

NEWSLETTER

Sediment management in Alpine basins

Dear Reader,

I'm very pleased to present you the first issue of SedAlp's newsletter! SedAlp is an European Territorial Cooperation project within the Alpine Space Programme and deals mainly with the integrated management of sediment continuum, risk mitigation and hydropower.

The SedAlp project started in September 2012 and in the meantime, the project and its work packages (WP) are soundly established. 14 partners from 5 Alpine countries investigate the short, medium and long term requirements for the improvement of sediment continuity in our Alpine basins – always having in mind how complex is this cross-cutting issue for our environment, the ecology, hydropower production, flood control or river morphology. This partnership is vital to develop recommendations and actions for policy and practice, that will help us to better consider sediment-related issues in future water and energy challenges in the Alps. SedAlp will develop and provide improved tools, instruments, knowledge and experience in the frame of sediment continuity and it is understood that this experience will be shared with technicians, decision makers, academia and the public.

Let me invite you to follow the progress of the project. This newsletter – which has been developed by Regione Piemonte, SedAlp leader partner for communication activities – will serve as a good basis to gain insight into SedAlp's activities and results. It will provide you regularly with news on the project, the partnership, and its proceedings as well as with further interesting aspects of sediment-related topics in the Alps.

Feedback on this publication as well as any other information provided by the SedAlp – Team would be gratefully received, as we are always striving to improve the content and format of our publications.

I hope readers will see SedAlp's newsletter – as well as any other output from SedAlp – as a valuable and unique contribution to strengthen sediment-related topics across the Alpine Space.

Enjoy reading and visit us also on our project homepage

<http://www.sedalp.eu/> !

Yours sincerely,



Maria Patek

Legal Responsible SedAlp

BMLFUW Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management - Head of Dep. IV/5 - Torrent and Avalanche Control



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Sediment management in Alpine basins

SedAlp Kick-off conference

The first public event for SedAlp, the official project start, took place on March 12th 2013 in the Austrian Academy of Sciences in Vienna. Ms Patek (BMLFUW), the legal representative of SedAlp, welcomed 55 delegates representing project partners, JTS representatives, project observers, representatives of other ETC projects, academia and administrations from Austria, France, Germany, Italy, Slovenia and Switzerland.

The conference started with two keynotes: Mr Schrittwieser (BMLFUW, representative of the Platform "Water Management in the Alps" of the Alpine Convention) emphasised "Challenges and Needs of Water and Sediment Management in Alpine Basins". Mr Georg Heim (Swiss Federal Office for the Environment) addressed the "Development of Swiss water protection legislation and its implementation". Both keynotes informed the audience about the importance of integrated sediment management in the Alps.

Mr Thomas Souffland (Joint Technical Secretariat - Alpine Space Programme) introduced into the general frame of the ETC Alpine Space Programme and gave an outlook on the next Alpine Space Programme period 2014-2020.

Later the Lead partner, as well as all Work package Leaders, informed about SedAlp-related actions, activities, and outputs and highlighted the opportunity to collaborate in such a fruitful partnership (presentations files are available on SedAlp website: <http://www.sedalp.eu/download>).

All participants appreciated the format in which the conference took place. The conversations during the dinner, as well as the coffee breaks were lively and intense and the venue was buzzing with French, Italian, English, German, etc. - everybody excited to exchange information and experience. All that can be summarised as SedAlp's first success – talking and discussing sediment-related issues for an improved future!



Project partners representatives
SedAlp kick-off conference in Vienna, March 12th 2013

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Sediment management in Alpine basins

Basin-scale sediment dynamics: the “first challenge” (work package WP4)

Sediment management of alpine rivers requires a better understanding of the sediment production and transfer conditions along stream networks, from the small headwaters (Fig. 1) to the large gravel-bed rivers (Fig. 2).



Figure 1 - Réal Torrent test bed in the Southern French Alps (Provence-Alpes-Côte-d'Azur Region)



Figure 2 - Drôme River (France)

This is of critical importance for the conservation of good ecological conditions in fluvial environments, those being altered by the disruption of sediment continuity along stream networks. The prevention of sediment disasters in the Alps also requires a better knowledge of the erosion, transport and deposition of sediment at the basin scale.

