SCIENCES & BIOENGINEERING SCIENCES

The Research Group
Archaeology, Environmental Changes & Geo-chemistry

has the honor to invite you to the public defence of the PhD thesis of

Thi My Hang Hoang

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

Environmental impact of aquaculture in the Tam Giang – Cau Hai lagoon system (Vietnam)

Supervisor:
Prof. dr. ir. Marc Elskens (VUB)
Co-supervisors:
Prof. dr. Iris Stiers (VUB)
Em. prof. dr. Ludwig Triest (VUB/ULB)

The defence will take place on

Monday, June 8, 2026 at 2 p.m.

The defence can be followed through a live stream:
https://teams.microsoft.com/meet/313610716642029?p=1KrieCZrB3MKt7WfKG

Members of the jury

Prof. dr. Martine Leermakers (VUB, chair)
Dr. Natacha Brion (VUB)
Em. prof. dr. Steven Eisenreich (VUB)
Dr. Phan Thi Thuy Hang (Hue University, VN)
Prof. dr. ir. Peter Goethals (UGent)

Curriculum vitae

Hoang Thi My Hang obtained a Master of Science in Environmental Science from University of Sciences, Hue University in 2013. In 2019, she started a PhD at VUB.

Her PhD research, in which she investigated the role of water quality on phytoplankton distribution, was carried out within the framework of the Institutional University Cooperation with Hue University (Vietnam) - the VLIR-UOS-IUC project: "Preservation of coastal ecosystems and natural resources in development activities," with financial support from VLIR-UOS.

Abstract of the PhD research

The development of aquaculture has increased nutrient enrichment and the accumulation of organic waste in coastal and lagoon ecosystems. Despite growing evidence of aquaculture-related environmental impacts, our understanding of the spatial dispersal of aquaculture-derived wastes and the dominant sources contributing to ecological degradation remains limited, particularly in complex lagoon environments.

This research investigates the environmental impact of aquaculture in the Tam Giang–Cau Hai lagoon system, the largest brackish lagoon system in Southeast Asia and one of the region's most ecologically valuable coastal ecosystems. The study aims to establish an integrated understanding of how aquaculture-derived pollutants are spatially distributed, how they alter water quality and biological communities, and how they contribute to trophic and ecological degradation across the lagoon environment.

Field sampling was conducted along spatial gradients from aquaculture ponds to open lagoon areas. Multivariate analyses (PCA, RDA), indicator genus analysis, stable isotope analysis ($\delta^{13}C$, $\delta^{15}N$), TOC/TN ratios, mixing model, TRIX assessment, and spatial interpolation techniques were applied in this research.

The findings revealed significant impacts of aquaculture on the lagoon environment. Concentrations of TN, TP, turbidity, and Chl-a decreased significantly with increasing distance from aquaculture areas, indicating strong localized nutrient loading. These gradients were accompanied by shifts in phytoplankton communities, with phytoplankton typical of inorganic and turbid water dominating ponds, while marine phytoplankton dominated the open-water area. Isotopic evidence indicated strong impacts of NPK fertilizer inputs in Thuy Tu Lagoon and the combined effects of aquaculture and agricultural runoff in Cau Hai Lagoon. Variations in trophic status were mainly associated with aquaculture practices rather than the monitoring year. Moderate ecological risk in Cau Hai Lagoon was primarily linked to heavy metals from aquaculture fertilizers, with additional contributions from agricultural runoff.

By integrating assessment of water quality, phytoplankton distribution, stable-isotope tracing, and trophic status, this study provides a comprehensive understanding of aquaculture-driven environmental change in tropical lagoon ecosystems and offers a scientific basis for future environmental monitoring and sustainable management.