

Individual Research Project (IRP)

Proiect Individual de Cercetare (PIC)

Candidate: Antonio V. LAZA

Proposed thesis title: The next frontier in crayfish conservation: Exploring the ecology of *Aphanomyces astaci* (Următoarea frontieră în conservarea racilor: Investigarea ecologiei patogenului *Aphanomyces astaci*)

1. Candidate presentation (BIO)

In 2023 I completed the Biochemistry Bachelor's program at the Faculty of Chemistry, Biology, Geography from West University of Timișoara with the Bachelor's thesis titled "Actualizarea distribuției Racului Bihorean *Austropotamobius bihariensis*", focused on the distribution of the Idle crayfish, *Austropotamobius bihariensis*. During the Bachelor's years I was part of the project PN-III-P4-ID-PCE-2020-1187, firstly as a volunteer and then was hired for the rest of the project, 14 months. After that, I spent my third year on 2 different Erasmus + mobilities, in Spain and Czech Republic, both of which contributed significantly to my perspective of this field and provided invaluable insight from associated domains. Later on, in 2025, I finished the Developmental Biology Master's program at the faculty of Chemistry, Biology, Geography from West University of Timișoara with the dissertation titled "Astacologia, între teorie și practică: experiență direct și aplicații de teren", aimed to provide a comprehensive guide in astacology based both on literature and personal experience for the crayfish present in Romania.

Since the end of my first year of Bachelor's degree, when I first joined the project as a volunteer, research in astacology was a central focus of my academic trajectory. Being part of the project offered me an important head start in research, granting access to practical experience in different conditions on the field, lab work and literature work. Furthermore, it also offered me the opportunity to participate to 2 International astacological conferences, which were a valuable opportunity for gaining insight into international scientific collaboration and research trends, creating connections, seeing what people study in this field and obtaining important insights for different studies. Since then, I joined the team and recently, in 2024, when the Crayfish Research Centre was created, I also became a member of it.

2. Brief background and context of the topic

Crayfish are keystone organisms in the freshwater ecosystems, having several significant roles - such as bioturbation, bioindicators and having both a predatory and detritivore diet – in maintaining the stability of the ecosystem.

Nowadays, invasive species are becoming increasingly problematic to indigenous ones, and crayfish are no exception. Since the first introduction of invasive crayfish species, they expanded their new territory into the indigenous ones due to better capabilities to reproduce, competitiveness for food, boldness, tolerance to pollution and plasticity overall. With them, they brought the crayfish plague, a lethal pathogen to crayfish populations that never encountered it before. Against these 2, indigenous species

stood no chance and rapidly declined. When combined with habitat degradation, these pressures create a critical scenario for population decline

Considering the previous events, there is an urgent need for conservation measures. To assess the most suitable ones, there's a need not only of accurate data regarding populations and habitats features but also having a rough idea of how the threats would behave once advancing. This is especially important in the case of the crayfish plague, known to be carried by the water currents, arriving downstream before the invasive crayfish.

Old quantification techniques proved to be reliable yet demanding both in terms of material and human resources. Compared, modern techniques require less resources but are more vulnerable to errors such as mispredictions, especially in the case of restricted, highly endemic species. By combining and relying on both worlds, the most robust results can be obtained.

3. Personal contributions to the topic

As part of the team project and later the Crayfish Research Centre, we conducted studies on the *Austropotamobius bihariensis*, both for population distribution and any type of possible and relevant threats. These studies contributed to clarifying the conservation status of this restricted, indigenous species and lead to its inclusion on IUCN red list. Furthermore, we are now implementing the old methods into modern approaches using predictive models for estimations of populations size and habitat, especially useful for the application of conservative measures. As of now, we are working on expanding the use of CPUE data paired with CMR data for more accurate predictions, paving the way for targeted ecological assessment of other threats such as crayfish plague.

4. Objectives

- a. Review contemporary crayfish conservation strategies.
- b. Evaluate modern monitoring effects.
- c. Assess the impact of different natural variables on crayfish plague infectivity.
- d. Propose an accurate prediction model for restricted crayfish populations.

Table 1 summarizes the temporal allocation of the objectives.

Activity	Year I				Year II				Year III				Year IV			
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Bibliographic review																
Research design																
Fieldwork and data collection																
Experimental tests on <i>A. astaci</i>																
Data processing and analysis																
Writing and dissemination																
Theoretical and methodological conceptualisation of results																
Conclusions and thesis finalisation																

Table 1. Temporal allocation of objectives per quantile over the study period, represented as a Gantt chart. Years are indicated above the quantiles, and the colors indicate the planned timing of activities for each objective across different periods.

5. Conclusions and proposals

My findings will integrate the reliability of traditional sampling methods with modern approaches in conservation, enabling more effective assessments of restricted populations that often lack sufficient data or accessibility. Furthermore, the understanding of how certain environmental factors affect the crayfish plague will offer a good baseline for assessing the potential effects on other crayfish species and populations, solely by knowing the values of these factors, providing a solid foundation for predicting pathogen dynamics across different crayfish species habitats, thereby directly informing conservation policies and management strategies. All the objectives are placed in time, as can be seen in table 1.

6. Personal achievements

Projects:

- PN-III-P4-ID-PCE-2020-1187; Lab-technician. My work in this project included both field activities and lab/desk work. During this time, I deepened my understanding of field methods -such as capturing, determination, sampling, observations– and research –scientific writing, technical and methodological skills and communication and documentation-.

Scientific papers:

- Ion, M. C., Ács, A. R., **Laza, A. V.**, Lorincz, I., Livadariu, D., Lamoly, A. M., ... & Pârvulescu, L. (2024). Conservation status of the idle crayfish *Austropotamobius bihariensis* Pârvulescu, 2019. *Global Ecology and Conservation*, 50, e02847. Collected field data.
- Ács, A. R., Ion, M. C., Miok, K., **Laza, A. V.**, Pitic, A., Robnik-Šikonja, M., & Pârvulescu, L. (2025). Threats Assessment of the Endemic Idle Crayfish (*Austropotamobius bihariensis* Pârvulescu,

2019): Lessons From Long-Term Monitoring. Aquatic Conservation: Marine and Freshwater Ecosystems, 35(1), e70033. Collected field data.

Conferences:


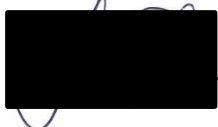
- International Astacology Association; IAA 23; Poster titled “Mapping the scientific research on crayfish behaviour: A bibliometric analysis”
- International Astacology Association; IAA 24; Co-author on presentation titled “Conservation and management strategies of the endemic idle crayfish (*Austropotamobius bihariensis* Pârvulescu, 2019): Lessons from long-term monitoring”

Candidate's signature

LAZA Antonio Vasile



Date: 08/09/2025

Mentor's approval	
<p>Prof. univ. dr. habil. Lucian PÂRVULESCU West University of Timisoara Crayfish Research Centre</p> <p>lucian.parvulescu@e-uvt.ro +4 0766 489 256</p> 	<p>I agree with the individual research project proposed by the candidate Laza Antonio Vasile</p> <p>Date: 08/09.2025</p> <p>Signature: </p>