

NEWSLETTER

SedAlp The challenge of Alpine sediment management

Welcome to the second newsletter of SedAlp!

The SedAlp project (Alpine Space Programme - ASP) is going on since September 2012, with the challenging goal to investigate the short, medium and long term requirements for the improvement of sediment continuity in Alpine basins; integrated management of sediment continuity, risk mitigation and hydropower is our fundamental objective.

Take a look at SedAlp's activities and first results: the first "milestone" of the project, on-going studies, informations about SedAlp activities in our pilot areas. In this newsletter, we're also glad to introduce you two new ASP-projects ("AIM" and "Start_It_Up"), which are going to promote SedAlp project's results.

SedAlp partners on September 23-24th 2013 gathered in the nice city of Feldkirch (Austria), for the second meeting of SedAlp ("Advisory Board Meeting"). The 35 delegates representing 14 project partners and subcontractors and two hosts by AIM and Start_it_Up projects intensively discussed actions, activities, and first outputs of the project and planned next steps. SedAlp partners are now looking forward to next meeting, which will be in Benediktbeuern (Bavaria, Germany), on the beginning of March 2014. Three days of project planning, discussions on sediment-related issues and an interesting excursion, organized by Bayerisches Landesamt für Umwelt, are waiting for us.



Project partners representatives and subcontractors -
2nd Advisory Board meeting in Feldkirch (Austria),
September 2013.

We invite you to follow the progress of the project and find interesting aspects of sediment-related topics in the Alps: enjoy reading this newsletter and visit our website

www.sedalp.eu

and the new Facebook page! 

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Sediment management in Alpine basins

Basin-scale sediment dynamics: an extensive use of GIS tools

Work-package WP4 of SedAlp project is halfway to its implementing period: during the last 18 months, project partners started to work on their test beds and to deliver preliminary results which are very encouraging. The first catchment-scale sediment source inventories have been compiled in several basins (Mid-Venosta valley and Maira River basin in Italy, several torrent catchments in the Bavarian Alps, and Gradascica and Bisticica river basins in Slovenia). Some of these maps are based on aerial photo stereoscopic inspection; others are based on GIS thematic layer analysis. Important efforts have been also deployed for collecting terrestrial laser scan data in the field in Italy and Germany. GIS tools for catchment-scale sediment dynamics assessment have been developed and tested. First results have already been presented

during conferences or training schools, and first publications are in preparation.

A first prototype of a sediment connectivity model was developed and tested on a set of catchments in the Venosta valley by CNR IRPI Padova. It consists of a toolbox running in ArcGIS 10.1 containing 3 tools generated through Model Builder functionalities. The first couple of tools allows to derive an index of sediment connectivity with regards to catchment outlet and selected targets (e.g., channel network, and lakes), respectively. The latter tool calculates surface roughness which can be used, after a normalization procedure, as weighting factor in the connectivity model. The model has been developed and tested in the Gatria and Strimm catchments, where detailed geomorphological information and a 1-m LiDAR-derived DTM are available.



Figure 1 - The Bisticica River in Slovenia, where erosion-prone areas in the catchment have been mapped for sediment management scheme (IZVRS: Institute for Water of the Republic of Slovenia, and Hidrotehnik).

