



**BUNDESMINISTERIUM
FÜR NACHHALTIGKEIT
UND TOURISMUS**

WILDBACH- UND LAWINENVERBAUUNG

die-wildbach.at

THE AUSTRIAN CONCEPT FOR SEDIMENT MANAGEMENT IN TORRENTIAL CATCHMENTS

Austrian Federal Ministry for Sustainability and Tourism/
Avalanche and Torrent Control, Austria

Susanne Mehlhorn
Florian Rudolf-Miklau
Markus Moser



TODAY

1. HISTORICAL DEVELOPMENT
2. FACTS AND FIGURES
3. PROBLEM STATEMENT
4. SEDIMENT MANAGEMENT/ TREATMENT AUSTRIA
5. OUTLOOK



SEDIMENT MANAGEMENT

- Sediment management is one of the central tasks in the protection against natural hazards in alpine catchments
- Comprises sediment from torrents and also landslides and rockfall



SEDIMENT MANAGEMENT – PRINCIPLES

- Torrents transport a high amount of sediment to the debris cone and receiving waters
- Protection measures prevent the deposition on debris cones
- Change of the natural sediment regime

3 Principles of sediment management

- Keep sediments in the torrent/river system
- Is this not possible than try utilize sediment (raw material, building material, agriculture)
- Last option: landfill

HISTORICAL DEVELOPMENT

at the end of the 19. Century

after 1945

since 1970

aim

reduction of potential loss
decrease of erosion
systematic control
measures

debris control

transformation of
process

task/function

local protection
decrease of depth- and
lateral erosion
integral watershed
management

debris retention
temporary storage
with dosing dam

dosing
filtering
energy dissipation
woody debris filtering

measures

chain of checkdams
forestal + technical
measures

local measures

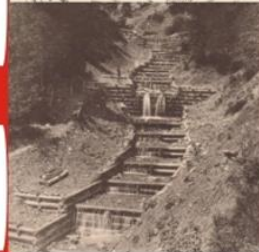
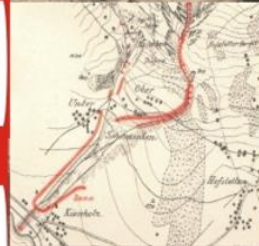
dam combination

control measures

walls, derivation of the
solid body barrier
afforestation
drainage

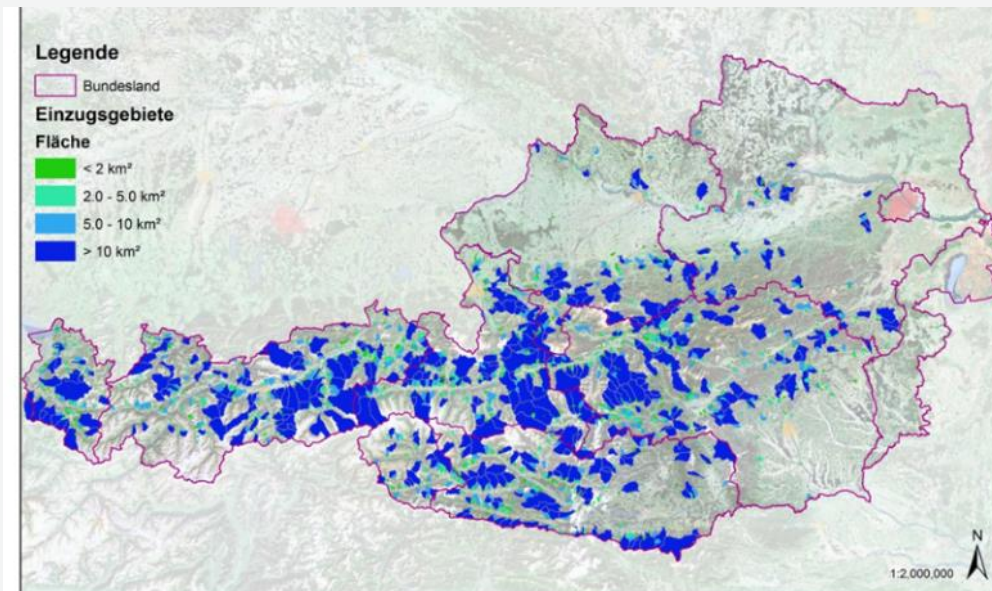
slit barrier
slot barrier

slit/slot barrier
for dosing/filtering
debris flow breaker
crash dams
woody debris filter





FACTS AND FIGURES	
Torrent Catchments Austria	12.000
Catchments with sediment management measures	2.200
Protection measures for sediment management	5.816
Key protection measures	2.399
Bed load retention volume	25 Mio. m ³





PROBLEM STATEMENT

- 25 Mio m³ total retention volume
- Average of 0.5 – 1.0 Mio m³/ year sediment deposition in course of events
- Even higher in years with large-scale events
- Clearing costs up to 12-20 € /m³
- High financial burden
- Lack of appropriate deposition sites

- Complex legal framework in regards to temporary storage and deposition (water, waste, tax,....law)



INCREASE DUE TO GLOBAL/CLIMATE CHANGE?

