



CEFINEA NEWSLETTER

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EDITOR 'S LETTER

Prof. Dr. Lam Minh Triet

Institute for Environment and Resources has published quarterly a NEWSLETTER to exchange information of research results, postgraduate training, technology transfers which relate to environmental protection, properly use of natural resources and sustainable development of Ho Chi Minh City and neighbour regions. The editor board is grateful sincerely to collaborators for contributing us the evaluable news and for continuously encouraging us during the years.

NEWS

REACHING TO ECO-INDUSTRY IN HO CHI MINH CITY

Bui Xuan Thanh

There are about 20 EPZs, IPs and 30.000 office premises including a lot of different industries in Ho chi Minh city so daily quantity of industrial wastes is very numerous including wastes in forms of solid, liquid, gas. There are some kinds of wastes that involve those needing money for treating to avoid their effects on people and environment. However, there are also some kinds of industrial wastes, which can be useful for other industries. Wastes can be recycled, reused, and exchanged ... Wastes of this industry can be raw materials or by-products for the others. Waste exchange among industries is part of "Eco-industry". However, In Ho chi Minh city there is no specific program with content of Eco-industry because the investigation of investment in building IPs, EPZs, or production villages totally hasn't depended on the basis of Eco-industry yet, totally they only plan to gather all industries into one determined area for easy management and still do not pay attention to waste exchange. This causes the loss of benefit from wastes and we even need a sum of money for treatment while we can get benefit from them. For example, wastes from seafood processing and food are raw materials for animal fodder processing, fertilizer industries; black solution from paper industries is reinforcing sub-product for cement industry, waste from chemicals factories can be created other kinds of chemicals with cheaper cost. For instance, wastes from oil sediment is used to produce asphalt ... From above examples that show that it is necessary that Eco-industry must be paid attention intendency and large scale to reduce wastes and get benefit from waste. These examples show the necessary for paying more attention to Eco-industry in specified direction with large scale in order to reduce wastes and get benefit from them.

To implement Eco-industry in Ho Chi Minh city needs teams of environmental experts and experts from DOSTEs, HEPZA, environmental local organizations. Besides,

these must consult, raise awareness about environment for companies and update precise data of quantity, component, quality of every company and have to set up a website to show all data here.

**THE IER-CEFINEA WELCOMES EPFL STUDENTS
FOR THEIR DIPLOMA'S INTERNSHIP
Nathalie Vallotton & Catherine Brassaud**

Ms Nathalie Vallotton, student at the Environmental Sciences and Engineering Department of the School of Architecture, Civil and Environmental Engineering of the Swiss Federal Institute of Technology – Lausanne (EPFL), tells her experience of two months with the team of Microbiology and Ecotoxicology of Dr Do Hong Lan Chi at the IER-CEFINEA.

« Within the framework of my studies at EPFL, I had the opportunity to benefit from the cooperation established between the IER-CEFINEA and the EPFL's Laboratory of Environmental Chemistry and Ecotoxicology (CECOTOX). For the fourth and last year of my engineer curriculum at EPFL, I had to do an internship: I chose to carry out an assessment of the ecotoxicity of lixiviats (percolating water) at two contaminated sites in Ho Chi Minh City.

This was a very interesting and useful research project, as I did the first ecological tests undertaken at these contaminated sites. I used *Daphnia magna*, *Vibrio fischeri* (Microtox®), and *Ceriodaphnia cornuta*, a local organism that has been isolated in the Saigon River in 1998 by Dr Do Hong Lan Chi.

In addition, I could complete the description of the samples by determining some physico-chemical parameters such as pH, DOB, DOC and heavy metal concentrations for which I used atomic absorption spectrometry (AAS).

The first studied site was the garbage dump of Dong Thanh, located at 20 kilometres in the north of the city. For about ten years this dump site of more than 40 hectares has been filled with most of the city's rubbishes. The results I have obtained showed a high toxicity of the lixiviats accumulated in the retention basins on the tested species.

Located in the Tan Binh District, the second site was a sewage treatment plant for the sludge issued by Ho Chi Minh City's septic tanks. My research showed that percolating waters were highly contaminated (DCO>1900mg/l). It also highlighted the problem of accumulating heavy metals.

Ecotoxicological tests carried out on the two sites have confirmed the better sensibility of *C. cornuta* in comparison with *D. magna*. Having a better representativity in tropical climates, *C. cornuta* should soon replace *D. magna* in the tests.

Besides my research work, my stay at the IER-CEFINEA enabled me to get more familiar with some environmental problems that curse the region ; for instance, the issues of dramatic air pollution or contaminated surface water by small- and medium-sized enterprises.

