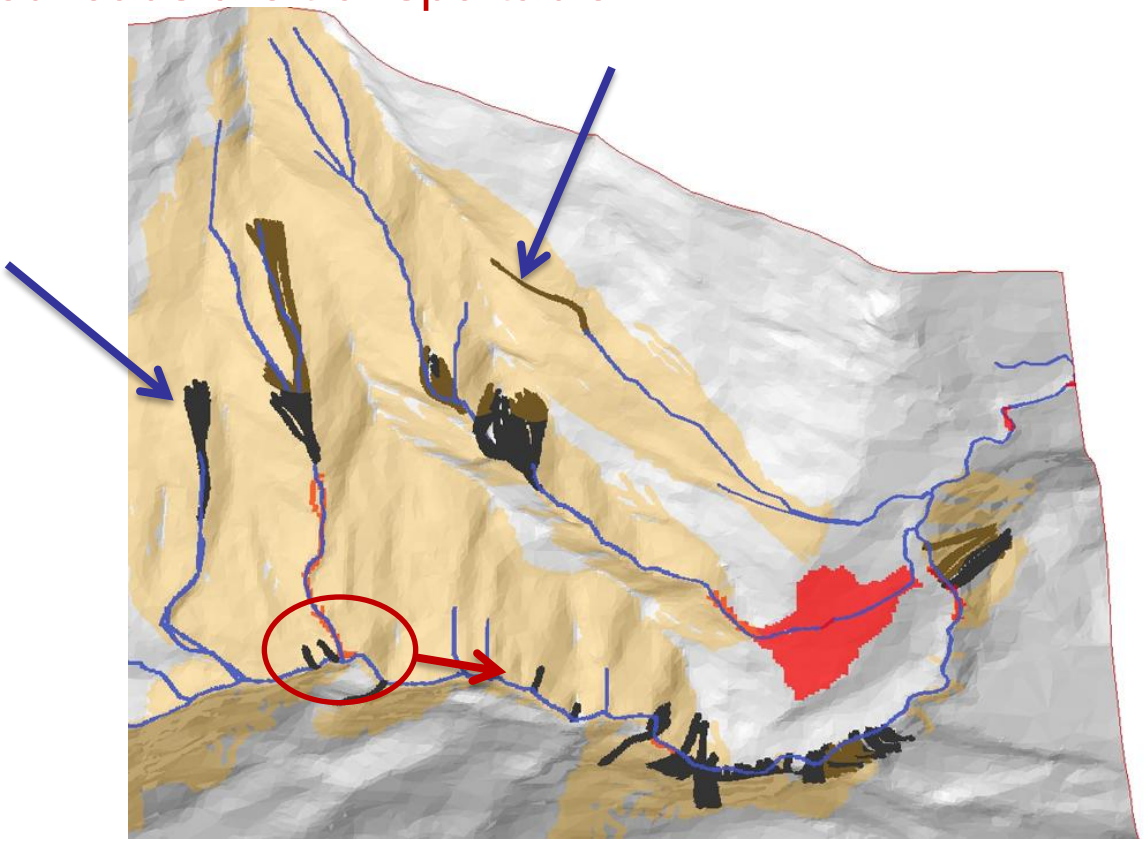
- Relevant torrents considered as “damage” potential
- Blue starting zones for avalanches
- Black rockfall
- Beige landslides
- Braun lateral erosion

Torrent related processes

(modeling of forest of indirect protection)

Analysis of results: identification of relevant torrents

- Which side streams are relevant?
- Which bed loads are transportable?