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SedAlp WP4 activities are entirely dedicated to this complex issue, with some specific actions on (1) the identification and quantification of sediment sources, (2) the assessment of sediment connectivity, (3) the estimation of sediment yield at different scales and for different geomorphic processes, (4) the assessment of sediment cascades in relevant landscape settings including the disruption of continuity due to hydraulic structures, and (5) the historical analysis of basin responses to changing environmental conditions.

This work package WP4 includes several project partners and subcontractors, with 3 scientific research centers (CNR-IRPI Padova, Irstea Grenoble, and CNRS Lyon), 4 universities (BOKU Vienna, ULFGG Ljubljana, KU Eichstätt, and UNIMIB Milano), one national development agency (IZVRS Ljubljana), and 3 regional authorities (Regione Piemonte, LFU Augsburg, and AKL Klagenfurt). Single activities are implemented in 17 pilot alpine basins in France, Italy, Germany, Slovenia, and Austria.

The wide spectrum of physical settings (relief, geology, and land cover) and catchment sizes (drainage areas ranging from 1 to 1000 km²) provided by the test beds gives an excellent opportunity to address the spatial variability of environmental condi-

tions governing the alpine sediment cascade. Sediment dynamics will be documented by a wide variety of modern and innovative surveying techniques, like airborne or terrestrial LiDAR scenes, as well as hyperspatial imagery from Unmanned Aerial Vehicles (UAV). Expected deliverables include maps of sediment sources, GIS-based tools specifically designed for the basin-scale assessment of sediment dynamics, a conceptual soil erosion model for long-term variations of suspended sediment yields, and a guideline report for ranking basins and channel reaches in terms of geomorphic activity and hazard potential.

Project partners started to compile georeferenced databases on the test beds, as well as first inventories of sediment sources. They also began to work on conceptualizing a topography-based sediment connectivity model and producing codes and tutorials for automatic GIS procedures. First terrestrial LiDAR surveys were also implemented in several pilot basins in the Italian Dolomites (read the article hereinafter) and the Bavarian Alps.

“Deepening your SedAlp knowledge” : have a browse through our activities!

Sediment source inventory in Venosta and Pusteria Valleys (NE Italy)

In the framework of SedAlp WP4, Italian partner CNR-IRPI has started implementing the multitemporal sediment source inventory in portions of the Venosta and Pusteria Valleys (respectively located in the western and eastern portions of Bolzano province, NE Italy). Presently we are testing the inventory structure within the pilot area of the Mazia Valley, a tributary of the Venosta Valley. A preliminary version of the inventory was illustrated at the Spring Symposium “The Fluvial System 1.0”, held at the University of Milano-Bicocca on May, 24th 2013.

The activity entails the identification of sediment sources mainly related to rapid shallow failures (e.g. debris flows, debris avalanches, debris slides, and bank erosion) via aerial photo interpretation (API) of five sequential photosets (1959, 1969, 1982, 1990, 2000, 2006, 2008) and complementary fieldwork. In particular, landslide initiation, transportation, and deposition zones are mapped as polygons (Fig. 3) in GIS environment through visual inspection of digital orthophotos and API of printed stereo pairs.

