Network application 2024/2025 – long program description

Research and Education of Environmental Risks

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Content

1 INTRODUCTION

1.1 History of the network

Due to population growth and its concentration in densely populated areas, there is an increasing need for modern society to be vigilant of the impact of catastrophic natural events. Every year, the number of disasters in the world is increasing. It causes more and more damage and deaths. Floods, forest fires, and droughts, which do not choose either the place or time when to occur, have been causing irreparable damage, often threaten the lives of people, cultural, material resources, and the environment. There are many areas, including towns and cities that are already at risk. Therefore, it is necessary to develop earthquake, tsunami, or flood damage scenarios by utilizing appropriate vulnerability assessment criteria, topographical information, building and infrastructure inventories, demographical data, and other relevant facts.

With this aim, we established in 2018 this network (cooperating faculties, departments, and institutes, as well as staff) in which every participant offers study programs in engineering and geospatial sciences education, particularly in the field of environmental risks.

The proposed network started in the 2018/2019 academic year and was prolonged in the following years. In the academic year 2018/2019, we got the status of the Umbrella network. The network constituted of 6 participants from three different countries:

1. J. J. Strossmayer University of Osijek
   Faculty of Civil Engineering Osijek
   Coordinator: Marijana Hadzima-Nyarko

2. University of Sarajevo, Faculty of Civil Engineering,
   Department of Materials and Constructions,
   Local coordinator: Naida Ademovic

3. University of Novi Sad,
   Faculty of Technical Sciences,
   Local coordinator: Borko Bulajic

4. University Sts. Cyril and Methodius - Skopje,
   Faculty of Civil Engineering-Department of Structural Analysis and Earthquake Engineering,
   Local coordinator: Sergey Churilov

5. University of Belgrade,
   Faculty of Geography
   Local coordinator: Snežana Đurđić

6. J. J. Strossmayer University of Osijek
   Faculty of Agriculture
   Local coordinator: Ivan Plaščak

In the academic year 2019/2020, the network expanded further by accepting 10 new partners from 4 new countries and comprised 16 participants from 8 different countries.

In the academic year 2020/2021, the network expanded further by accepting 2 new partners but lost two old ones. So, again, the number of participants was 16 from 8 different countries. In the academic year 2020/2021, we got the status of the Umbrella network.

In the academic year 2021/2022, the network expanded further by accepting 1 new partner. The number of participants was 17, and they were from 9 different countries.

The network expanded further in the academic year 2022/2023 by accepting 3 new partners. The number of participants was 19, and they were from 11 different countries.

In the academic year 2023/2024, the network expanded further by accepting 2 new partners. The number of participants is 21, and they are from 11 different countries.

This year, in the academic year 2024/2025, the network expanded further by accepting 2 new partners. The number of participants is 23, and they are from 11 different countries.

1.2 Participating Units

1. J. J. Strossmayer University of Osijek
   Faculty of Civil Engineering Osijek
2. University of Sarajevo, Faculty of Civil Engineering,
   Department of Materials and Constructions
3. University of Novi Sad,
   Faculty of Technical Sciences
4. University Sts. Cyril and Methodius - Skopje,
   Faculty of Civil Engineering-Department of Structural Analysis and Earthquake Engineering
5. University of Belgrade,
   Faculty of Geography
6. J. J. Strossmayer University of Osijek
   Faculty of Agriculture
7. University of Nyíregyháza
   Engineering and Agriculture Faculty
8. Brno University
   Faculty of Civil Engineering
9. “EPOKA" University
   Department of Civil Engineering
10. University of Montenegro
    Faculty of Civil Engineering
11. Transilvania University of Brasov - UniTBv
    Faculty of Civil Engineering

12. University of Belgrade
Faculty of Civil Engineering - Department of materials and structures

13. University of Novi Sad,
Faculty of Civil Engineering in Subotica

14. University of Novi Sad
Technical Faculty "Mihajlo Pupin"

15. J. J. Strossmayer University of Osijek
Faculty of Electrical Engineering, Computer Science and Information Technology Osijek

16. University of Mostar
Faculty of Civil Engineering

17. University of Warmia and Mazury in Olsztyn
Faculty of Geodesy, Geospatial and Civil Engineering

18. University of Prishtina with temporary seat un Kosovska Mitrovica
Faculty of Technical Sciences

19. Technical University in Košice
Faculty of Civil Engineering

20. North University
Department of Civil Engineering

21. University of East Sarajevo
Faculty of Mechanical Engineering

22. University of Rijeka
Faculty of Civil Engineering

23. Budapest University of Technology and Economics
Faculty of Civil Engineering

1.3 Aim of the network

The aim of this multilateral association is the promotion of free exchange of students and teachers to:

- build personal connections and widen their professional horizon
- educate students to apply methods and current knowledge about natural hazards and risk assessment by integrating research and practical application on actual construction structures or facilities - special risk analysis and decision making.

Students will become familiar with various analysis methods, techniques, tools for assessing sensitivity, and modern methods of predicting and tracking disorders or accidents - modeling, simulation, GIS technology, etc.

2 PROJECT OBJECTIVES

2.1 Basic objectives

The basic objectives we strive to accomplish through the network are as follows:

- improvement of regional cooperation, especially in education and research, between the Serbian, Croatian, North Macedonian, Romanian, Hungarian, Albanian, Montenegrin, B&H, Slovak, Czech, and Polish territories.
- the fields of common interest are to have an advanced transfer and exchange of regional information and knowledge.
- to create a framework for increased international cooperation in both research and education between all the participating institutions.
- to establish pioneering approaches for teaching principal subjects related to the network's topics in agreement with the modern tendencies and needs of the future.
- to make common participation in Ph.D. thesis evaluation commissions possible in the topics covered within the framework of the project.
- the utilization of unique laboratory equipment and devices in the participating universities gives broader possibilities for research work. The ones who would most benefit from this are young lecturers working on their dissertations, Ph.D. students, and those working on their theses.

