

International Sediment Initiative (ISI) A contribution to IHP IX

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ISI strategy

- The International Sediment Initiative (ISI), established in 2002, is a global initiative to assess erosion and sediment transport to marine, lake or reservoir environments aimed at the creation of a comprehensive approach for the remediation and conservation of surface waters, intricately linking science with policy and management needs.
- **ISI** has the aim to increase awareness of erosion and sedimentation dynamics and sediment issues in all spheres of The initiative water management. promotes sustainable management of soil and sediment resources at local, regional, and global scales.

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UNESCI

Group I: Western European and North American States **Regional Coordinator**

Regional Coordinator

Group III: Latin American and Caribbean States **Regional Coordinator**

Group IV: Asian and Pacific States **Regional Coordinator**

> Group Va Africa States **Regional Coordinator**

Group Vb Arab States **Regional Coordinator**





Three thematic priorities:

 Erosion and Sediment Transport and Management in river systems

2. Sediment-related Disaster Risk Reduction

3. Glacier-related sediment, erosion and hazards management





ISI provides a holistic approach for sustainable sediment and erosion management and relevant hazards management through scientific tools and methodologies, capacity building and effective science-policysociety interfaces to UNESCO member states to accelerate the implementation of water-related SDGs and other international agendas.

Member States have improved capacity of erosion, sediments, and relevant hazards management.

Erosion and Sediment Transport and Management	Sediment-related hazards management	Glacier-related sediment, and hazards manager
Expected Result 1 Scientific tools and methodologies related to Erosion and Sediment Transport have been developed and disseminated, along with pilot case studies as demonstration projects.	Expected Result 2 Scientific tools for Sediment- related hazards management have been developed and disseminated, along with pilot case studies.	Expected Result 3 Methodologies and too glacier related sediment, and risk reduction have developed and dissemi along with case studies mountain areas.
Output 1.7 Output 3.1	Output 1.6 Output 1.9, Out 3.1	Output 4.7 Output 3.1
Sediment and erosion related research and tools	Toolset for landslide and debris-flow hazard management	Tools for glacier-related se erosion, and hazards man
Clobal repository of information on erosion and sediment transport		Climate Change Impact as
	Cases studies of landslide and debris-flow hazard management	Data on erosion-related a the degradation of the cry
Case studies for river basins as demonstration projects	Capacity building	
		Capacity building
	ISI Community of practice	



1. Erosion and Sediment Transport and Management – Part B: in river basins.

Key Activity 1.1: Development of sediment and erosion related research, guidelines, and tools

Sediments and the impacts on Nature-based solutions in rivers

NATURE-DEMO (https://nature-demo.eu/) 5/2024 - 4/2028 **Nature-Based Solutions for Climate-Resilient Infrastructure**

DANUBE4ALL (https://www.danube4allproject.eu/) 2023 – 2028 Restoration of the Danube River Basin for ecosystems and people from mountains to coast







Result:

One publication in mid term (2026-27) on how sediment supply from headwaters and fluvial geomorphological processes (ie. bank erosion, bed incision,...) are interacting with Nature-based solutions (NbS) for river training, flood protection etc.

2. Sediment-related Disaster Risk Reduction

Key Activity 2.1: Development of toolset for landslide and debris flows hazard and risk assessment, monitoring and forecasting

- Development of toolset for landslide risk assessment, monitoring, and forecasting
- Compiling Landslide inventories, mapping Landslide susceptibility, evaluating Landslide risk
- Use of ML technologies, such as training machine learning models on landslide susceptibility datasets for improved accuracy and real-time risk assessment
- Use of SAR technologies (like GB-SAR and satellite InSAR) for landslide monitoring and implementing an operational early warning system









forecasting

Susceptibility Map at regional/continental scale

Europe

Assessing landslide risk at subcontinental/ Pan-European scale

Central asia



scale (No. EGU24-8660). Copernicus Meetings.



Caleca, F., Scaini, C., Frodella, W. and Tofani, V., 2024. Regional-scale landslide risk assessment in Central Asia. Natural Hazards and Earth System Sciences, 24(1), pp.13-27.



Key Activity 2.1: Development of toolset for landslide hazard and risk assessment, monitoring and

Caleca, F., Lombardo, L., Steger, S., Dahal, A., Tanyas, H., Raspini, F. and Tofani, V., 2024. Assessing landslide risk on a Pan-European



forecasting

Landslide monitoring by using remotely sensed technologies



The Ruinon landslide

Use of GBInSAR and groundbased Doppler radar to regulate traffic along a road critically exposed to rockfall hazards







10°27'30°E



Carlà, T., Gigli, G., Lombardi, L., Nocentini, M., Meier, L., Schmid, L., Wahlen, S. and Casagli, N., 2024. Real-time detection and management of rockfall hazards by ground-based Doppler radar. Landslides, 21(1), pp.155-163.