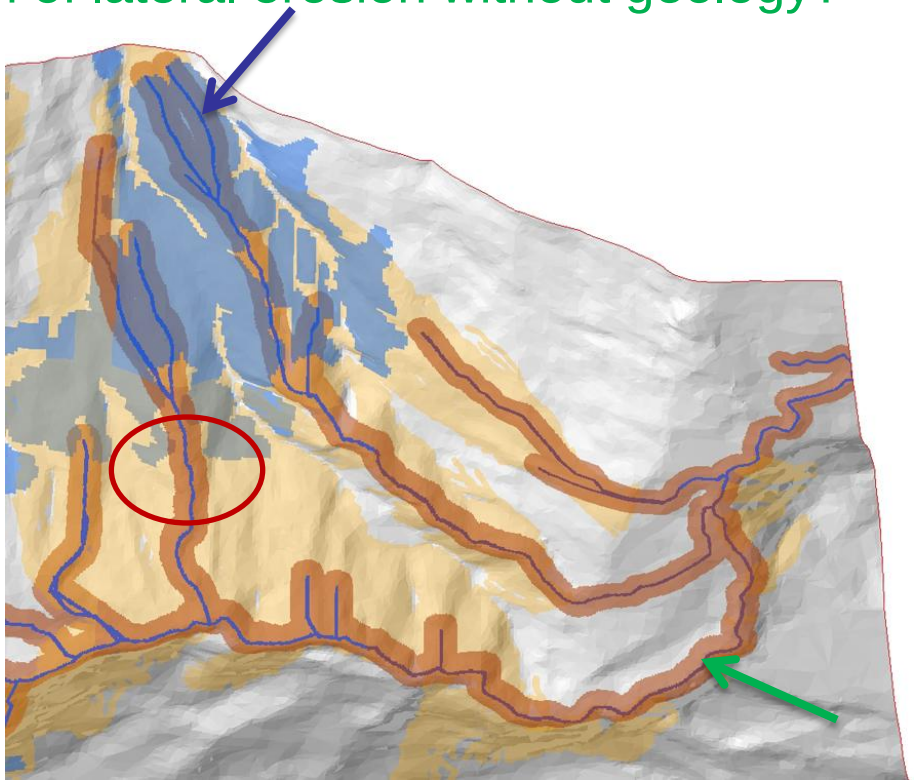


Torrent related processes

(modeling of forest of indirect protection)

