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and the

CRES

Center for Natural Resources and Environmental Studies

Vietnam National University, Hanoi

Final report

Workshop

on

***Workshop on Waste Management and Remediation
of Polluted Sites for Sustainable Development***

Hanoi, Vietnam

11-16 May 1998

UNIDO Project No. TF/GLO/96/105

Purchase Order No.: 15-8-1136X

AL

Title: Workshop on Waste Management and Remediation of Polluted Sites for Sustainable Development
Dates: 11-16 May 1998
Venue: Ha Noi, Vietnam

Introduction

The International Center for Science and High Technology (ICS) in cooperation with the Center for Natural Resources and Environmental Studies (CRES) carried out the Workshop on "Waste Management and Remediation of Polluted Sites for Sustainable Development" from the 11 to the 16 of May 1998 in Ha Noi, Vietnam. The Workshop was organized under the ICS mission to promote awareness building on waste management and remediation in developing countries.

Objectives

The objectives of the workshop were discussed during a Scientific Planning and Coordination Meeting held in Trieste, Italy, 20-22 November 1996. As discussed in the meeting, the objectives were as follows:

1. To improve the scientific and technological skills of participants in the field of remediation and provide them with up-to-date information in this field;
2. To focus on waste management strategies (methodologies, techniques and practical expertise) developed and applied to solve soil and water pollution in variety of situations;
3. To discuss the prospects for technical remediation approaches to contaminated sites as well as to discuss their economic aspects;
4. To review, assess and collect updated information on bio/phyto and physico-chemical remediation technologies and economics;
5. To identify regional R&D institutions in developing countries and countries in transition through contacts established with the participants in the workshop, which could cooperate and launch possible common initiatives and projects in remediation for the establishment of an international network addressed to the diffusion of knowledge and awareness on remediation;
6. To give ICS representatives the opportunity to identify centers to be considered as future cooperative institutions in the ICS Network.

Organization

The workshop was jointly organised by the International Center for Science and High Technology (ICS) and the Center for Natural Resources and Environmental Studies, Vietnam National University, Hanoi.

The members of the Organizing Committee were as follows:

1. Prof. Stanislav Miertus, ICS-UNIDO Area Coordinator, Pure and Applied Chemistry, Trieste – Italy
2. Dr. Adrea Lodolo, ICS-UNIDO Associate Area Coordinator, Pure and Applied Chemistry, Trieste - Italy.
3. Prof. Le Trong Cuc, Director of CRES, Vietnam National University, Ha Noi - Vietnam
4. Dr. Dang Thi Sy, Biological Faculty, Vietnam National University at Hanoi
5. Ms. Nghiem Phuong Tuyen, Administrative Officer of CRES
6. Ms. Phan Anh Dao, CRES.
7. Ms. Hoang Thu Ha, CRES
8. Ms. Nguyen Phuong Mai, CRES
9. Mr. Dang Dinh Thuong, CRES
10. Mr. Michael DiGregorio. Ph.D. candidate from UCLA (USA)

The organizers provided the facilities and the necessities for the holding of the workshop. The local organizers invited lecturers, institutional representatives and industry representatives from China, Cambodia, Laos, Vietnam, Thailand with the assistance of ICS.

The Chairmen of the scientific sections of the Workshop were Prof. Stanislav Miertus, Dr. Adrea Lodolo, Prof. Le Trong Cuc, Mr. Michael DiGregorio, Dr. Giovanni Vallini and Prof. Konstantin Terytze.

Lecturers and participants

Based on ICS recommendations, the organizers invited lecturers coming from Germany, Hong Kong and Italy. The lecturers, during the workshop, provided participants with their technical reports and case studies, as well as co-chaired the discussions regarding waste management and remediation problems in the Mekong basin.

The local organizers sent invitations and application forms to potential representatives from industrial areas and institutions in countries of the Mekong basin. In total 12 industry representatives were invited. Applicants from the industrial areas were given a preferential status in the selection of the participants.

In summary, the workshop included the following lecturers: three from Italy, one from Hong Kong, one from Germany and six from Vietnam.