Key Activity 2.1: Development of toolset for landslide hazard and risk assessment, monitoring and forecasting

Landslide mapping by using remotely sensed technologies





Lake Sarez and Usoi landslide dam in Tajikistan

Integration of satellite SAR and optical acquisitions for characterization of the Lake Sarez landslides in Tajikistan



Nardini, O., Confuorto, P., Intrieri, E., Montalti, R., Montanaro, T., Robles, J.G., Poggi, F. and Raspini, F., **2024**. Integration of satellite SAR and optical acquisitions for the characterization of the Lake Sarez landslides in Tajikistan. Landslides, pp.1-17.







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Proposed activity: Thematic issue in Landslides Journal





Key Activity 2.1: Development of toolset for landslide hazard and risk assessment, monitoring and



Topic and editor defined

Papers received

ICL publications: international journal and open access book series



Key Activity 2.2: Development of Case studies of landslides and debris flows hazard management

- Piloting and testing the methodologies and toolset previously developed under Key Activity 2.1
- Case studies as demonstration projects, to assess performance, identify strengths and limitations, and gather valuable insights.
- Case study from Europe of landslides impact on sediment supply.
- The case studies from Be-Resilient Project in Zimbabwe and Mozambique are under preparation and case studies from other regions will follow.













Key Activity 2.2: Development of Case studies of landslides and debris flows hazard management

Proposed activity: Case studies on landslides



- Literature report on landslides contribution to sediment yield
- State of knowledge on joint modeling of soil erosion and landslides as sediment sources

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Short term (2024-2025)

Medium term (2026-2027)

1 report/publication

1 case study



 Case study on landslide susceptibility and risk mapping in developing countries Sub-Saharan Africa







Key Activity 2.3: Enhancement of skills, knowledge and practices related to Sediment-related Hazard and risk management

- related Disaster Risk Reduction at the local, regional, and global scale.
- Development of training materials in the UNESCO Openlearning Platform.
- Training courses, with support from UNESCO Chair on Prevention and Sustainable Management of Geo-Hydrological Hazards







Promoting scientific conferences, workshops and seminars focusing on critical issues relating to Sediment-







Key Activity 2.3: Enhancement of skills, knowledge and practices related to Sediment-related **Disaster Risk Reduction**

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Proposed activity: Capacity building and scientific networking

ISI IHP-IX Implementation Plan

Medium term (2026-2027)

1 Conference Session



7th World Landslide Forum (WLF) in Amrita, Faridabad Campus, India: 23-27th November 2026



3. Glacier-related sediment, erosion and hazards management

and erosion and sedimentation

Local databases: Vilímek V., Emmer A., Huggel Ch., Schaub Y., Würmli S. (2014): Database of glacial lake outburst floods (GLOFs) – IPL Project No. 179. Landslides, 11, 1, 161-165.

The GLOFs database V4.0 (Georg Veh et al., University Potsdam, Germany)

VEH, G., LÜTZOW, N., KHARLAMOVA, V., PETRAKOV, D., HUGONNET, R., KORUP, O. (2022): Glacier Lake Outburst Flood Database V2.0, http://glofs.geoecology.uni-potsdam.de/ (10. 4. 2022).

Kovanda, M. (2024): Interpretation of the glacial lake outburst floods database in relation to climatic conditions in different world regions. AUC Geographica 59(2), 1–12 https://doi.org/10.142/23361980.2024.12





Key Activity 3.1 Development of research, guidelines, and tools related to assess climate change impact on cryosphere system



Co-funded by the European Union



Research advancements for understanding the drivers and impacts of sediment cascades in high mountains (A. Emmer)

- Sediment supply from recently deglaciated areas
- High mountain lakes in sediment cascades
- Lake sediments in palaeo-environmental reconstructions



Major processes driving sediment release and transport in mountain areas



Key Activity 3.2. Development of data on erosion-related aspects of the degradation of the cryosphere



Lacustrine sediment sequence exposed in failed Jircacocha lake, C. Blanca, Peru



Co-funded by the European Union









Workshop

"Cryosphere remote sensing and hazards monitoring in environmental transitions" project, initiated by the newly established GLAM research team (Glacier Landscape Analysis and Geohazards Monitoring with Remote Sensing): Charles University in Prague + University of Milan + Heidelberg University







Co-funded by the European Union