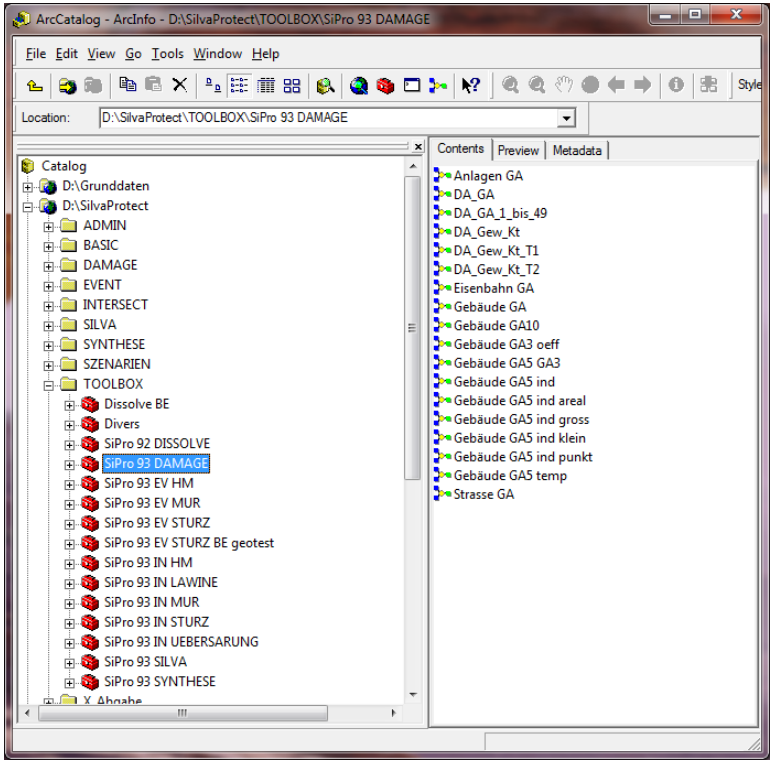
Analysis of results: hazard processes

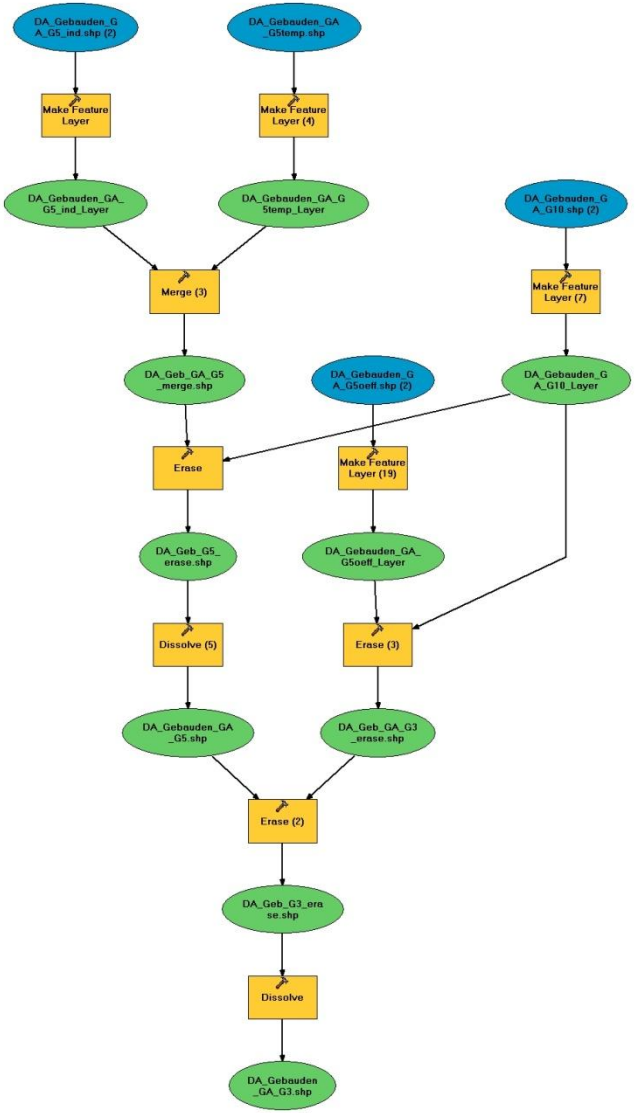
- Starting zones for avalanches?
- Landslide (currently use: geotechnical map scale 250’000)
- Evaluation of lateral erosion without geology?



GIS Modeling SilvaProtect-CH

- Modeling with ModelBuiler and Python





GIS Modelling SilvaProtect-CH

Module	Number of models	Time
Damage	15	5 h
IN avalanches	30	100 h
IN rockfall	30	30 h
IN landslides	30	35 h
Torrent related processes	90	200 h
Protection forest index	1	3 h
TOTAL	200	350 h

Federal legislation

Forest Ordinance

Chapter 4: Maintenance and Use of the Forest Section 1: Forest Management

Art. 18 Forestry planning

[1] The cantons shall issue regulations for the planning of forest management.

[2] The forestry planning documents must describe, at least, the location conditions as well as the **forest functions** and their importance.

[3] In the case of interoperational planning, the cantons shall ensure that the population:

a. is informed of the goals and progress of the planning;

b. may be involved in a suitable manner;

c. may inspect it.

Standardized criteria for the delimitation

- Criteria for additional areas with the 4 processes (SilvaProtect-CH Phase I)
  - Hazard index map, hazard map, event register
  - Avalanches, rockfall, landslides and torrent related processes

- Criteria for additional damage potential
  - Secundary roads
  - Single buildings

- Criteria of readjusting
  - Natural borderlines (ridges, torrent, street, …)
  - Buffer max 100 m