- last years events have shown a clear increase of sediment dominated extreme events (bed load, debris flow, mass movement)
- also the moved masses are increasing
- influenced by:
 - Retreat of glaciers and permafrost
 - Increasing local heavy rainfall events
 - Seasonal increase of rainfall amounts
 - Soil consolidation and saturation
 - Increasing soil erosion processes due to changes in vegetation



**Debris Flows 2017:
Styria, Salzburg und Tyrol**



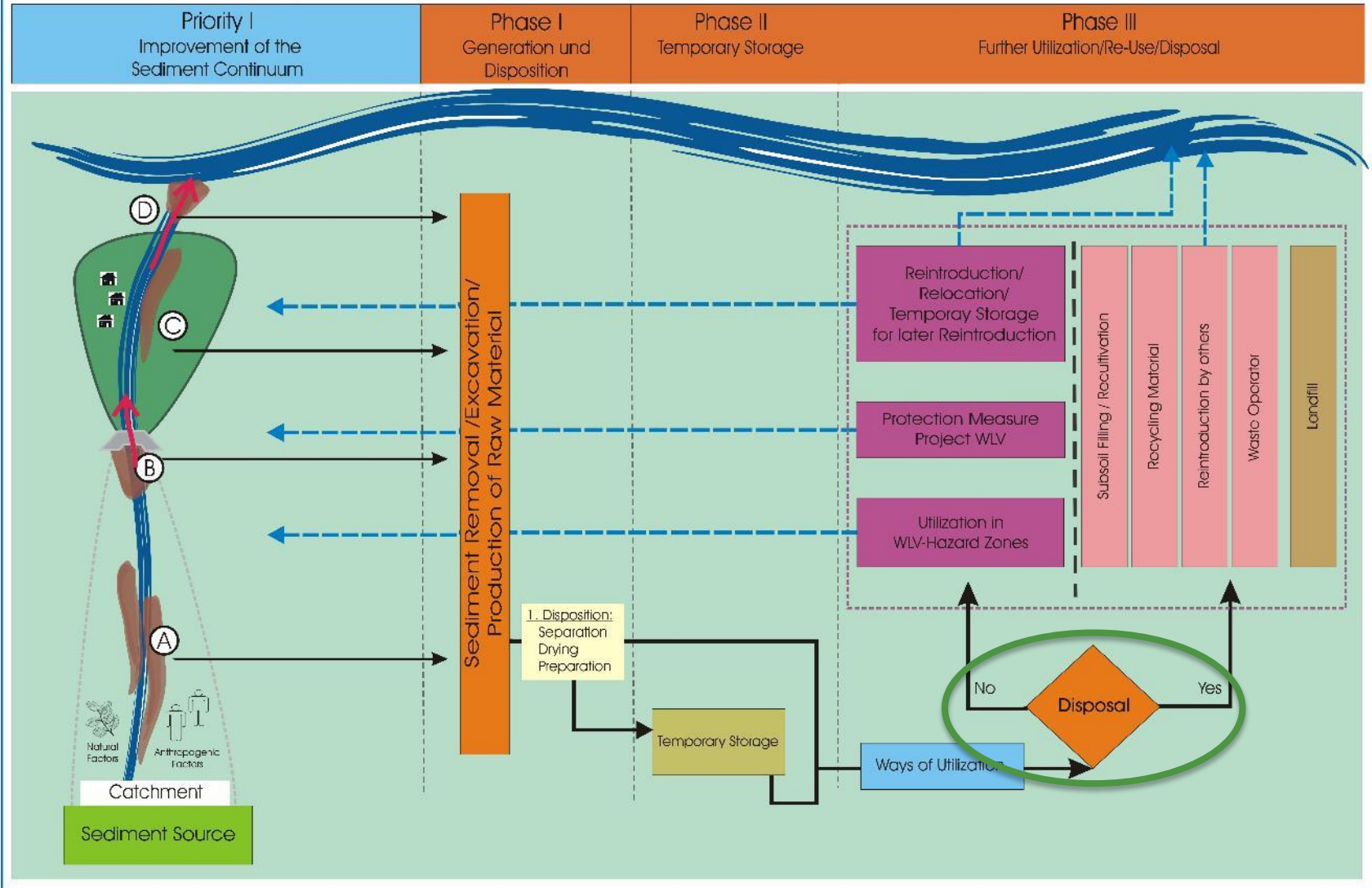
AUSTRIAN WORKING GROUP ON SEDIMENT MANAGEMENT IN TORRENTIAL CATCHMENTS

TASKS:

- Preparation of legal and practical framework
- Guideline for institutions and practitioners
- Guidelines for chemical characterization and analysis of sediment
- Rules for allocation of suitable deposition sites (deposition, utilization, disposal)
- Financial aspects (subsidies)



