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## Training of Talented Vietnamese Researchers at the Swiss Federal Institute for Technology

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Since 1996, the Institute for the Environment and Resources (IER-CEFINEA) has developed numerous scientific cooperation activities with the laboratory of Environmental Chemistry and Ecotoxicology (CECOTOX), a lab of the Faculty of Architecture, Civil and Environmental Engineering (ENAC) at the Swiss Federal Institute of Technology (EPFL). Among these activities: the training of some of IER-CEFINEA's best researchers.

Currently responsible for the Institute's microbiology and ecotoxicology laboratory, Mrs. Do Hong Lan Chi has recently obtained her PhD in ecotoxicology through the cooperation project with CECOTOX.

Focused on Vietnam's environmental problems, her research is both innovative and critical to the country. Called "Development and validation of a bioassay for the ecotoxicological risk assessment of tropical fresh water systems," Chi's thesis is the first step towards the creation of an environmental monitoring tool for the Saigon-Dongnai river basin. This river system in southern Vietnam has a great social and economic importance, but its pollution by many industrial, domestic and agricultural discharges poses numerous human health problems. Therefore, ecotoxicological risk assessment is receiving increasing atten-

tion in the region. The development of tests adapted to local conditions and using a representative species of invertebrates living in these aquatic ecosystems has become a priority.

Chi's research has led to the development and validation of an ecotoxicological test with the microcrustacean *Ceriodaphnia cornuta* (Cladocera), a local organism that has been isolated in the Saigon River. A protocol has been developed for the organism's culture and encouraging results obtained for its long-term reproduction. *C. cornuta* is a sensitive and easily cultivable organism; furthermore, it is well adapted to the ecotoxicological risk assessment of tropical fresh water systems. These promising results earned Chi the national project of environmental monitoring of the Saigon-Dongnai river basin. In addition, she has been awarded local projects such as the development of an ecotoxicity test for the ecotoxicological risk assessment of Ho Chi Minh City's domestic and industrial wastewater.

Research in the field of ecotoxicology is new in Vietnam. The tight collaboration with CECOTOX enabled the IER-CEFINEA to become one of the first laboratories fitted out with modern equipment in Ho Chi Minh City and probably in Vietnam. "At this stage, we may be the only laboratory in town equipped with a Microtox® and a microscope with a camera," said Chi.

The training of the most talented IER-CEFINEA's scientists at CECOTOX will intensify this year. While four of IER-CEFINEA's researchers have already obtained their Master and PhD degrees in environmental science and technology through the coopera-

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tion project, three new candidates are awaited there in the coming months. Among them is Mr. Mai Tuan Anh, General Laboratory Supervisor at IER-CEFINEA, who will work on dioxins. His thesis will focus on the sources and fate of PCDDs and PCDFs in the rural and urban ecosystems and food chains of South Vietnam. Tuan Anh's thesis will enable the IER-CEFINEA to receive additional high tech equipment: a gas chromatograph – mass spectrometer (GC-MS).

The relationships between CECOTOX and IER-CEFINEA have recently been strengthened with the possibility for CECOTOX's

students to carry out their internship at IER-CEFINEA. For her diploma at EPFL and supervised by Chi, Ms. Nathalie Valloton will work on the ecotoxicological risk assessment of Ho Chi Minh City's contaminated sites.

Activities and opportunities in the fields of research, teaching, and consulting have become more and more numerous thanks to the skills and dedication of all the organisations involved. While the cooperation project is now starting its second phase, which will last until early 2005, new activities are being implemented with numerous and varied opportunities for collaboration, in Europe and in Asia.