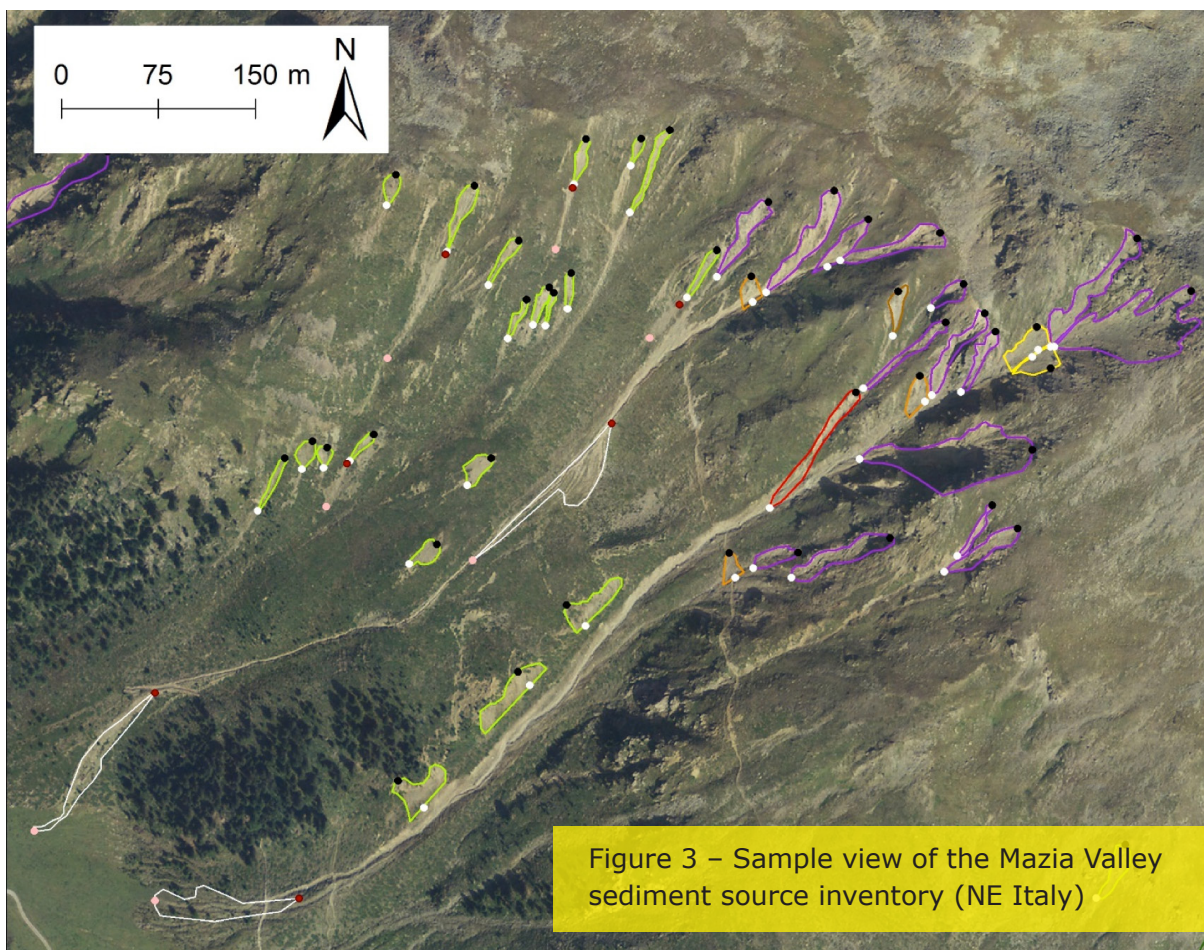


Figure 3 – Sample view of the Mazia Valley
sediment source inventory (NE Italy)

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Different colors indicate movement typologies and morphological initiation zones. The classification scheme follows and integrates the specifics detailed by Brardinoni et al. (2009). Each sediment source is characterized in terms of:

- year of first identification and vegetation dynamics through time (e.g., actively eroding, partial vegetation regrowth, complete vegetation regrowth);
- movement typology (e.g., debris slide, debris flow, debris avalanche and slump);
- morphological position at initiation (e.g., open slope, gully headwall, gully sidewall, gully channel, escarpment face, rock glacier body and glacier front);
- land use (e.g., alpine, pasture, bushes, conifer forest, mixed forest, and farmland);
- surficial material (e.g., bedrock, till and colluvium);
- dominant lithology (derived from provincial geological maps);
- areal extent (m²).

Each deposit is characterized in terms of:

- year of identification which eventually allows identifying the period of event occurrence and the return period in case of reactivation;
- vegetation dynamics through time (e.g., actively eroding, partial vegetation regrowth, complete vegetation regrowth);
- areal extent (m²).

Basic topographic attributes (e.g., elevation, slope and aspect) of the highest and lowest points of each polygon are extracted from LiDAR-derived DTMs.

Future fieldwork activity will aim at: (i) confirming landslide classification as obtained from API; (ii) measuring landslide depth (both in source and deposition zones); and (iii) obtaining field-based landslide depth-area and volume-area relations so that areal information can be converted into volumes of mobilized debris.

The final result will be a georeferenced database of the sediment sources, the relevant deposition zones, their activity and the degree of vegetation regrowth through time. At a later stage of the project the inventory will be combined with IFFI and ED30 databases. The former is concerned with the province-wide, historical event documentation of landslides, the latter with debris flows and river floods. Both inventories were created and are currently updated by the SedAlp Italian partner Autonomous Province of Bolzano.