The participants who attended the workshop were the following: 2 from Laos, 2 from Thailand, 1 from China and 12 from Vietnam. Representatives of Italian Embassy, UNIDO and private consulting firms in Vietnam were also present (see Annex 1 for the full list).

UNIDO covered all expenses for lecturers and participants. The local organizers arranged local formalities, accommodations for the participants and the meeting rooms for the workshop. The local organizers also satisfied participant's requests.

Printed materials distribution

All documents relevant to the workshop were prepared before and during the workshop and distributed to the participants. This included the following:

- All documentation i.e. application forms, Aide-Memoire.
- Preliminary programme.
- Written material.
- Preliminary information about Ha Noi City.
- List of participants and lectures including position and address.

Programme

The organizers worked out a program in accord with the workshop's objectives and the lecturers' schedule. There were 6 sessions regarding the topics of the workshop.

The completed programme is enclosed in Annex 2.

Visit

The workshop included a visit to the Sai Dong industrial area and wastewater treatment facilities in the Thanh Tri District. In Sai Dong Hanel company representatives guided participants on a tour of wastewater treatment facilities. Participants asked the engineers on the site about the process of wastewater treatment and standards for wastewater discharges. One of the local lecturers, Dr. Dang Thi Sy introduced the system of wastewater treatment in Thanh Tri District and, in particular, how wastewater is used to rear fish.

Mr. Michael DiGregorio escorted Dr. Giovanni Vallini to the Urban Environment Company Composting facility. The director of the composting plant, Mr. Pham Huy, guided Mr. Michael DiGregorio and Dr. Giovanni Vallini on a tour.

Summary and conclusions

Participants summarized the main issues brought out in the workshop around three topic areas. These were the conditions and constraints under which waste management and remediation of polluted sites must operate: standardization, regulation and the scale of interventions.

Conditions and constraints

Industrial sectors within each of the Mekong Basin countries contain a large share of small enterprises. These enterprises are very good at mobilizing capital and labor but are generally unable to afford up-to-date production and pollution abatement technology. In many cases, they are pressed by internal market constraints on price and quality that undermine their ability to invest in such equipment profitably as individual firms. Furthermore, even if the most up-to date equipment were available, it should probably be avoided since the training and background knowledge requirements are often too high. For these reasons, most chemical and mechanical treatment methods would appear to be beyond the reach of most small industries. Participants concluded that programs and projects in the region should focus on methods that have low training requirements, are low cost and generally small scale. Cleaner production and biological treatment methods thus appear to offer the most appropriate means of reducing environmental impacts in the small industry sector.

Participants identified three main industrial branches that could benefit from research, analysis and demonstration projects in cleaner production and biotreatment methods. These were: recycling industries (paper, scrap metal and plastic), food processing industries (sugar, tapioca, and noodles), and breweries and distilleries. While noting the problems of transfer of information, participants suggested that future training workshops should bring together more representatives from these small industrial sectors with technical experts. Since many of these industries are located in the countryside, participants also noted linkages to agriculture through impacts of pollution.

Finally, participants also raised the issue of solid and liquid waste management. In line with the previous discussion of small industry, the participants noted the technical and financial constraints imposed upon small rural communities. Like the industrial sector, they proposed the development and use of cleaner production (recycling) and biotreatment methods (composting and fish farming) as a means of managing solid and liquid waste in rural areas. As an immediate project, participants suggested dissemination of methods of constructing small-scale rural landfills.

Scale

The discussion of scale was related to the conditions and constraints noted above. Participants agreed that cleaner production and biotreatment methods were generally preferable under small industry and rural community conditions and constraints. Again, it was noted that the reason for this is that chemical treatment methods generally require higher technical skill and are more costly. The exception to this rule is when time is an issue. When immediate remediation is required, chemical, physical and thermal methods may be preferred.

Standardization and regulation

Participants noted that standardization and regulation could provide a focal point for joint (regional) activities since all of the countries in the region have similar problems in these areas. Standardization must encompass both the standardization of methods of collecting and analyzing samples and the standardization of limits. Regulation should incorporate monitoring activities as well as various forms of compliance incentives (local environmental funds, incremental application of standards, etc.).