Sedimentmanagement / Treatment in Torrential Catchments



Material Flow Chart – Phase Modell

Based on study JK-University Linz (Wagner/Jandl/Bergthaler)

PROCEDURE FOR CHARACTERIZATION AND ANALYSIS

CONTENTS:

- Development of a simplified, standardized method for quality classification and potential contamination
- GIS based analysis and classification of the catchments in regards of contamination sources
- Guidelines for visual examination and chemical analyses adapted for sediment from torrential catchments



GIS CLASSIFICATION of potential contaminations in catchments

- Spatial intersection of all available data

Basic data:

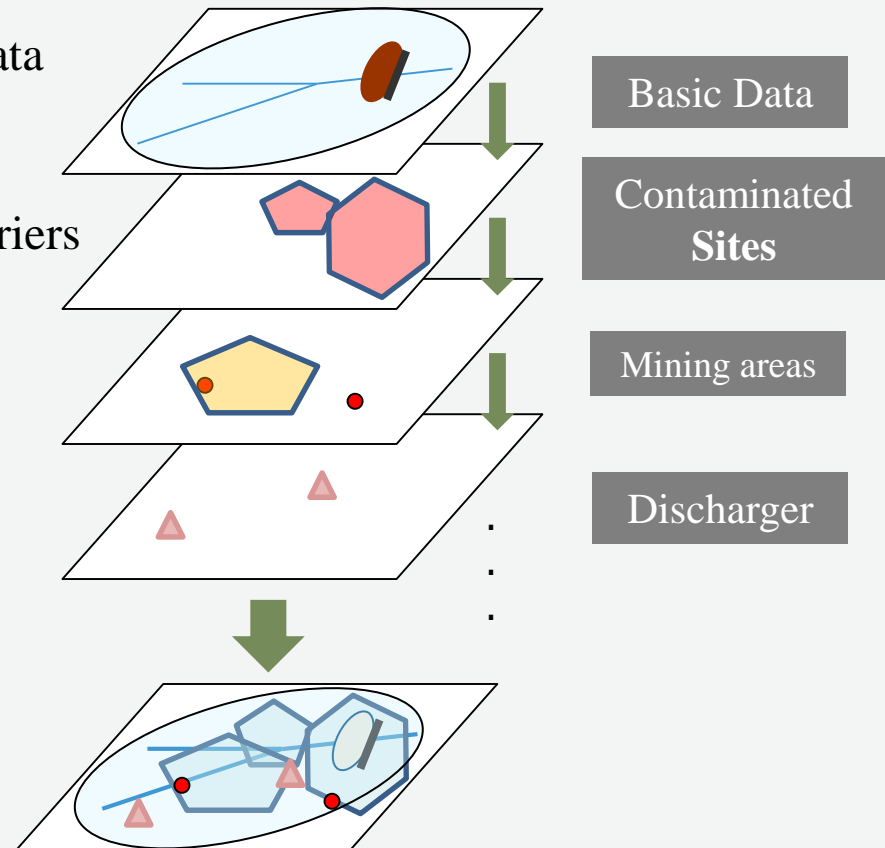
Torrents, catchments, check dams, barriers and retention basins

Potential contamination sources:

- Register of contaminated sites
- Mining areas and mine dumps
- Discharger from filter plants
- ...etc (existing chemical analysis)