(Brardinoni F, Hassan M, Rollerson T, Maynard D, 2009. Colluvial sediment dynamics in mountain drainage basins. *Earth and Planetary Science Letters* 284, 310-319)

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Field research: sediment transport monitoring

The main objective of the SedAlp project is to develop tools and strategies for an integrated sediment management. To reach this ambitious goal, it is fundamental to understand the behaviour and characteristics of sediment transport. The knowledge about this complex natural process is still limited, therefore field observations and data on sediment transport are needed. Work package 5 (WP5), "Sediment transport monitoring", basically aims on providing this data to expand the understanding of sediment transport, debris flows and wood transport. The obtained measurement data will be also used for enhancing river restoration projects in sediment and wood continuity. Further work will additionally focus on the application of sediment transport equations and numerical models.

One of the first activities was the development of monitoring concepts of all WP5 SedAlp partners. These concepts give a de-

tailed overview about the wide spectrum of used monitoring methods and the diversity of observation areas in the alpine region. The implemented methods cover various direct and indirect monitoring devices, which enable the measurement of sediment transport, debris flows and wood transport processes. Figure 4 (showing extracted dead wood at the Genissiat dam in France) and Figure 5 (showing a bedload transport measurement with the TIWAG basket sampler at the Isel River in Lienz - Austria) give an impression of the diverse monitoring procedures within SedAlp project.

To ensure the comparability of collected measurement data within WP5, standard protocols on bedload transport, wood transport and debris flow monitoring have been developed. These protocols, which represent the first Milestone of the SedAlp project, are intended to work as guidelines for supporting prospective monitoring efforts.



Figure 4: Extracted dead wood at the Genissiat dam in France
photo: Hervé Piegay 2013 (CNRS National Center of Scientific Research, France)

At this time in the whole Alpine region various monitoring field work is carried out and will contribute to a better understanding of sediment transport processes. Follow us on the SedAlp website and next newsletters for coming outputs and results!



Figure 5: Bedload transport measurement with the TIWAG basket sampler at the Isel River in Lienz, Austria
photo: Johann Aigner 2013 (BOKU University of applied sciences, Austria)

The project flyer is online:

<http://www.sedalp.eu/download/flyer.shtml>

For more informations about SedAlp project and partnership please visit the SedAlp website! www.sedalp.eu

Contacts:

- SedAlp Lead Partner : BMLFUW (Austria)
Andreas Pichler
andreas.pichler@lebensministerium.at
- SedAlp Communication: Regione Piemonte (Italy)
info@sedalp.eu



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Project partners

Austria

- Bundesministerium für Land und Forstwirtschaft, Umwelt und Wasserwirtschaft (Lead partner)
- Amt der Tiroler Landesregierung
- Amt der Kärntner Landesregierung
- Universität für Bodenkultur Wien (BOKU)

France

- Centre National de la Recherche Scientifique (CNRS)
- Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture (Irstea)

Germany

- Bayerisches Landesamt für Umwelt (LfU)

Italy

- Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto
- Consiglio Nazionale delle Ricerche (CNR - IRPI)
- Provincia Autonoma di Bolzano/Autonome Provinz Bozen
- Regione Piemonte
- Università di Padova

Slovenia

- Inštituit za vode Republike Slovenije
- Univerza v Ljubljani

Project observers

- Agence de l'Eau Rhône-Méditerranée-Corse
- Agenzia Regionale per la Protezione dell'Ambiente della Valle d'Aosta
- Austrian Hydro Power
- Autorità di bacino del fiume Po
- Autorità di bacino del fiume Adige
- Bundesamt für Umwelt (BAFU)
- Enel Produzione SpA
- Enel Produzione SpA - UBI Hydro Piemonte
- Enel Green Power SpA
- Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft (WSL)
- Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA)
- Maira SpA
- Municipality of Kamnik
- Regione Autonoma Friuli Venezia Giulia
- Regione Lombardia
- Ricerca sul Sistema Energetico
- SEL AG/SpA
- Stand Montafon
- Verbund - Austria Hydro Power
- Vorarlberger Ilwerke AG

SedAlp - Sediment management in Alpine basins:
integrating sediment continuum, risk mitigation and hydropower

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