Summary of issues

Upon review, the participants summarized their conclusion into five local and regional issues.

Local

Small-scale industries generally lack the financial or technical means to reduce environmental and health impacts.

Village and town levels solid waste and wastewater treatment is generally lacking, of low quality or located in inappropriate areas.

Regional

Standards for environmental quality, assessment or treatment are unapplied, unknown, incompatible or incomplete.

Treatment methods should be low-cost, technologically simple, and appropriate to the market conditions under which enterprises operate.

Common industrial branches for future ICS activities include food processing (tapioca, sugar, noodles), breweries and distilleries, and recycling industries (paper, metal, plastic).

Recommendations

The participants recommended four types and foci for ICS activities in the region.

1. Organize a training course in the region that brings together technical experts with industry and institute representatives. The course should be detailed and targeted on monitoring, remediation, cleaner production, or appropriate technologies issues in the industrial sectors noted above. Part of the course should also include training on the development of proposals to conduct feasibility studies. A committee composed of ICS and regional experts can review proposals developed in the training course. Those proposals that meet the standards of the committee can be provided with small, short-term research stipends. The next meeting within the region can then focus on reviewing the outcomes of these feasibility studies and selecting possible demonstration projects. Proposal for demonstration projects can be developed in the workshop and distributed to possible funding agencies.
2. Expand networking activities in the region to include a mixture of institutional, academic and industrial representatives. Facilitate the flow of information between parties.
3. Research and design waste management projects appropriate to rural towns and villages. Develop demonstration projects, especially in the area of rural landfills.
4. Improve production processes and the management of waste in brewery and distillery, food industry, and recycling sectors. Provide training on cleaner production and biological treatment methods.

Feed back

Participants completed the evaluation form were distributed by ICS. The assessments concern the organizers, duration of the programme, training facilities and others. The participants assessed the organization as "excellent" and "very good", including information on the process, quality of scientific programme, evaluation of lectures, training room, and breaks. They rated as "excellent" and "good" the use of small working groups, case studies, announcement and pre-course material and accommodation. The participants found information of the workshop "very profitable" application in their countries. Almost of them wanted to expand discussion of methods of the waste treatment and increased the number of the participants. Participants recommended training courses, exchange of experts, demonstration of small-scale projects to be carried out in the future.

Statistics of the evaluation forms of the participants in the workshop on "Workshop on Waste Management and Remediation of Polluted Site for Sustainable Development", 11-16 May 1998, Ha Noi, Vietnam.

A. Organization

Chart A.2. Information process:

Excellent: 11.76%, Very Good: 70.60%, Good: 17.64%, Fair: 0%

Chart A.3. Announcement and pre-course material

Excellent: 7.69%, Very Good: 38.46%, Good: 53.85%, Fair: 0%

Chart A.4. Quality of scientific programme:

Excellent: 12.5%, Very Good: 87.5%, Good: 0%, Fair: 0%

Chart A.4.1. Applied lecture/workshop

Excellent: 17.65%, Very Good: 47.05%, Good: 35.30%, Fair: 0%

Chart A.4.2. Use of small working groups

Excellent: 18.75%, Very Good: 31.25%, Good: 50.00%, Fair: 0%

Chart A. 4.3. Case study

Excellent: 18.75%, Very Good: 31.25%, Good: 50.00%, Fair: 0%

Chart A.4.4. Time spent by lectures in class and after class on specific question/examples

Excellent: 37.5%, Very Good: 43.75%, Good: 18.75%, Fair: 0%

Chart A.4.5. Student scientific knowledge was

Balanced: 100%, Unbalanced: 0%

B. Duration of programme

Chart B.1. Number of days

Just right: 88.24%, Too long: 11.76%. Too short: 0%

Chart B.2. Length of working days
Just right: 86.67%, Too long: 13.33%. Too short: 0%

C. Training facilities and hotel

Chart C.1. Lecture/training rooms
Excellent: 11.76%, Very Good: 52.94%, Good: 35.30%, Fair: 0%