Implementation in Cantons

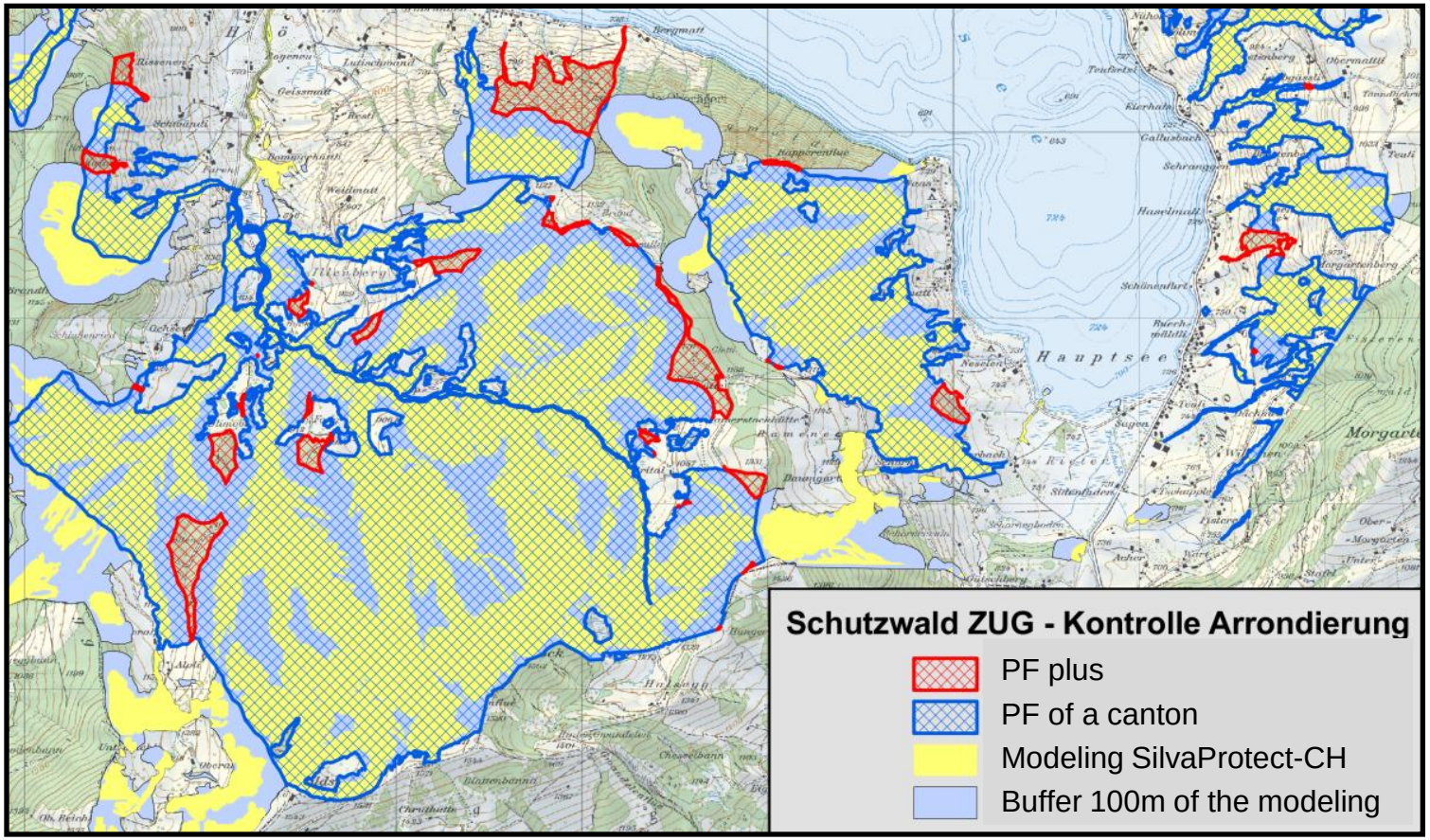
- Explanations in the canton (cooperation)
  - 2-3 times
  - Credibility of the project
  - Job description
  - Control method