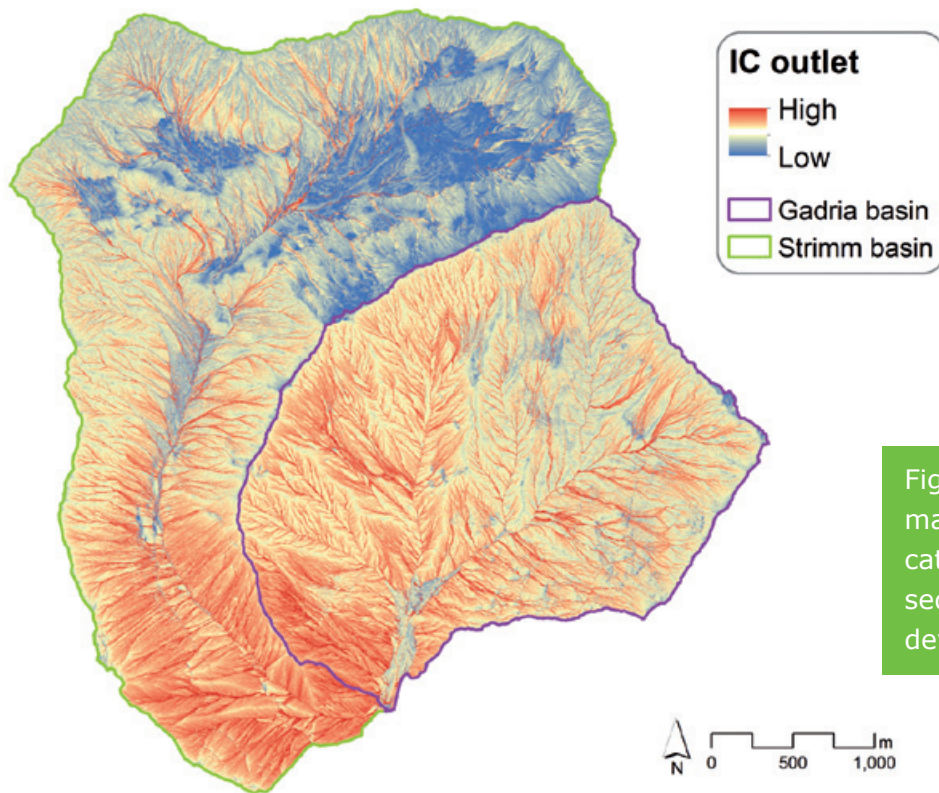


Figure 2 - Index of Connectivity map of the Gadria and Strimm catchments derived from the sediment connectivity model developed by CNR-IRPI.

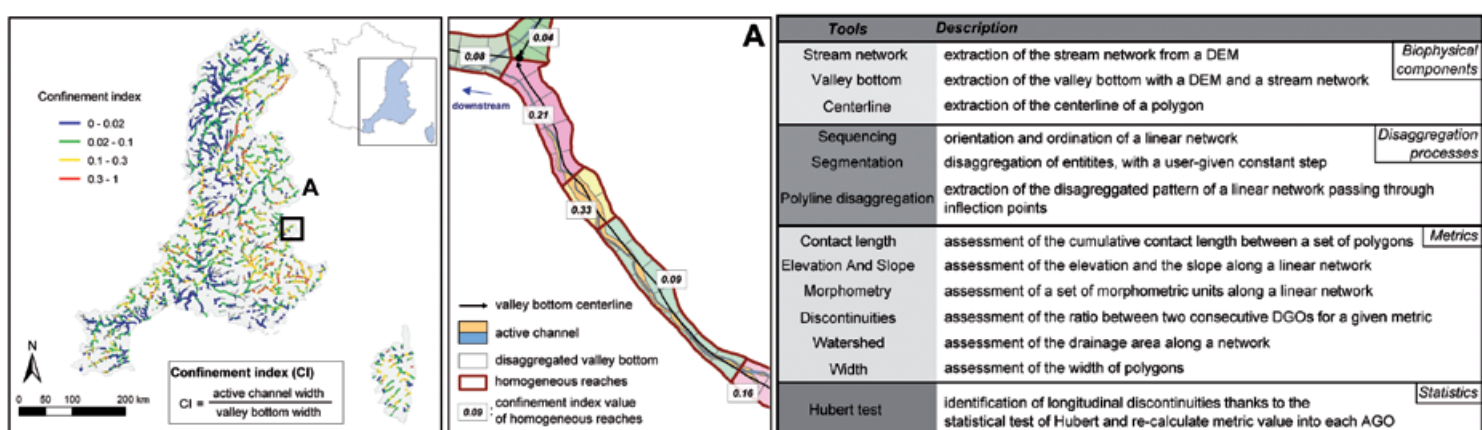
“FluvialCorridor”

