Date of Submission	**01 May 2025**

IPL Project Annual Report Form 2024

01 January 2024 to 31 December 2024

1. Project Title (**IPL-276**)

   "Landslide risk management on the road network in climate changing conditions"

2. Main Project Fields

   (1) **Technology Development**

   B. Hazard Mapping, Vulnerability and Risk Assessment

   (2) Targeted Landslides: Mechanisms and Impacts

   A. Catastrophic Landslides

3. Name of Project leader: Prof. Biljana Abolmasov, PhD

   Affiliation: Full Professor, University of Belgrade, Faculty of Mining and Geology

   Contact: Serbia, 11000 Belgrade, Djusina 7, tel +381 11 3219 225, biljana.abolmasov@rgf.bg.ac.rs

   Core members of the Project - Names/Affiliations: (4 individuals maximum)

Prof. Miloš Marjanović, University of Belgrade, Faculty of Mining and Geology, Belgrade, Serbia (UBFMG)

Prof. Dario Peduto, University of Salerno, Department of Civil Engineering, Salerno, Italy (DICIV-UNISA)

Prof. Igor Peshevski, University of Ss. Cyril and Methodius in Skopje, Faculty of Civil Engineering, Skopje, North Macedonia (USFCE)

Associate members:

Ass. Prof. Uroš Đurić, University of Belgrade, Faculty for Civil Engineering, Belgrade, Serbia (UBFCE)

Assoc. Prof. Marko Pejić, University of Belgrade, Faculty for Civil Engineering, Belgrade, Serbia (UBFCE)

Ass. Prof. Jelka Krušić, University of Belgrade, Faculty of Mining and Geology, Belgrade, Serbia (UBFMG)

Prof. Settimio Ferlisi, University of Salerno, Dept. of Civil Engineering, Salerno, Italy (DICIV-UNISA)

Res. Dr. Gianfranco Nicodemo, Univ. of Salerno, Dept. of Civil Engineering, Salerno, Italy (DICIV-UNISA)

PhD students:
Ksenija Micić, UBFMG, Davide Luongo (DICIV-UNISA), Natasa Nedelkovska (USFCE)

4. Objectives: (5 lines maximum)
   - Evaluation of methodologies for landslide risk management on the road network;
   - Involving road managing authorities (public enterprises, local self-governments) in road mitigation (raising awareness, training, etc.)
   - Harmonization of data and forms important for landslide risk management for the roads;
   - Testing the methodology for landslide risk management on the pilot areas (road network);
   - Dissemination of Project results (regional, national, international).

5. Study Area: (2 lines maximum)

It is planned to include pilot areas in Serbia (state and local roads in the city of Kraljevo), Italy (state roads in Acri and Lago municipalities in the Calabria Region) and North Macedonia (state roads in the Polog region).

Project duration – November 2023 - ongoing

6. Report

1) Progress in the project: (30 lines maximum)

Phase 1 – Drafting: Developing preliminary methodology for modeling landslide risk on local and state network, starting from terminology consensus, scope and scale definition, landslide inventorying sheets standardization and other input data requirements.

Milestone 1 – Drafting methodology

Phase 2 – Training: Familiarizing the road managing authorities with the methodology. Organizing field campaigns to collect landslide data with specified dynamics using simplified, but standardized inventory data sheets.

Milestone 2 – Landslide databases for all pilot areas.

Phase 3 – Testing: Implementing the methodology using the landslide databases and available GIS layers. Assessing the modeling performance and calibrating the models per each pilot area. Producing output maps of landslide risk along the pilot road networks.

Phase 4 – Dissemination: Closing workshops with partners, publishing results in scientific and public communities, attempting to standardize the methodology through legislation, or within the community (ICL meetings, WP/WLI meetings), project promotion including the contribution plan of articles on the IPL project (progress/result) to the Open Access Book Series P-LRT in the coming few years.

Milestone 3 – Publications:

- **Contributions of IPL Project activities will be focused on articles in P-LRT Vol.3 Issue 1 and Issue 2;**
- Landslides Journal;

- articles in WLF proceedings;
- articles in ICL ABN ReSyLAB proceedings;
- other Journals and International Conferences (ISL, IAEG).

2) Planned future activities or Statement of completion of the Project (15 lines maximum)

Following the Project proposal the Project activities were focused on: (1) Phase 1, Phase 2 and Phase 3 of the project proposal (Developing preliminary methodology for modeling landslide risk on local and state network, starting from terminology consensus, scope and scale definition, landslide inventorying sheets standardization and other input data requirements; Familiarizing the road managing authorities with the methodology. Organizing field campaigns to collect landslide data with specified dynamics using simplified, but standardized inventory data sheets; Implementing the methodology using the landslide databases and available GIS layers. Assessing the modeling performance and calibrating the models per each pilot area. Producing output maps of landslide risk along the pilot road networks.

3) Beneficiaries of Project for Science, Education and/or Society (15 lines maximum)

Direct beneficiaries of IPL activities will be local/national road authorities responsible for Transport and Infrastructure (Public and Local Self Governmental Enterprises) and the Ministries (as Governmental Institutions). Indirect beneficiaries will be also wider landslide community on national, regional and international level. Results will be also disseminated to PhD students and Young Doctors attending LARAM "LAndslide Risk Assessment and Mitigation" International School, yearly organized by UNISA group of with the contribution of several ICL members.

4) Results: (15 line maximum, e.g. publications)

The list of publications in the framework the project is as follows:

- Abolmasov, B., Stanković, R., Marjanović, M., Vulović, N., Đurić, U. (2023). CliRtheRoads: An Integrated Approach to Landslide Risk Management on Roads in Serbia. In: Alcántara-Ayala, I., *et al.* Progress in Landslide Research and Technology, Volume 2 Issue 2, 2023. pp 403-409.Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-44296-4_23
- Abolmasov, B., Marjanović, M., Đurić, U., Krušić, J. (2023). An Integrated Approach to Landslides Risk Management for Local and National Authorities. In: Alcántara-Ayala, I., *et al.* Progress in Landslide Research and Technology, Volume 2 Issue 2, 2023. pp 355-360. Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-44296-4_20
- Abolmasov, B., Marjanović, M., Stanković, R., Đurić, U., Vulović, N. (2024). Increasing the Local Road Network Resilience from Natural Hazards in Municipalities in Serbia. In: Abolmasov, B., *et al.* Progress in Landslide Research and Technology, Volume 3 Issue 1,

2024. pp 319-327. Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-55120-8_22

- Marjanović, M., Abolmasov, B., Krušić, J., Đurić, U. (2024). Regional Debris Flow Hazard Assessment of the Grdelica Gorge (Serbia). In: Abolmasov, B., *et al.* Progress in Landslide Research and Technology, Volume 3 Issue 1, 2024. Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-55120-8_15
- Abolmasov, B., Stanković, R., Vulović, N., Marjanović, M., Đurić, U., Gudžić, N. (2025). MaPLoRds: Mobile Application for Local Road Network Risk Assessment. In: Abolmasov, B., *et al.* Progress in Landslide Research and Technology, Volume 3 Issue 2, 2024. Progress in Landslide Research and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-72736-8_20

Note:

1) If you will change items 1)-6) from the proposal, please write the revised content in red.

The Project should be completed by the end of 2024.