

Date of Submission	<u>November 15, 2015</u>
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IPL Project Proposal Form 2016

(MAXIMUM: 3 PAGES IN LENGTH)

1. Project Title: **Massive landsliding in Serbia following Cyclone Tamara in May 2014**

2. Main Project Fields

Select the suitable topics. If no suitable one, you may add new field.

(1) Technology Development

A. Monitoring and Early Warning, B. **Hazard Mapping, Vulnerability and Risk Assessment**

(2) Targeted Landslides: Mechanisms and Impacts

A. **Catastrophic Landslides**, B. Landslides Threatening Heritage Sites

(3) Capacity Building

A. Enhancing Human and Institutional Capacities

B. Collating and Disseminating Information/ Knowledge

(4) Mitigation, Preparedness and Recovery

A. Preparedness, B. Mitigation, C. Recovery

3. Name of Project leader **Biljana Abolmasov, PhD**

Affiliation: **Associate 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)

Miloš Marjanović, PhD, Assistant Professor, University of Belgrade, Faculty of Mining and Geology

Uroš Djurić, PhD student, researcher, University of Belgrade, Faculty of Civil engineering

Jelka Krušić, PhD student, researcher, University of Belgrade, Faculty of Mining and Geology

Katarina Andrejev, PhD student, researcher, University of Belgrade, Faculty of Mining and Geology

4. Objectives: (5 lines maximum; what you expect to accomplish?)

The project attempts to accomplish that the May 2014 extreme landsliding event was preconditioned by soil saturation, caused by a high precipitation yield, within several weeks to the event. All relevant data, including historic/current rainfall, landslide records, aftermath reports, and environmental features datasets, have to be analyzed for characterizing the extreme nature of the event and identifying key environmental controls of landslide occurrences.

5. Background Justification: (10 lines maximum)

The Cyclone “Tamara” swept through Serbia, Croatia and Bosnia and Herzegovina, causing severe damage and dozens of casualties during mid May 2014. It is considered as the 100-year rainfall event that triggered extreme landsliding throughout Serbia and Bosnia and Herzegovina, while no

significant landslide occurrences were reported in Croatia (only floods). The damages were not uniform in character along affected municipalities due to their different origin, i.e. landslides, floods or erosion, and intensity of the event. As a result, 1.6 million persons (one fifth of the population) were directly or indirectly affected in Serbia. The floods and landslides caused 51 casualties and around 32000 people were evacuated. The Serbian Recovery Needs Assessment (RNA) revealed that the total effects of the disaster in the 24 affected municipalities amounts to EUR 1.525 billion (equal to 3% of the Serbian Gross Domestic Product).

6. Study Area: (2 lines maximum; where will the project be conducted/applied?)

The study area is Western and Central part of the Republic of Serbia - territory affected by Cyclone Tamara during May 2014.

7. Project Duration: 3 years

8. Resources necessary for the Project and their mobilization

Personnel, Facilities, and Budgets

The Project will be organized by University of Belgrade, Faculty of Mining and Geology and Faculty of Civil Engineering. University and staff will provide all necessary documentation for Project finalization. Additional software will be necessary for numerical modeling of landslides (debris flow). The total budget requirement is US 40000.

9. Project Description: (30 lines maximum)

Landslides are amongst the most dangerous natural threats to human lives and property, especially in times of dramatic climate change effects on one hand, and urban sprawl and land consumption on the other. Heavy precipitation peaked on May 14-16, locally exceeding monthly rates 3-4 times in just 3 days (RHMSS - Republic Hydro-Meteorological Survey of Serbia 2014). In Western and Central Serbia for instance, daily precipitation on May 15 exceeded the expected average of the entire month (Fig 6). Several rain gauges in Belgrade, Valjevo and Loznica, registered the highest daily precipitation ever recorded (over 100mm/day), since the beginning of recording in Serbia (1888). The rainfall event was synchronized throughout the region and concentrated on the Sava River catchment and partly the Velika Morava River system. The first flow-like landslides occurred on May 15, and the hotspots were located in the areas Western Serbia. Early estimates on the number of activated landslides were in the order of hundreds, but the final number was estimated to over 2000. In this respect, it was essential to produce unified large-scale inventories of May 2014 event and use them for the state-of-the-art hazard analysis. Thus, the project aims to summarizing and analyzing collected landslide information from the May 2014 sequence. Following these idea objectives of the proposed project include: (1) collecting all available (existing) and acquiring landslides data, (2) analyzing the trigger/landslide relation in affordable time span (past 15 years) and May 2014 event, (3) relating the landslide mechanisms and magnitudes versus the trigger and its aftermath, (4) locating spatial patterns and relationships between landslides and geological and environmental controls, (5) proposing an overview susceptibility map of the event and (6) numerical modeling on the site specific location/landslide mechanism.

10. Work Plan/Expected Results: (20 lines maximum; work phases and milestones)
- Phase 1: Collecting, review and harmonization of landslides data
 - Phase 2: Analysis of trigger/landslide data
 - Phase 3: Analysis of landslides vs. geological/environmental controls
 - Phase 4: Proposing landslide susceptibility map
 - Phase 5: Numerical modeling on site specific locations/landslide mechanism
 - Phase 6: Compilation and analysis of all results
11. Deliverables/Time Frame: (10 lines maximum; what and when will you produce?)
- Report 1. Compilation of results of Phase 1 and Phase 2 (end of 1st year)
 - Report 2. Compilation of results Phase 3 (end of month 18th)
 - Report 3. Proposing landslide susceptibility map Phase 4 (end of month 24th)
 - Report 4. Numerical modeling on site specific locations/landslide mechanism Phase 5 (end of month 30th)
 - Report 6. Final report (end of 3rd year)
12. Project Beneficiaries: (5 lines maximum; who directly benefits from the work?)
- (1) Direct beneficiaries will be local community – municipalities affected by landslide occurrences during May 2014 event
 - (2) Local and regional authorities – housing sector, infrastructure authorities, Civil protection units and land/use sectors within affected area
13. References (Optional): (6 lines maximum; i.e. relevant publications)

Note: Please fill and submit this form by 15 November 2015 to [ICL network](mailto:ICL-network@iclhq.org)
<ICL-network@iclhq.org>