- Be sure that the method in canton is correct

→ Together instead of control

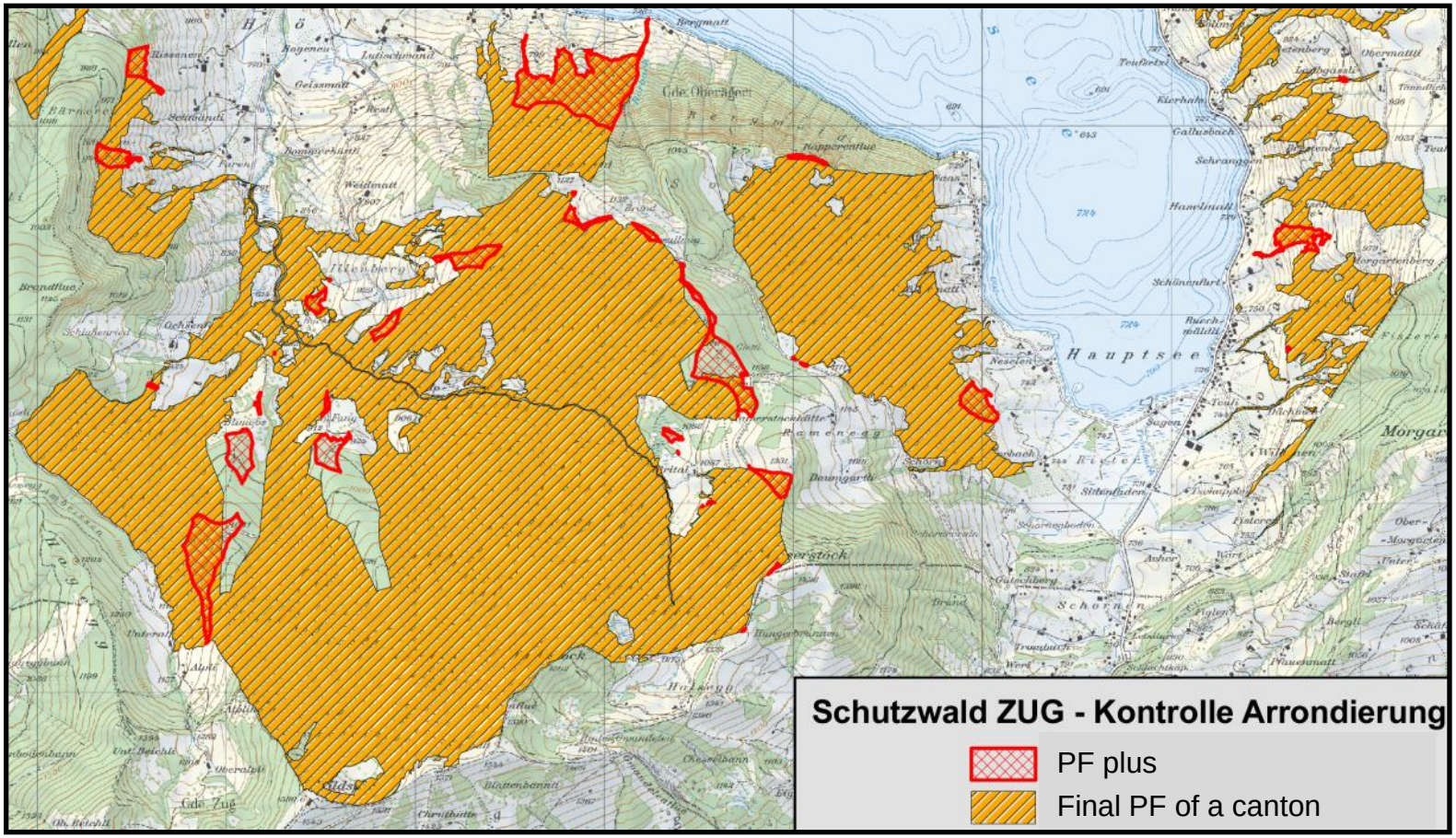
Controlling of delimitation

Controlling: buffer of model 100m & areas > 1ha



- Comparison with standardized criteria

Controlling of delimitation



Controlling of delimitation

