

**DOCTORAL THESIS INFORMATION WITH NEW SCIENTIFIC
CONTRIBUTION, THEORETICAL STUDY**

1. **Thesis name:** Experimental research on role of some aquatic plants and some biological solutions to improve water quality of Nhue River

- *Major:* Natural Resources and Environmental Management,
- *Code:* 62850111

2. **Name of Ph.D student:** Vu Thi Phuong Thao

Supervisor : Assoc. Prof. Dr. Le Xuan Tuan

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Institute: Vietnam Institute of Meteorology, Hydrology and Climate Change.

3. **Introduction:**

Nhue River is a tributary of Day River, with 72 km long, plays a very important role in economic activities of the river basin, which is also suffering negative impacts of human in Vietnam. Nhue River receives big amounts of polluted wastewater discharge load from Hanoi and the riverside areas, making the river become polluted more and more with phospho, nitrogen, heavy metal, microbiology,... Polluted Nhue River water, containing high levels of phosphorus compounds, nitrogen compounds, microorganisms and toxic heavy metals, are still used as irrigation water, which is threatening to human health and ecosystem. Improvement of river water quality is necessary to ensure urban landscape, public health and ecosystem. This thesis did experiment to use *Cyperus alterfolious*, *Impomoea aquatic* Forsk, *Enydra fluctuans* Lour. to absorb high concentrations of pollutants in Nhue River. Result show that these 3 aquatic macrophyte have good absorption capacity of high concentrations of pollutants in river water to create biomass, meeting the requirements for improvement water quality of Nhue River. This thesis has also built a model using

these aquatic macrophyte to improve Nhue River water environment, which is wetland model using surface flow with appropriate planting time for well growing of aquatic plants, plant- floating bed does not affect much to water flow, creating beautiful ecological landscape. Biomass after treatment should be encouraged using for biogas or material for gasification.

4. New contributions of thesis:

For the first time, a study on role of three species of *Cyperus alterfolious*, *Ipomoea aquatica* Forsk., *Enydra fluctuans* Lour. in Nhue river water quality improvement by experimental method was implemented. Experimental results have demonstrated that three aquatic macrophyte species are capable of absorbing high concentrations of TN, TP, Fe and Zn in Nhue river water. Higher biomass, higher pollutant content in plant tissues, and tissue anatomy show large variations in cell size indicating adaptation to polluted environment. Results of water quality analysis showed that in the tanks with aquatic macrophyte, Nhue river water quality after the experiment almost met irrigation water quality standards of MONRE (QCVN 08:MT/BTNMT/2015). Experimental results are the scientific basis for the development of environmentally-friendly bio-solutions to improve the quality of the Nhue River.

Hanoi, July 16, 2017

Supervisor 1

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Le Xuan Tuan



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