And of course, besides the scientific interests that motivated my research in Vietnam in the first place, the project of studying abroad also attracted me for its cultural and social aspects: I have found new friends in Vietnam and I hope to have the pleasure to welcome them in Switzerland at EPFL sometime!”

ECONOMIC EVALUATION OF AIR POLLUTION DAMAGE TO MATERIALS **Dr. Le Thanh Hai**

Acidic pollutants in the air, besides “famous” effects on surface water and soil environment, have others serious influences. Damaging effects have observed on technical materials, buildings and other structures. Limestone status, cultural structures created from many centuries ago have been damaged gradually, especially in places with high level polluted air. Air pollutants also have another damage such as corroding materials in houses, museums, libraries and storehouses ... that cause serious effects in various fields.

Corrosion and its direct economic effect are paid attention by many contras over the world, specifically addressed in Convention on the Long Range Transboundary Air Pollution - CLRTAP). In this convention, a working group was established to research effect of acidic pollutants on materials and calculate their economic damage. On of place for people who is interested in this issue to contact is Swedish Corrosion Institute, website: www.corr-institute.se.

In Vietnam, the research on economic damage on materials caused by corrosion has not paid attention much in many documents and researching works due to some specific difficulties. However, the author of this report confirms the urgency of this research because Vietnam has humid monsoon tropical climate, moreover, air pollution is more and more increasing, specially in big cities. Therefore, the corrosion on various materials (esp. construction projects) caused by air pollution is unavoidable issue and requires more attention than it is in others developed countries. The concerning problem here is to set out a new research direction, if we can not generalize, at least we have to research specific case, to contribute in warning society and experts in planning municipal environment.

EVALUATION OF TOXICITY OF SEDIMENT FROM HOCHIMINH CITY TO AMPHIPODS *H. azteca*

Tran Thi Mai Phuong*, Do Hong Lan Chi*, Kristin Becker van Slooten**

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Toxicity of sediment from HCMC on *H.azteca* (14-days acute sediment toxicity test) was tested in this study. The amphipods *H. azteca* test showed that the 9 sediment samples from 5 canals of HCMC were toxic with mortality varying from 87.5% to 100%. The reference sediment Tri An showing no acute toxicity can be considered as being a non contaminated site. The order in mean survival in these canal samples was the following: TriAn(76.3%)>NL-TN(10%)>KD-KT(7.5%)>TL-BC(6.3%)>TH-LG (5%)>TH-BN (0%). All sediments of HCMC were classified as very toxic (effects greater than 50% difference from the control - according to Burton et al., 1996). The *H.azteca* sediment test is interesting for the assessment and classification of the sediment contamination in the HCM canals with the aim to assess and manage sediment quality, including dredged material in HCMC.

THE TRANSPORT OF CU AND ZN FROM AGRICULTURAL SOILS TO SURFACE WATER IN A SMALL CATCHMENT

Pham Hong Nhat

Vietnam Institute for Tropical Technology and Environmental Protection (VITTEP)

Agricultural activities, contributing a large amount of nutrients and metals, may cause pollution for receiving water bodies and soils. In this study, the transport of Cu and Zn from the farming soils to surface water was assessed for the catchment of the river Kleine Aa, a first tributary to Lake Sempach located in the Central Switzerland.

For practical purpose, the farming soils in the study area were classified into Normal Soil and Organic Soil which differ in the intensiveness of agricultural activities. Water samples from the artificial drainage pipes, from the river Kleine Aa, and from other five major tributaries of Lake Sempach, were collected during six different weather conditions. Water samples were analyzed for dissolved Cu, Zn, and various related parameters. Three different soil cores were randomly collected as representatives for the Normal and Organic Soils of the catchment. The metal contents and organic carbon concentrations of the collected soil cores were analyzed. It was found that dissolved Cu and Zn were high in the river Kleine Aa, ranging from 1.9 to 8.5 µg/l of Cu and from 1.2 to 14.5 µg/l of Zn. In the water of the other five tributaries, concentrations of dissolved Cu and Zn ranged between from 0.7 to 4.5 µg/l and from 0.06 to 16 µg/l, respectively. Water draining from Organic Soil contained from 6.3 to 11.4 µg/l of Cu and from 6.1 to 21.9 µg/l of Zn. The organic content was 65% in Organic Soil and 8% in Normal Soil. The contents of Cu and Zn in Organic Soil were 160 and 180 µg/g and in Normal Soil 30 and 90 µg/g, respectively. Water extractable organic carbon ranged from 0.7 to 2.5 mg/g in Organic Soil and was 4-8 fold higher

than in Normal Soil. Water extractable Cu and Zn in Organic Soil were 1 and 1.2 µg/g respectively, and exceeded Normal Soil from 5 to 9 fold for Cu and 4 fold for Zn.