Chart C.2. Breaks/refreshments
Excellent: 35.30%, Very Good: 35.30%, Good: 29.40%, Fair: 0%

Chart C.3. Hotel accommodation
Excellent: 66.67%, Very Good: 0%, Good: 33.33%, Fair: 0%

Chart C.4. Meals at the hotel
Excellent: 42.86%, Very Good: 0%, Good: 57.14%, Fair: 0%

Chart D. Organizer's response to participants needs

Excellent: 37.5%, Very Good: 31.25%, Good: 31.25%, Fair: 0%

Chart E. Overall programme organization

Excellent: 0%, Very Good: 66.67%, Good: 33.33%, Fair: 0%

G. Evaluation of Lectures and Speakers

Chart G.1. Course material
Excellent: 17.65%, Very Good: 70.59%, Good: 11.76%, Fair: 0%

Chart G.2. Resident Lecture presentation
Excellent: 11.76%, Very Good: 82.36%, Good: 5.88%, Fair: 0%

Chart G.3. International lecture presentation
Excellent: 24.41%, Very Good: 58.82%, Good: 11.76%, Fair: 0%

Chart G.4. Ability of lectures to answer specific questions
Excellent: 35.29%, Very Good: 52.94%, Good: 11.77%, Fair: 0%

F. Would you recommend to others from your institution/ country to attend a similar activity in the future:

Yes: 100%, Maybe: 0%, No: 0%

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ANNEX 2. PROGRAMME

Monday, 11 May

- 8:30 - 9:30 Registration at Hoabinh Hotel Meeting room
- Session Chairman: Dr. Le Trong Cuc*
- 9:30 - 10:30: Welcome by a representative of the Vietnam National University (Prof. L. V. Khoi)
Greeting & Introduction (Prof. S.Miertus, ICS/UNIDO)
Welcoming remark from Italian Embassy (Ms. Rezoagli Sara)
Report on Activities within the Remediation Program of ICS – UNIDO (Prof. S.Miertus)
Report on Environmental Assessment and Protection Activities of CRES (Dr. L.T. Cuc).
- 10:30 - 10:45 *Coffee Break*

Session One

Overview on Original Needs of the Region and Current Remediation Tools

Session Chairman: Prof. S. Miertus

- 10:45 - 12:15 Pollution problems and remediation initiatives in developing countries and countries in transition
Country reports of China, and Laos
Ms. S. Li, Dr. Gnophanxay
- 12:15 – 13:30 *Lunch break*
- 13:30 - 15:00 Pollution problems and remediation initiatives in developing countries and countries in transition
Country reports of Vietnam and Thailand
Prof. T. H. Nhue, Dr. Dang T. C. Ha, Dr. J. Homchan.
- 15:00 - 15:15 *Coffee break*
- 15:15 - 17:00 Discussion on original needs of the region and current remediation tools
Definition of specific problems in the region

Tuesday, 12 May

Session Two

Domestic Waste Remediation and Management

Session Chairman: Dr. A. Lodolo

- 8:30 - 10:30 Solid wastes, composting, land disposal, digesters and recycling (Mr. M. Digregorio)
- 10:30 - 10:45 *Coffee Break*
- 10:45 - 12:15 Protection of the Tay Lake and management of waste water in Hanoi (Dr. D. T. Sy)
- 12:15 - 13:30 *Lunch*
- 13:30 - 15:30 Toxic waste remediation and management (Dr. T. T. Thanh)
Questions
- 15:30 - 15:45 *Coffee break*
- 15:45 - 17:00 Discussion and Comments

Wednesday, 13 May

Session Three

Industrial Waste Remediation and Management

Session Chairman: Mr. M. Digregorio

- 8:30 - 10:30 Integration of biosorption and biological/chemical degradation of synthetic dyes in industrial effluent (Dr. P. K. Wong)
- 10:30 - 10:45 *Coffee break*
- 10:45 - 12:15 Remediation technologies (Dr. A. Lodolo)
- 12:15 - 13:30 *Lunch break*