A new GIS toolbox by CNRS Lyon (France)

Development of automated geographic information system (GIS) tools is essential today both for scientists and river basin managers to characterize riverscape features and explore relationships between these parameters and catchment properties over large channel networks. Since the 1990's, GIS toolboxes and add-in programs have been used to characterize catchments. However, there is currently no equivalent to a planimetric and longitudinal characterization of fluvial corridor networks at multiple scales.

As part of WP4, an ArcGIS toolbox dedicated to the characterization of riverscape units along river corridor networks has been developed by CNRS Lyon. This new toolbox named “FluvialCorridor” now provides a tools package allowing a planimetric and downstream characterization of fluvial corridor networks at multiple scales (i.e. from meter-scale to large regional scale issues). Mainly based on previous works, this toolbox enables (1) to extract main biophysical components (i.e. stream network, valley bottom and median axis), (2) to extract a large set of riverscape features, (3) to implement spatial aggregation into homogeneous segments, and (4) to produce metrics characterization. The toolbox is available both for ArcGIS10.0 and ArcGIS10.1. Processes can be used within a general workflow, from raw data of the study site (i.e. DEM and vector layers), to provide multiscale results answering a specific question. This package is continuously developed, therefore upgraded versions will follow. Next enhancements will focus on spatial disaggregation and aggregation processes improvements and available metrics increase. Moreover a set of technical guidelines is included to the deliverables and a technical paper has been submitted to the *Geomorphology Journal*.

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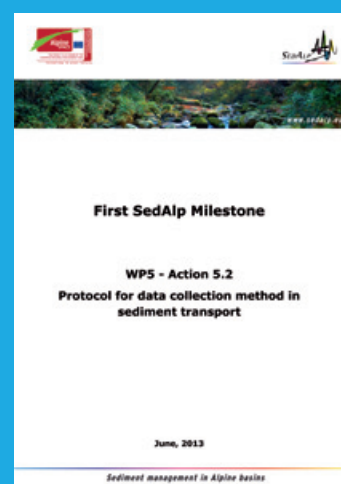
- Alber, A., Piégay, H., 2011. *Spatial disaggregation and aggregation procedures for characterizing fluvial features at the network-scale: Application to the Rhône basin (France)*. *Geomorphology*, 125(3), 343–360.
- Bertrand, M., Piégay, H., Pont, D., Liébault, F., Sauquet, E., 2013. *Sensitivity analysis of environmental changes associated with riverscape evolutions following sediment reintroduction: geomatic approach on the Drôme river network, France*. *International Journal of River Basin Management*, 11(1), 19-32.
- Roux, C., Alber, A., Bertrand, M., Vaudor, L., Piégay, H., Submitted. "FluvialCorridor": *A new ArcGIS toolbox package for multiscale riverscapes exploration*. *Geomorphology*.

Figure 3 - Exploitation of the "FluvialCorridor" package over the Rhône-Méditerranée-Corse French catchment (over 100.000 km² and 17.000 km of streams) to identify homogeneous reaches in terms of confinement index (i.e. ratio of the active channel and valley bottom width). Reaches with a confinement index higher than 0.3 are usually considered as confined. The bottom table describes the different tools included into the "FluvialCorridor" toolbox.

Protocol for data collection methods in sediment transport

the first SedAlp "milestone" is online:
www.sedalp.eu/download/reports.shtml

Field observations and data on sediment transport are needed to understand the behaviour and characteristics of sediment transport: work-package 5 (WP5) is working to expand the understanding of sediment transport, debris flows and wood transport. Throughout the whole Alpine Region, a lot of different monitoring methods are currently in use; this "milestone" aims on ensuring the comparability of the collected monitoring data. Three standard protocols on bedload transport, debris flow and wood transport monitoring have been developed: they are intended to describe the used monitoring technics and data processing methods. Furthermore, the protocols work also as guidelines to assist in choosing the appropriate monitoring method, for supporting prospective monitoring efforts.