48 % of forested areas in Switzerland have a protective function

Scenarios

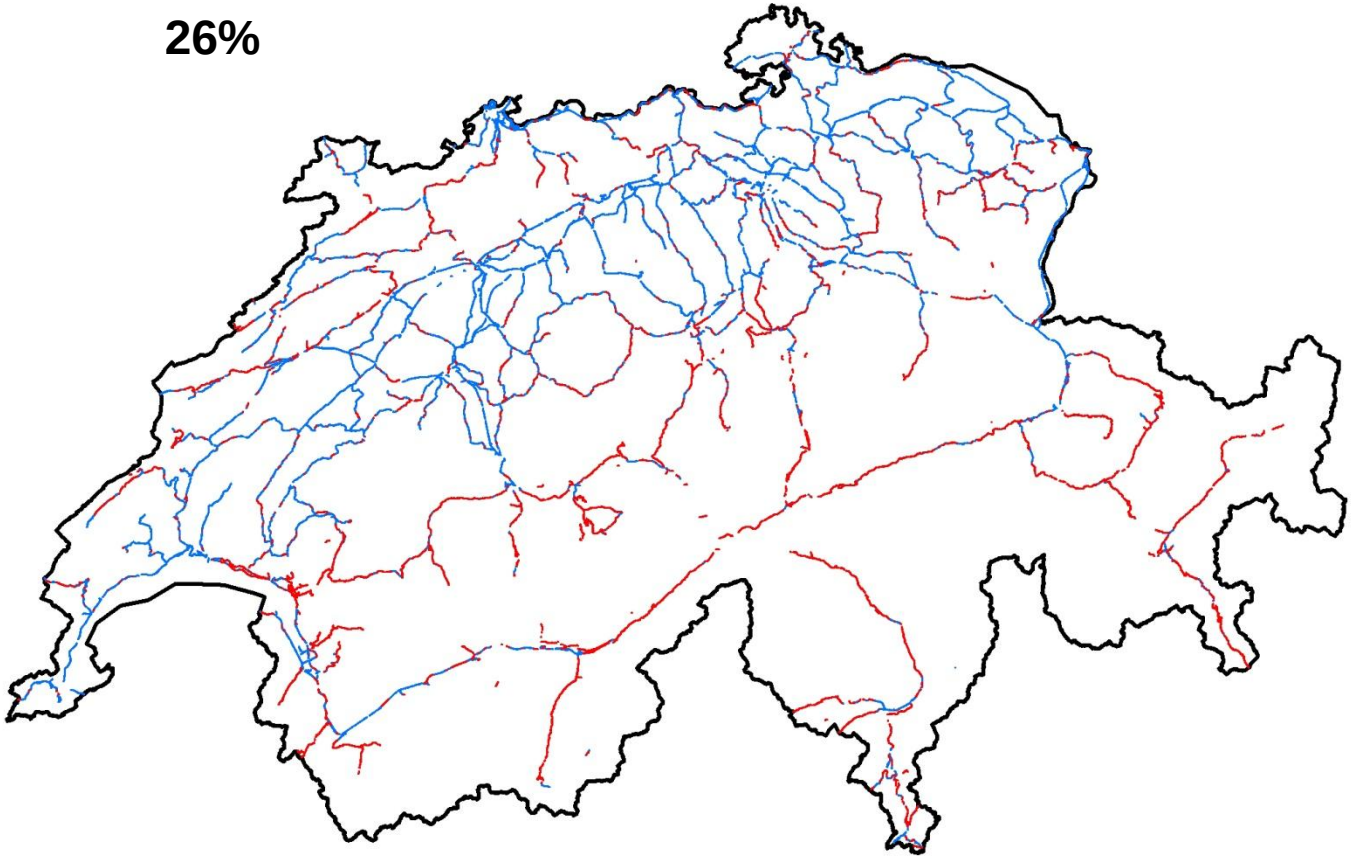
All combination of:

- Natural hazards
  - Landslides, rockfall, avalanches and torrent related processes
- Damage potential
  - Railroads, inhabitated buildings, streets and infrastructures
- Superposition with forested areas