- 13:30 - 15:30 Remediation and management of waste in paper industries
(Ms. Sun Li)
Contamination by transformer oil PCBs and risk assessment
(Mr. D. T. Bai)
Industrial pollution prevention in Vietnam (Dr. T. V. Nhan)
15:30 - 17:00 Discussion

Thursday, 14 May

Session Four

- 8:30 - 12:30 Site visit: Thanh Tri District and the Tay Lake
(M. Digregorio, Dr. D. T. Sy)

Session Chairman: Dr. Giovanni Vallini

- 14:00 - 16:00 Harmonization of soil investigation methods for assessing soil contaminants
(Prof. K. Terytze)
Discussion
16:00 - 16:15 *Coffee break*
16:15 - 17:00 Physico-chemical treatments and applicability of biotreatments in China and
Laos
Discussion

Friday, 15 May

Session Five

Agricultural and Animal Waste Remediation and Management

Session Chairman: Prof. K. Terytze

- 8:30 - 10:30 Exploitation of composting ecosystem for soil-phase treatment and reclamation
of organic waste (Dr. G. Vallini)
Discussion
10:30 - 10:45 *Coffee break*
10:45 - 12:15 Soil polluted by agro-chemical pollutants in Vietnam
(Ms. L. T. N. Quynh)
Discussion
12:15 - 13:30 *Lunch break*

Session Six

Session Chairman: Dr. A. Lodolo, Prof. K. Terytze

- 13:30 - 15:30 Discussion on remediation technologies management
15:30 - 15:45 *Coffee break*
15:45 - 17:00 Legal and economic aspects of sustainable development

Saturday, 16 May

Session Seven

Session Chairman: Dr. A. Lodolo, Dr. Le Trong Cuc

- 8:30 - 10:00 Discussion on co-operation between Mekong River basin countries with ICS
10:00 - 10:15 *Coffee break*
10:15 - 11:15 Discussion on co-operation between Mekong basin countries on pollution
remediation
11:15 - 12:00 Recommendation of the workshop
Conclusions of the workshop

LIST OF WRITTEN CONTRIBUTION

Prof. S. Mieurtus, Dr. A. Lodolo (UNIDO)	Overview of ICS 1998 activities in the area of pure and applied chemistry
Dr. Juckrit Homchan (Thailand)	Waste management in Thailand
Dr. Giovanni Vallini (Lecture – Italy)	Exploitation of composting ecosystem management for solid-phase treatment and reclamation of organic waste
Ms. Manichanh Manammivong (Laos)	Waste management and remediation of polluted site for sustainable development. Case study: Beer Lao Co. Ltd.
Dr. Patma Vityakon (Thailand)	Management of organic waste to improve problem soils of Northeast Thailand: Farmer vs. researchers' perspective
Dr. Somsy (Laos)	Waste problem and remediation in Lao P.D.R.
Ms. Sun Li (China)	Environmental issue of Jiamusi Industry area
Michael DiGregorio at all	Linking community and small enterprise activities with urban waste management
Michael DiGregorio at all	Health care waste and small enterprises in Hanoi, Vietnam
Dang T. C. Ha	Use of bioremediation to clean up oil contamination
Tran Van Nhan Dinh Van Sam (Vietnam)	Industrial pollution prevention in Vietnam: current situation and future challenges
Dr. P.K. Wong (Hong Kong)	Integration of biosorption and biological/ chemical degradation of synthetic dyes in industrial effluent
Prof. Tran Hieu Nhue (Vietnam)	State of water environmental pollution and solid waste in urban-industrial areas of Vietnam
Mr. Do Thanh Bai (Vietnam)	Contamination by transformer oil PCBs and risk assessment
Dr. Dang Thi Sy (Vietnam)	The bio-remediation solution for Tay lake
Dr. Trinh Thi Thanh (Vietnam)	Environmental assessment of Hanoi master plan with regard to industrial and hazardous wastes
Dr. Pham Binh Quyen (Vietnam)	Environmental protection issue through the utilization of agrochemical in Vietnam
Dr. K. Terytze (Germany)	Result obtained in harmonizing soil investigation methods within the framework of cooperation with countries in central and eastern Europe.