2 Classes :





DATABASES



Contaminated Sites



Mining Areas

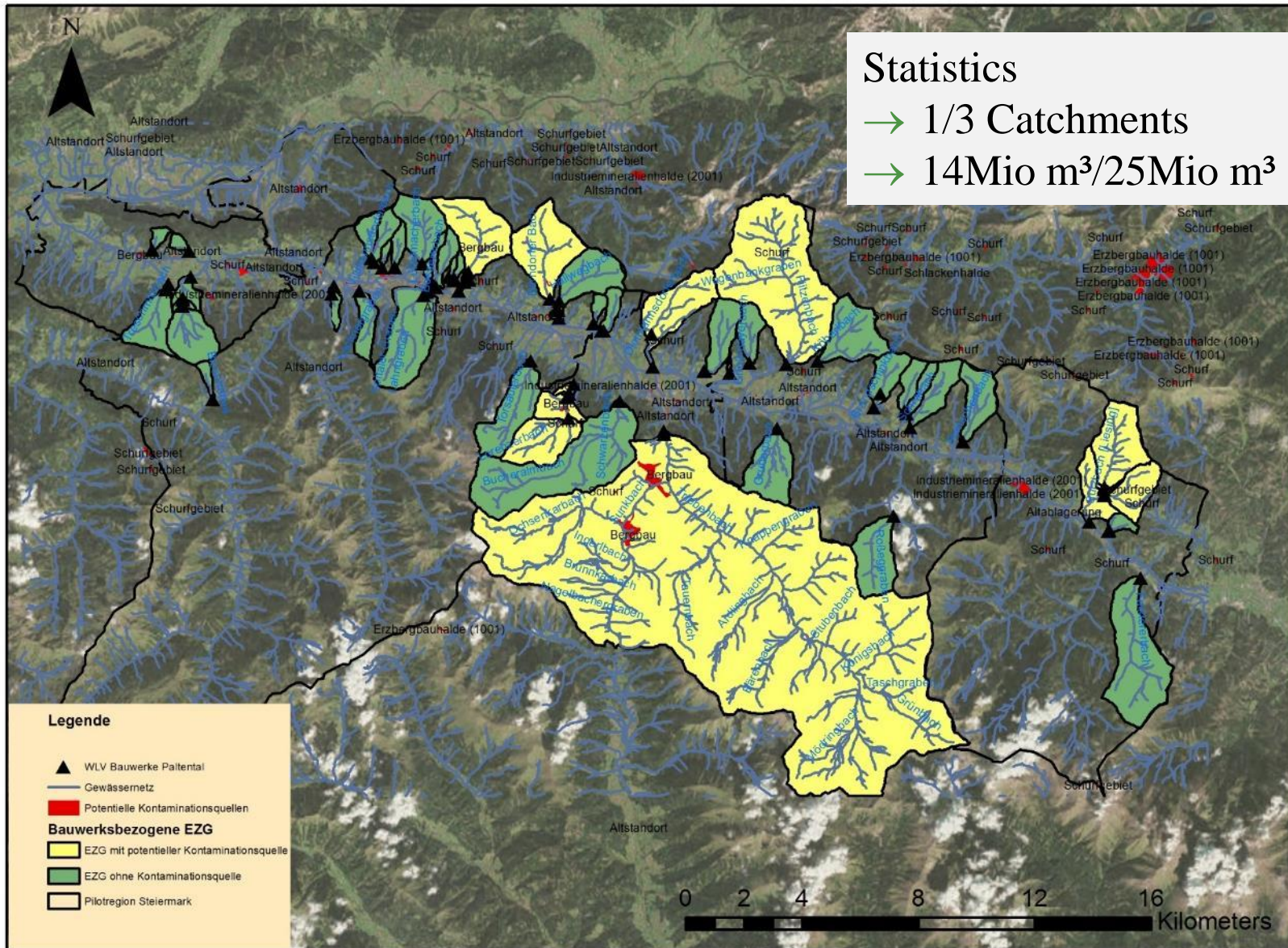
GIS-Data

Mining Dump, Landfill



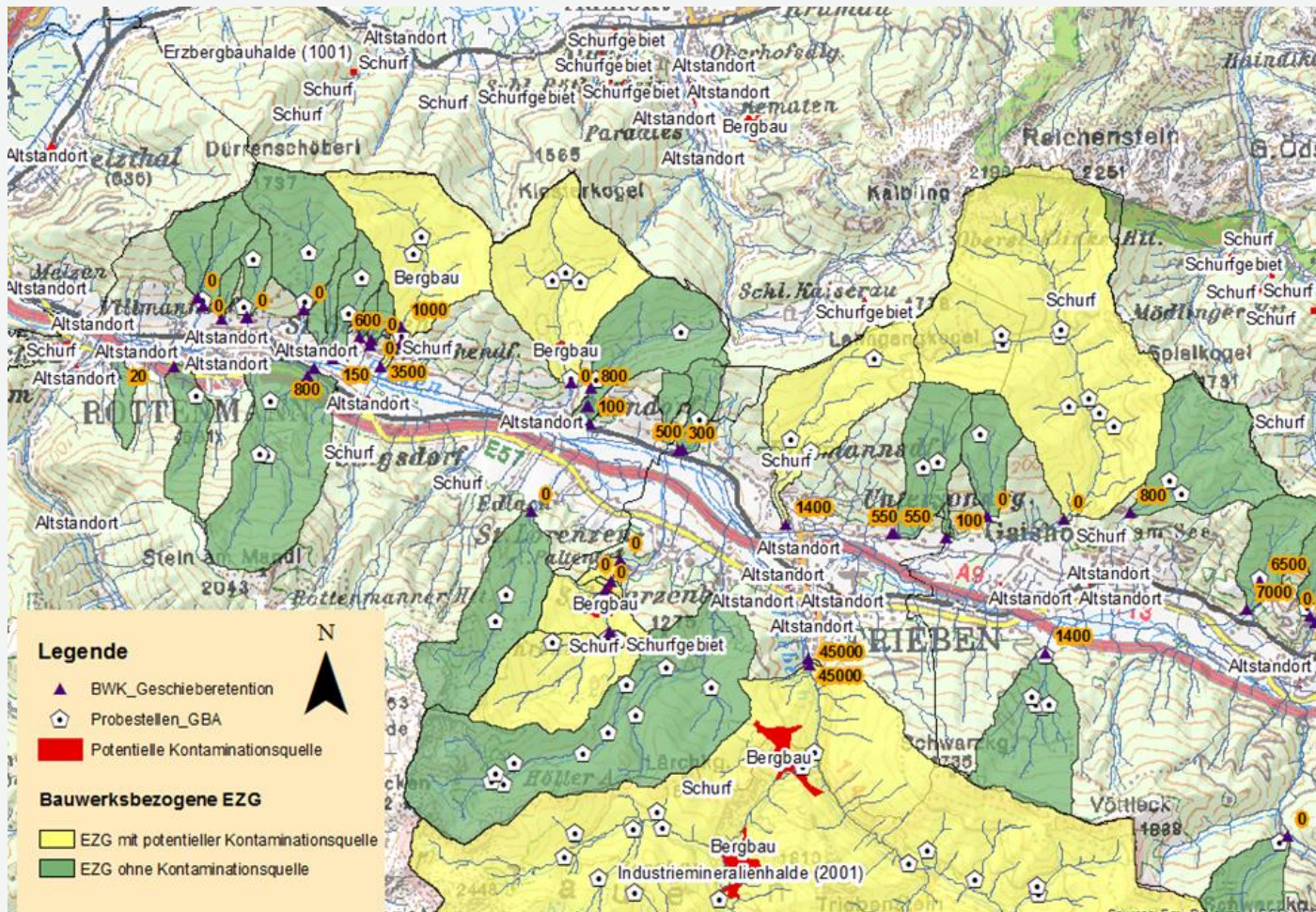
Discharger





WLK SEDIMENT MANAGEMENT

internal Planing Tool → Overview, planing





CHECK LIST

- I. Estimated volume?
- II. Characteristics, quality and potential utilization
- III. Availability of sites for temporary deposition
- IV. Possibility of own utilization or disposal
- V. Available landfill sites

PROVISION OF APPROPRIATE SITES

- Challenge of appropriate and available sites
- consideration of potential utilization (agricultural use, recycling) before the events/ in the course of planning
- Search of available sites within economical reach
- Preparation of all needed permissions
- Part of sediment management plan





SEDIMENT MANAGEMENT PLAN

For catchments with

- a high bed load potential
- Regular events
- Key protection measures
- potential contamination





OUTLOOK

A lot of important steps are reached

- Publication of the guideline next year
- Practical application has to be approved
- A lot of communication will be needed
- Need of prospective planning

An aerial photograph showing a village with several buildings and a road. A large area of grey debris, likely from a landslide or avalanche, is visible in the foreground, partially obscuring a road and a river. The surrounding landscape is green and hilly.

Thank you!



**BUNDESMINISTERIUM
FÜR NACHHALTIGKEIT
UND TOURISMUS**

WILDBACH- UND LAWINENVERBAUUNG