Several priority areas of common activity planned in the network are included in these objectives:

- Mobility of undergraduate and doctoral students
- Ph.D. students training
- Teacher mobility
- Curricula development
- Mutual application for EU-funded projects.

2.2 Achievements

The active cooperation between the partners, which are specialized in various scopes of environmental risk, is supported by jointly published articles and books, as well as organization and participation in conferences.

As the technology and maintenance organizations are expanding from the industrial and agricultural production domain to the maintenance of municipal infrastructure, we introduced NEW SECTION, "ENVIRONMENTAL ENGINEERING" at the conference *International Scientific Conference "Organization and Maintenance Technology"* organized by the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek and the Faculty of Civil Engineering and Architecture Osijek.

This was the fruit of our collaboration, which was encouraged by each institution's management, where we saw how we could connect different professions and areas. A multidisciplinary approach has proven to be the predominant way of working in the future.

2.3 Biggest Challenge

The biggest challenge to me would be the responsibility of becoming a successful leader of a new network that would achieve the following:

- encourage students to participate in academic mobility at foreign universities,
- carry out common research and prepare joint scientific papers together with Ph.D. students,
- utilize as many awarded scholarships monthly as possible.

3 PLANNED ACTIVITIES

1 Student mobility:

a) Short-term student mobility:

Short-term stays are reserved specifically for thesis mentoring and Ph.D. research - they will have the opportunity to observe and learn certain techniques and methods that otherwise would not be available to them at their faculty. Also, some of the partners' institutions have more equipped laboratories, allowing them to conduct some parts of their research. When such a short stay abroad is in question, the student makes provisions to complete the semester at home without difficulties.

b) Long-term student mobility:

Students can spend a whole semester at the partner institution and get credits for their activities (attending courses, working on student project work, working on diploma thesis, etc.).

2 Teaching mobility:

University teachers will give lectures at partner institutions within regular undergraduate and graduate programs.

Professors from our network will work on the preparation of study materials for specific courses.

Professors from our network will supervise diploma master students and Ph.D. students from partner institutions. They will also be official supervisors to students from other institutions working on their Ph.D. thesis.

Teacher mobility will serve as a platform for continuing existing cooperation and establishing new contacts, which will help widen the opportunity spectrum.

Teachers are experts in special fields of study of environmental risk. Thus, they will share their knowledge of teaching and teaching methods/didactics, which they plan to apply in their CEEPUS course.

3 Joint program: This collaborative program is based on research regarding earthquake risk assessment. The goal of the joint program is to develop and implement innovative practices in the construction field. a sector from which a large number of partners come through the implementation of machine learning and artificial intelligence by computing experts, where a database of a large number of digitally collected parameters (characteristics) will be created through joint efforts. The latter will result in making predictions in the area of earthquake risk but will also create a foundation for future research in that area and in the area of earthquake protection, both in all member countries of the consortium and potentially beyond. The results can be reused, refined, upgraded, and additionally connected and have a pronounced transdisciplinary dimension,

considering that they can be used by both higher education institutions and other stakeholders in the construction sector, primarily companies and construction engineers. In this project, four partners from our network are involved.

4 COORDINATION OF THE NETWORK

The network management will be done regularly by e-mail and phone contacts between the partners, traffic sheets, etc.

Partners of this network recognize the need for having regular meetings.

The first meeting is proposed to be held in May 2022. This yearly coordination meeting has several functions:
1. Distribution of the final traffic quota and planned mobility realizations
2. Preparation for the summer school
3. New partners get to know each other, and more natural cooperation may be established.

The second meeting is proposed to be held in November 2022, and this will be organized regularly. This yearly coordination meeting has several functions:
1. Allow the partners to evaluate their half-time activities
2. Prepare and help with the final report of the previous year's network
3. Discuss future tasks (next semester plans and preparation for the new year application).

This yearly meeting of the coordinators will provide the occasion for sharing problems and potential redistribution of not yet used-up months.

Regular communication will be organized via circular e-mails, circulated by the coordinator (in the form of chart and questionnaire forms). In this way, carried-out mobility activities will be continuously monitored.

5 CONCLUSION

Protection against earthquakes, as one of the most dangerous environmental hazards, involves the construction of earthquake-resistant structures and a deepened understanding of the earthquake hazard and the risks involved regarding tangible assets, infrastructure, crucial importance, and population.

Within the network "Research and Education of Environmental Risks" partners agree on:

- Supporting student and teacher mobility among partner institutions. The emphasis will be on teaching target topics regarding environmental risks. Student mobility will be the focus during the implementation.
- Creating the possibility to study specific subjects at various universities.
- Support the compatibility of curricula by recognizing courses and exams with the ECTS tool.
- Creating suitable conditions for studying abroad.
- Continuing and development of inter-university research cooperation in the field of earthquake and environmental risks

- Developing new teaching methods
- Utilizing advanced information and communication technologies (e-learning) to exchange ideas efficiently.
- Supporting elaboration and finishing Ph.D. thesis of home /host/ students in host/home/ universities.
- Continuing and expanding the network of universities in the field of environmental risks with dissemination and valorization of the outcomes.
- Fostering sustainable knowledge in the field of environmental protection.
- Integration of the partners, especially those who are cooperating for the first time in the frame of the CEEPUS project
- The exchange of experience, ideas, and information among researchers, especially from Serbia, Croatia, North Macedonia, Romania, Hungary, Albania, Montenegro, B&H, Slovakia, Czech Republic, and Poland.