Railroads

Affected railroads

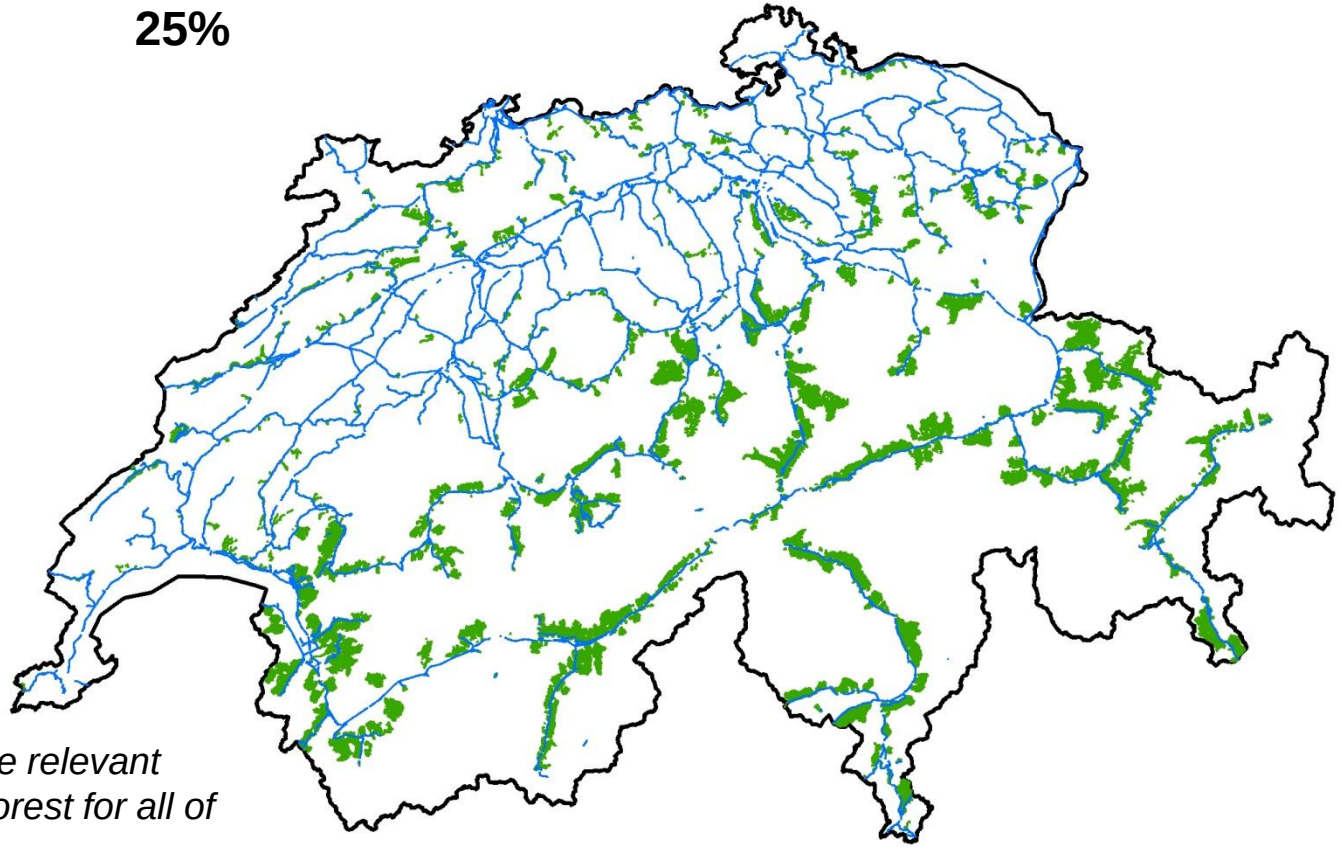
Landslides	17%	Avalanches	13%
Rockfall	6%	Torrent related processes	5%
Total	**26%**		



Railroads

Relevant processes in forested areas* :

Landslides	4%	Avalanches	4%
Rockfall	2%	Torrent related processes	21%
Total	**25%**		