The study concludes that the Organic Soil contributes from 34 to 41% of dissolved Cu and from 35 to 77% of dissolved Zn to the total metal export from the agricultural soil, despite occupying only 10% of the total agricultural soil in the study area. Furthermore, the transport of the dissolved metals and the speciation of Zn during the transport were significantly linked with pH and DOC. Finally, intensive agricultural activities can not only elevate the concentrations of dissolved Cu and Zn in the receiving water body, but also cause the accumulation of these metals in the soil.

ARSENIC REMOVAL FOR GROUNDWATER

Samuel Luzi
EAWAG, Switzerland

A study conducted in winter February 2003 investigated the effect of household sand filters on arsenic removal in three villages of Hanoi Province. Sand filters are used by rural families to remove iron from groundwater but prove to be efficient also for arsenic mitigation. The findings of the study show that arsenic concentration and thus arsenic consumption in the studied households is reduced by an average of 80%. The dominant mechanism of arsenic removal in sand filter is co-precipitation with naturally occurring dissolved iron rather than adsorption to pre-formed iron(hydr)oxide coatings on the filter sand. Arsenic removal is thus more dependent on water composition than on filter specifications, with dissolved iron and phosphate being the dominant influence factors. Sand filters are already applied in rural households in Vietnam (unlike Bangladesh for instance), use locally available materials and result in a perceivable improvement of water quality (iron removal) in addition to arsenic mitigation. Household sand filters thus constitute a very attractive method to limit the health risk due to arsenic in Vietnam.

In order to benefit from each others experience, it would be extremely interesting to exchange knowledge between institutions in the South and the North of Vietnam. The following questions could be discussed in the seminar:

- Are results from this study applicable in the South?
- What sand filters are used in rural households in Southern Vietnam? How widespread is the use of household sand filters in the South? Are there differences in filter design?
- How are sand filters promoted in Southern Vietnam? What institutions and methods are involved?
- How are upcoming research projects affected by the results of this study? Findings indicate that not necessarily households with maximum arsenic concentrations are most critical with regard to adverse health effects but rather households where arsenic cannot be removed due to very low iron concentrations. Are there common patterns to identify such "hot spots"? What are the hydro-geological conditions responsible for the occurrence of high arsenic/low iron groundwater?

In this seminar, the findings of the study were presented in more detail. The scientific results will be published in an international journal later this year. In addition, a technical report relating to possible conclusions and recommendations for arsenic mitigation in Vietnam will be produced. The seminar offers an opportunity to debate

the relevance of this study for future research and mitigation programs and the form the findings should be disseminated in Vietnam. A similar seminar will be held at CETASD in Hanoi, involving the responsible institutions in Northern Vietnam.

USING PASSIVE SAMPLERS TO STUDY AIR POLLUTANTS' CONCENTRATION DISTRIBUTION OVER HO CHI MINH CITY **Vo Thanh Dam, DOSTE-HCMC**

A screening study of air pollution using passive samplers in Ho Chi Minh City (HCMC), Vietnam was performed in order to evaluate the representative of selected air quality continuous monitoring sites. The data also aims to give a simplified picture of air pollutants' concentration distribution over the city.

The study was designed and performed in three different periods:

1. A period of 1 week in August 2000: with 30 passive samplers were located in 15 sites over the city.
2. A period of 1 week in December 2000: with 15 passive samplers were located in 9 sites over the city.
3. A period of 2 weeks in November 2002: with 20 passive samplers were located in different parts of HCMC.

Most of the passive samplers were installed at and round sites selected for continuous operation of air pollution monitors. At some of the sites, the passive samplers were placed at different distances from main street to have a look about the effect of distance.

The highest concentrations were observed in streets and near major roads. An other interested result is the contour map of total concentration distribution over Ho Chi Minh City.

WATER AND SLUDGE QUALITY STATUS IN TAYNINH CANAL **Eng.Nguyen Hong Quan et al.**

Institute for Environment and Resources – The Vietnam National University Ho Chi Minh City is carrying out a project titled “Surveying, assessing environmental pollution status and suggesting solutions to control and protect water quality in Tayninh canal”. The project is contracted by DOSTE Tay Ninh. The project's aim is: Assessing status and forecasting process of water pollution, and erosion, sedimentation, self-clarification in Tayninh canal. Suggesting some feasible solutions to protect water quality that serve for sustainable development of Economy and Society in Tayninh canal catchment.

Based on monitoring results, water quality status in Tayninh canal is evaluated. The study canal is polluted mostly by organic matters in which some parameter such as COD, SS, BOD₅ have reached 136, 273, 50 mg/l, respectively. Besides, only OC in other parameters about sludge pollution has exceeded TEL threshold at all monitoring sites.

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