



Universitatea  
Transilvania  
din Braşov

# **HABILITATION THESIS**

## **SUMMARY**

**Title: Study of the environmental factors quality and of microbial activities in ecosystems**

**Domain: Environmental Engineering**

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The habilitation thesis with the title "*Study of environmental factors quality and microbial activities in ecosystems*" is structured on the following main aspects: professional achievements, scientific achievements and career development and development plans.

In the first chapter, namely *Professional Achievements*, I presented the evolution of my university career starting with obtaining the bachelor degree in Environmental Engineering at the University of Oradea, obtaining the Ph.D. title in fundamental field of Agricultural and Forestry Sciences at the Transilvania University in Braşov, carrying out postdoctoral studies Horizon 2020: „Promoting the national interest through excellence, competitiveness and responsibility in Romanian fundamental and applied scientific research”. Partner: Institute of the World Economy. Research group: Economic fundamental research group, agriculture, food security and safety, as well as the course I have had so far in terms of teaching and research activity.

Thus, in 2005, I was hired, through a competition as university preparatory, then in 2007 as university assistant being responsible of several specialized disciplines (e.g. General Microbiology, Biotechnology). Continuing my teaching career, I advanced in 2012, through a competition, to the position of lecturer being responsible for discipline of Environmental Management, and in 2021 I promoted to the position of Associate Professor, which I still hold today, for specialty discipline of Environmental Microbiology. As soon as I get habilitation, I intend to apply for the competition of the position of professor within the Faculty of Environmental Protection, University of Oradea.

Another component of my teaching career is also based on the international experience within Erasmus Program where I applied for both Staff training and Staff Teaching at several international universities: University of Debrecen, Hungary, Faculty of Agriculture and the Faculty of Agriculture, Food Sciences and Environmental Management; University of Szeged, Hungary, Faculty of Engineering; College of Nyíregyháza, Hungary, Faculty of Environmental Science; Rzeszów University of Technology, Poland; University of Agriculture Nitra, Slovakia.

The experience gained within Erasmus Program allowed me to evaluate and analyze the way of working in other research teams, to share experiences and knowledge about studies of microbial ecology, microbial metabolism and environmental microbiology. Also, this ongoing experience facilitated the development of teaching/learning tools and strategies, helping students to learn through knowledge transfer, stimulated me to contribute to the creation of links between higher education institutions and the establishment of cooperation between partner institutions within

Erasmus program as well as to exchange experience on teaching methodologies, to acquire new practical skills and to establish contacts with specialists in similar fields to the field of environmental microbiology. The evaluation of the possibilities of developing the partnership in research projects represented another objective.

I was a member of 5 research projects in national competitions. Considering the performance indicators, I have published 118 scientific works, of which 27 articles in ISI indexed publications, the Hirsh index according to ISI Thomson Web of Science is equal to 10; 57 articles published in journals and internationally volumes BDI indexed, 62 papers presented at congresses, conferences, symposia. I have published 14 books and book chapters (of which 1 in international publishing), accumulated over 259 citations (without self-citations) and I'm reviewer for several high-impact journals.

Starting from year 2023 I'm Guest Editor of the special issue "Soil Microbial Communities in Forests: Assessing Impact of Disturbances and Climate Change" Forests, Impact factor 2.9.

In the chapter II, *Scientific achievements*, I listed the main achievements from the research activity. It is structured on three subchapters representing the main research directions addressed:

(a) Air Microbiology - where I indicated the main results obtained in the study of microaeroflora in indoor spaces. In this sense, the results were presented regarding: air contamination inside a sports hall at the University of Oradea; bacterial and fungal contamination of air and surfaces in a historic wooden church in Oradea, Romania, this being a heritage site.

(b) Water quality - in this sub-chapter I presented some of my work on groundwater and wastewater quality studies. Thus, part of the subchapter is focused on studies regarding the evolution over a period of 30 years of some chemical parameters in water samples taken from drilling wells in order to characterize the quality of underground water. The second part of this sub-chapter was dedicated to the results regarding the quality parameters of wastewater from the food industry, before and after treatment.

(c) Soil microbiology. In this sub-chapter I have addressed various research directions focused around concerns regarding the monitoring of soil health, in relation to anthropic intervention (agricultural practices, pollution) but also to abiotic stress factors (fires, windthrows disturbance, erosion, exploitation mining).

The results described in this chapter have been published in prestigious journals such as *Forest*, *Diversity*, *EEMJ*, *Applied Science*, *Canadian Journal of Forest Research*, *Journal of Soil and Sediment*.

The last chapter of the habilitation thesis *Career development plans* has been structured into two components that I consider fundamental for an academic career, namely teaching and research activities. For the first part, I presented a short plan concerning didactic management which involves the development of aspects related to specialized courses, new specializations, tutoring activity, the promotion of university education, etc. For the second part, I presented the research management plan as well as the main directions for further development. Among these directions I have listed: the bioremediation of pollutants, study of ecological technologies for nutrient recycling and environmental sustainability involving the use of biofertilizers, but also bacterial sequencing in order to obtain essential information for the biology and genetics of microorganisms that populate aquatic and terrestrial habitats.

In order to develop my university career, the objectives whose fulfillment contributes to my professional development both from a didactic point of view and from the point of view of scientific research activities are:

- students awareness on the educational role of the "Environmental Microbiology" discipline in the training and preparation of future environmental engineers;
- obtaining the necessary skills and competences for knowing, understanding and using procedures and terminology specific to environmental microbiology;
- continuous updating of teaching methods, verification and assessment of students;
- involvement in the academic and administrative life of the department;
- participation in continuous training courses;
- development of inter-institutional partnership relations with departments from other universities through proposals for research projects in national or international competitions;
- development of a research team and the acquisition through research projects of the latest generation equipment and instruments, specialized for the isolation, identification and characterization of microorganisms as well as for the analysis of environment composition;
- facilitating students' access to data sources and advanced DNA sequencing technologies, advanced imaging and other technological tools crucial for conducting microbiology research at a higher level.

All these university career development objectives will represent the starting points for doctoral theses as well as for the continuation of the research activity

Carrying out teaching and research activities requires specific skills and abilities, which are perfected through sustained activity. Based on what was said above, I will continuously focus on improving the didactic activity, the qualitative orientation of the educational process and the anticipation of the results, together with the evaluation of the efficiency of the activity carried out.

The general conclusions of the paper emphasize the sustainability of the results and initiatives aimed at supporting the practical implementation of the proposed objectives and future development directions, together with the maintenance and continuous improvement of all considered processes and activities, in accordance with the requirements and regulations in the areas of interest, both from professional as well as scientific perspective.