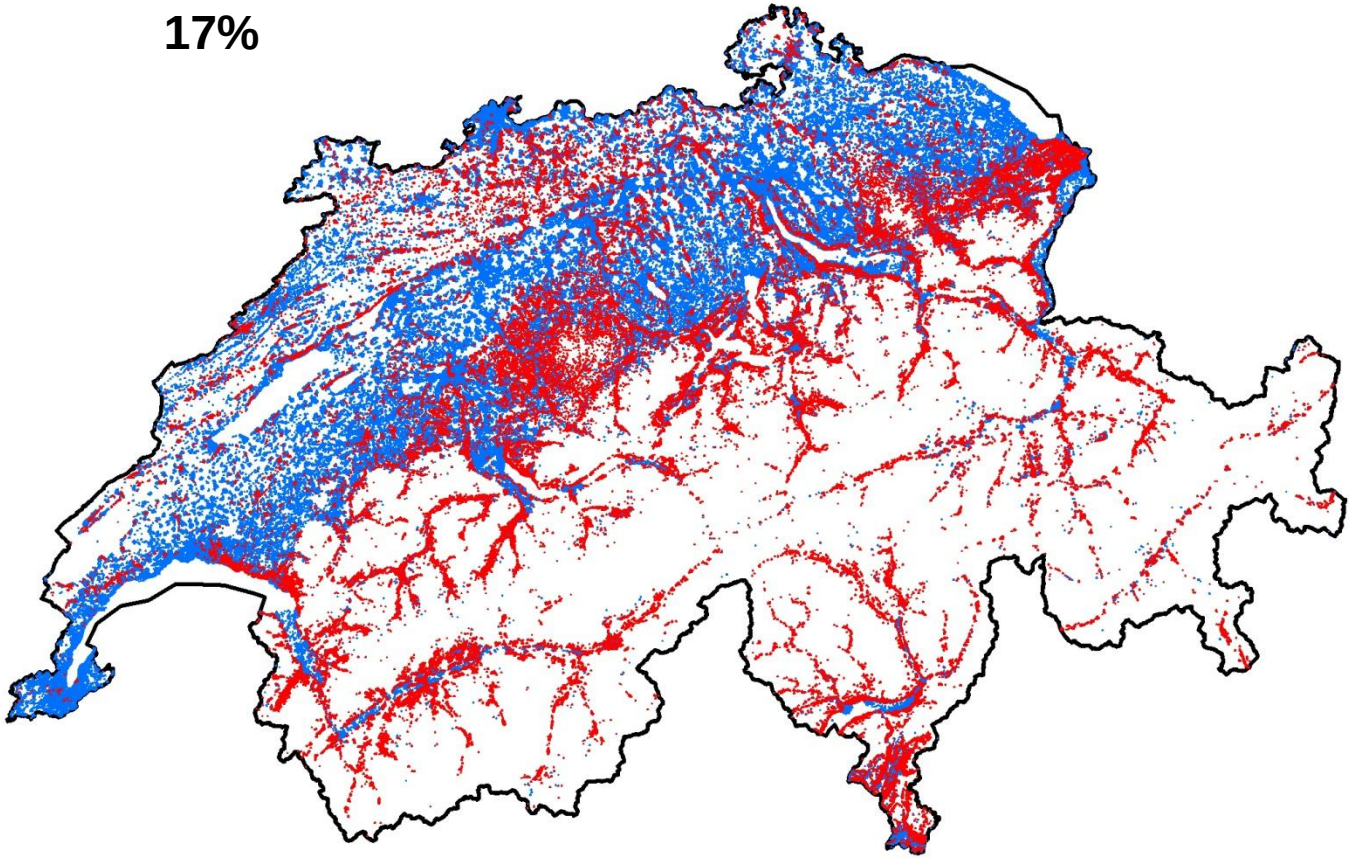


** Percentage of the relevant processes in the forest for all of Switzerland*

Inhabitated buildings (yearly or temporary)

Affected inhabitated buildings

Landslides	9%	Avalanches	7%
Rockfall	1%	Torrent related processes	5%
Total	**17%**		



Inhabitated buildings (yearly or temporary)

Relevant processes in forested areas * :

Landslides	12%	Avalanches	14%
Rockfall	3%	Torrent related processes	65%
Total	**76%**		

** Percentage of the relevant processes in the forest for all of Switzerland*

Federal legislation

Federal Act on Forest

Chapter 4: Maintenance and Use of the Forest
Section 1: Forest Management

Art. 20 Forest management principles

[5] Where required by the protective function of the forest, the cantons ensure a **minimum level of maintenance**.

Silvicultural measures

Monika Frehner

Sustainability and success monitoring in protection forests

Guidelines for silvicultural interventions in forests with protection functions

Federal Act on Forest

Chapter 5: Promotional Measures, Section 2: Financing

Art. 37 Protective forest

1 The Confederation grants to the cantons on the basis of programme agreements global payments for measures necessary for the fulfilment of function of the protective forest, in particular for:

a. the maintenance of the protective forest, including the prevention and remediation of forest damage that endanger the protective forest;

b. the guaranteeing of the infrastructure for the maintenance of the protective forest insofar as it takes the forest as a natural community into account.

2 The amount of financial assistance is determined by the protective forest area to be maintained, the risk to be hindered and the effectiveness of the measures.

Financial means for measures

- Confederation: 50 millions € per year =
  - 40 % of the total net costs
    (after deduction of the timber revenues)

  → About 125 millions € spent annually for the management of protection forest

- Contribution per Canton:
  Proportion of forested area with protective function (damage-relevant process areas in forested areas) of the Canton compared to the entire area with protective function in Switzerland.

Financial means for measures

- Program agreement with each Canton

- Silvicultural measures for the maintenances and improvement of the protective forest
  → area to treat
  → 4’100 € per hectare
  → silvicultural measures
  → forest protection (p. ex. Organisms)
  → measures for game

- Measures to maintain and improve the infrastructure (e.g. maintenance of forest roads)

Monitoring

- Operational management in the Cantons
- Implementation of the actual measures in the forest

  → NaiS

Examples

Examples

Examples

Examples

Examples

Examples

Examples

Thank you for you attention

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