Bedload transport monitoring station at Suggadinbach (Austria)

The monitoring station at Suggadinbach torrent is situated in the south of Vorarlberg, in the village of St.Gallenkirch (Austria). Downstream (approximately 200 m) the monitoring station there is the hydropower plant from the Illwerke PLC of Vorarlberg arranged. In consequence of the heavy bedload transport, the Suggadinbach is very interesting for installing a bedload transport monitoring station.

The aim of this project (by BMLFUW-Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management and included in work-package WP5) is to measure the sediment transport and the influence of the check dam to the power plant and also the influence of the transport capacity, as a consequence of less water after the water intake.



Figure 4 - Building the monitoring station - Suggadinbach torrent (Vorarlberg, Austria).

A new bedload transport monitoring station has been designed by the Institute of Mountain Risk engineering at Suggadinbach in Vorarlberg. In cooperation with the Austrian Service for Torrent and Avalanche Control the station has been installed in a check dam. The dam is structured into a low water section, in order to have concentrated flow and sediment transport for most time of the year. Two different types of measuring systems are installed: 13 Swiss-type geophone sensors record the vi-

brations of the transported sediment; additionally 3 modified Japanese pipe hydrophones are mounted under steel plates, in order to record the acoustic signal produced by the sediment transport. Both systems can be compared directly because they are arranged consecutively in flow direction. Therefore the advantages of both systems can be combined. The monitoring station measures with high frequency of 10 kHz and the signal is evaluated for 1 minute intervals. The maximum amplitude, the number of impulses over a certain threshold and the quadratic sum of the energy is stored. Additionally the water stage and surface velocity is measured upstream the station to record the discharge and flow conditions in the Suggadinbach torrent. Further experiments to calibrate the measuring system are continuing.



Figure 5 - Monitoring station at Suggadinbach torrent (Vorarlberg-Austria).

Interactions with structures: how man-made structures disrupt the sediment and large woody debris transport processes (WP6)

River structures are constructed and operated for a wide variety of purposes including water supply, flood/erosion control and hydropower production. Regardless of their purpose, structures influence sediment and large woody debris transport processes to some degree, thereby profoundly changing the character and functioning of rivers and torrents. Especially transverse structures disrupt the longitudinal continuity of the river system and interrupt the action of the sediment conveyance along the river channel.

Upstream of the dam, generally all bedload sediment and all or a part of the suspended load is deposited in the quiet water of the reservoirs. Downstream, water released from the dam possesses the energy to move sediment, but has little or no sediment load.

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This clear water released from the dam is often referred to as “hungry water”, because the excess energy is typically expended on erosion of the channel bed and banks for some years following dam construction, resulting in incision (down-cutting of the bed) and coarsening of the bed material until new equilibrium is reached and the river channel bed material cannot be moved by the flows.

Activities of SedAlp work-package 6 (WP6) are dealing with the interactions between the sediment transport and large woody debris dynamics and man-made hydraulic structures in the torrent and river channels. Specific actions foreseen in the WP6 are (1) Assessment of mutual interactions between control structures, torrential and river sediments including large woody debris; (2) Evaluation of the effects of hydropower dams on sediment continuity for design and planning purposes; (3) Evaluation of river hydro-morphological alterations due to longitudinal sediment

continuity disruption and performance analysis of river restoration measures; (4) Performance analysis and definition of optimal planning and design of torrent control works to reduce their impact on sediment continuity along the river channels.

WP6 involves several project partners and subcontractors from Austria (BMLFUW Vienna, BOKU Vienna, Amt Tiroler LR Innsbruck, AKL Klagenfurt); France (Irstea Grenoble); Italy (Province of Bolzano, ARPAV Belluno, UNIPD Padova, Regione Piemonte Torino) and Slovenia (ULFGG Ljubljana, IZVRS Ljubljana).

Expected deliverables of WP6 include improved concepts of responses of torrent and river control structures to floods and debris flow impacts, guidelines for planning of efficient torrent control structures with low impact on sediment continuity, guidelines for improved planning of hydropower plants aimed to improve the longitudinal sediment continuity, guidelines for planning



Figure 6 - Check dam on Pišnica torrent in Kranjska Gora (Alpine Ski Center - Slovenia).

and designing of effective flood protection systems, river training and restoration projects that have lower impact on sediment continuity.

Project partners started with activities including performance analysis of existing torrent control structures and hydropower dam, torrent/river/hydropower database compilation, a laboratory experiment is under preparation. Field surveys of the test areas have been carried out and effectiveness of existing structures was assessed. Public bodies were involved into development of common strategies related to structures/sediments/woody debris interactions.

Activities within WP6 are closely connected with other SedAlp project's activities, which will provide knowledge on basin-scale sediment dynamics and sediment monitoring results in test reaches.



Figure 7 - Woody debris on Suhelj torrent (Slovenia).

Figure 8 - Sediment budget on Nadiža torrent (near Planica Nordic Ski Center - Slovenia).



AIM - Alpine space In Movement

A project targeted to water & energy capitalization



In October 2013 the project "AIM - Alpine space In Movement" kicked off, with the aim to become a "megaphone" of other Alpine Space Programme (ASP) projects active in the field of water & renewable energy (SHARE, Alp-Water-Scarce, SedAlp, SEAPAlps, ECONNECT, recharge.green).

AIM project will capitalise the achievements of these numerous projects dedicated to the promotion of renewable energy production and to optimization of water resource exploitation: in this context, hydropower is the most important renewable energy source in Alpine areas, but it also creates serious environmental impacts.

Moreover, AIM will set the scene for the 2014+ project generation, by mapping the European/regional/transboundary/national programs with possible synergies and identifying key relevant policy actors and institutional competences to be addressed.

Specific dissemination actions (seminars involving key stakeholders of target groups, web communication, publications, etc.) are

foreseen and will address in priority the relevant actors at EU, national and regional policy level.

Partnership

Lead partner: Research on Energy Systems – RSE S.p.A. – Milano – Italy

Project partners:

- Institute of Hydrobiology and Aquatic Ecosystem Management, Department of Water, Atmosphere and Environment, University of Natural Resources and Life – Wien – Austria;
- Institute for Water of the Republic of Slovenia – Ljubljana – Slovenia;
- European Association of elected representatives from mountain regions – Chambéry – France.

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START_it_up

A project to promote transnational unification process in the field of natural hazard risk management and risk governance



The demand for common standards in the field of natural hazard engineering and risk management is strongly increasing. National standardization initiatives have been launched recently but are still fragmentary and don't exist on international level.

Within the Alpine Space-project "START_it_up" a consortium of 8 partners from Austria, France, Italy, Slovenia and Switzerland in close cooperation with 14 observer institutions, aims to pave the way to a transnationally common standardisation initiative of the Alpine states and the establishment of a joint pool of knowledge and technology easily accessible to the expert public.

During the project duration from September 2013 to November 2014 project partners are working on the elaboration and distribution of a common "State-of-the-Art" based on the results of former and currently running ASP-Projects (also SedAlp) or other research and development initiatives. The project focuses on the following thematic fields of hazards and risks related to floods, debris flow, avalanches, rock fall and landslides:

- Hazard Mapping and Implementation in Regional Development
- Technologies in Natural Hazard Engineering
- Expert Decision Making
- Good Governance in Risk Management

Follow the project's progress on www.startit-up.eu!

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

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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

- Inštitut 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
- Regione Veneto
- 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

The project is co-funded by the European Regional Development Fund

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Sediment management in Alpine basins