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Sommai

2 Aug. 96



Sixth Anniversary
Suranaree University of Technology
(SUT)

International Seminar Workshop

*"Advances in Water Resources
Management
and
Wastewater Treatment Technologies"*

Surasammanakhan Hall
Suranaree University of Technology
Nakhon Ratchasima, Thailand
22-25 July 1996



INTERNATIONAL SEMINAR WORKSHOP ON ADVANCES IN WATER RESOURCES MANAGEMENT AND WASTEWATER TREATMENT TECHNOLOGIES

22 -25 JULY, 1996

PROGRAM

22 July Monday

0830 - 0930 REGISTRATION

0930 -1000 OPENING CEREMONY

Welcome Remarks :

Prof. Dr. Wichit Srisa-an,
Rector, Suranaree University of Technology

Address :

H.E. Mr. Boonchoo Treethong,
Minister of University Affairs

1000 -1045 COFFEE BREAK

1045 -1200 KEYNOTE PAPER PRESENTATION

*Advances in Water Resources Management and
Wastewater Treatment Technologies*

by Mr. Pramote Maiklad,
Inspector General, Ministry of Agriculture and Cooperatives

Chair: Assoc. Prof. Dr. Sam-ang Srimita

Rapporteur:

Prof. Dr. Ruben C. Umaly

1200 - 1330 LUNCH BREAK

1330 - 1500 PLENARY SESSION I: INVITED PAPERS ON
WATER RESOURCES MANAGEMENT

Canada Experience

by Dr. Bruce Mitchell, Technical University of Nova Scotia

Thailand Experience

by Prof. Dr. Kasem Jankaew,
Faculty of Forestry, Kasetsart University

Chair: Mr. Manu Omakupt

Rapporteur:

Assoc. Prof. Dr. Chaiyot Tangsathitkulchai

1500 - 1530 COFFEE BREAK

1530 - 1700 PLENARY SESSION II: INVITED PAPERS ON
WATER USE AND DEVELOPMENT

Water Use and Development - Canada Experience

by Ms. Catriona Moir, Technical University of Nova Scotia

*Urban Development Impact on Water
and Wastewater Treatment Needs*

by Mr. Bichit Rattakul,
Governor, Bangkok Metropolitan Authority

Water Use / Development Policies and Regulations

by Ms. Chuanpit Dhamasiri,
Governor, Metropolitan Waterworks Authority,

Chair: Asst. Prof. Dr. Tavee Lertpanyavit

Rapporteur:

Asst. Prof. Dr. Sarawut Sujitjorn

1800 DINNER RECEPTION

23 July Tuesday

**0830 - 1000 PLENARY SESSION III: INVITED PAPERS
ON ENVIRONMENTAL IMPACT AUDITING**

***Environmental Impact Auditing Techniques:
Thailand Experience***

by Ms. Nipaporn Watcharasin,
Office of Environmental Policy and Planning
Quality Assurance and Environmental Auditing:

by Dr. John K. Underwood,
Technical University of Nova Scotia
Minimizing Environmental Impact
by Dr. William Hart, Technical University of Nova Scotia

Chair: Prof. Dr. Ronald Goforth

Rapporteur:

Assoc. Prof. Dr. Amnat Apichatvullop

1000 - 1030 COFFEE BREAK

**1030 - 1200 PLENARY SESSION IV: INVITED PAPERS ON
WASTEWATER TREATMENT TECHNOLOGIES**

***Wastewater Treatment Technologies:
Thailand Experience***

by Dr. Chongrak Polprasert,
Asian Institute of Technology
***Advances in Wastewater Treatment Technologies:
Canada Experience***

by Dr. Michel Khalil, University of Quebec at Rimouski

Chair: Prof. Dr. Ruben C. Umaly

Rapporteur:

Assoc. Prof. Dr. Vorapot Khompis

1200 - 1330 LUNCH BREAK

**1330 - 1500 PLENARY SESSION V: INVITED PAPERS ON USE
OF COMPUTER TOOLS FOR WATER MANAGEMENT**

Computer Tools for Water Management

by Dr. David Swayne, Department of Computing and
Information Science, University of Guelph
***Impact of Eutrophication and Other Degradation Processes
on Water Quality of Tropical Ecosystems***

by Dr. Jacques Moreau,
Institut National Polytechnique de Toulouse

Chair: Dr. Angelina Galang

Rapporteur:

Dr. Nathawut Thancee

1500 - 1530 COFFEE BREAK

**1530 - 1730 PLENARY SESSION VI: CONTRIBUTED PAPERS ON
WATER RESOURCES MANAGEMENT**

***Watershed Classification: Macro Land Use Planning for
Sustainable Development of Water Resources***

by Assoc. Prof. Nipon Tangtham,
Faculty of Forestry, Kasetsart University
***Impact of Various Land Uses on Water Quality at
Mae Klong Head Watershed Area, Kanchanaburi***

by Dr. Songtam Suksawang,
Royal Forestry Department
Kok River Diversion Schemes
by Dr. Chaitawat Saowapon,
Faculty of Engineering, Chiangmai University

Chair: Dr. David Swayne

Rapporteur:

Dr. Chongchin Polprasert

1900 DINNER

24 July Wednesday

FIELD TRIP

0730 ASSEMBLY AND DEPARTURE
0830 - 0930 JIM THOMPSON'S SILK FACTORY
1100 - 1400 LAM TAKONG RESERVOIR
LUNCH AT THE RESERVOIR
1430 - 1530 SEAGATE WASTE TREATMENT PLANT
1600 - 1700 DAN KWIAN CERAMICS
1730 - 1830 THAI HI-TECH HOUSE, SUT
1900 DINNER

25 July Thursday

0830 - 1000 PLENARY SESSION VII: CONTRIBUTED PAPERS ON WATER QUALITY ASSESSMENT

Application of Anthropological Assessment in Water Resources Management

by Luisa Umaly and Lucas Fernan,
Anthropological Association of the Philippines
Institute of Biology, University of The Philippines

Water Quality of Malabon River

by Dr. Annabelle Herrera,
Institute of Biology, University of the Philippines
Wastewater in Navotas-Malabon River: Its Impact on Milkfish (Chanos chanos)

by Dr. Edna Amparado,
Institute of Biology, University of the Philippines

Chair : Dr. Jacques Moreau
Rapporteur :
Dr. Noppadol Kongratharoern

1000 - 1030 COFFEE BREAK

1030 - 1200 PLENARY SESSION VIII: CONTRIBUTED PAPERS ON WASTEWATER TREATMENT

Wastewater Treatment in Huaxi

Mr. Zhang Chao,
Department of Chemistry, Guizhou University
Removal of Ca, Cr, Ni, Zn Ions by Amidoximated Cellulose

by Asst. Prof. Winai Somboon,
KMIT Thonburi

The Treatment of the Scalp Industrial Wastewater Using Its Solid Waste by Trickling Filter Method

by Mrs. Endang Srirahayu,
Polytechnic ITB, Ciwaruga, Bandung, Indonesia

Possibility of Narrow-leaved Cattail for Wastewater Treatment

by Ms. Supaporn Junrungreang, et al.
Land Development Department

Chair : Dr. Michel Khalil
Rapporteur :
Dr. Narong Akkarapattanasoon

1200 CLOSING REMARKS

Prof. Dr. Wichit Srisa-an,
Rector, Suranaree University of Technology

1230 CLOSING LUNCH





Sixth Anniversary
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1230 CLOSING LUNCH



**SURANAREE UNIVERSITY OF TECHNOLOGY
NAKHON RATCHASIMA, THAILAND**

FINAL CALL FOR PARTICIPATION

INTERNATIONAL SEMINAR WORKSHOP ON
“INTEGRATED WATER RESOURCES MANAGEMENT AND WASTEWATER
TREATMENT TECHNOLOGIES”

22-25 JULY 1996

FEE: US\$ 250

INTERNATIONAL COLLOQUIUM ON
“SCIENCE PARK-FOR MEETING TECHNOLOGY CHALLENGES
OF THE 21ST CENTURY”

26 JULY 1996

FEE: US\$ 200

FEE IF ATTENDING BOTH EVENTS: US\$ 450

FEE INCLUDES REGISTRATION FEE, SHARED TWIN ROOM ACCOMMODATION AT THE
UNIVERSITY HOTEL, MEALS AND SNACKS. SINGLE ROOM OCCUPANCY IS ALSO
AVAILABLE FOR AN ADDITIONAL FEE.

**SURANAREE UNIVERSITY OF TECHNOLOGY
6th FOUNDING ANNIVERSARY CELEBRATION**

27 JULY 1996 (BY INVITATION)

PARTICIPATION FORM

Title _____ Name _____

Position _____ Institution _____

Address _____

Tel: _____ Fax: _____ E-mial: _____

Please Check:

I am attending:

☐ Water Resources Seminar

☐ presenting ☐ not presenting a paper

☐ Science Park Colloquium

☐ 6th Anniversary Celebration

☐ All the above

Arrival Date: _____

Departure Date: _____

Means of Transport _____

Means of Transport _____

Hotel Accommodation: ☐ Single ☐ Shared Twin

If shared, do you have a specific person with whom you would want to share?

☐ None ☐ Yes, If yes, Name _____

Institution: _____

Please Fax or E-mail response to:

Center for International Affairs

Suranaree University of Technology

111 University Avenue, Nakhon Ratchasima

Thailand

Tel: (66-44) 216191-8 ext 1155, 1156

FAX: (66-44) 216122

E-mail: Cenintaf@ccs.sut.ac.th

Deadline: 30 June 1996

ANNOUNCEMENT

DUE TO A TYPING ERROR, THE JOINT REGISTRATION FEE FOR BOTH EVENTS (INTERNATIONAL SEMINAR WORKSHOP ON "ADVANCES IN WATER RESOURCES MANAGEMENT AND WASTEWATER TREATMENT TECHNOLOGIES" & INTERNATIONAL COLLOQUIUM "SCIENCE PARK FOR MEETING TECHNOLOGICAL CHALLENGES OF THE 21ST CENTURY") STATED IN THE LATEST ANNOUNCEMENT IS INCORRECT. PLEASE BE INFORMED THAT ***THE CORRECT FEE FOR BOTH EVENTS IS \$ 350.***

PLEASE SEND PRE-REGISTRATION FORM AND TITLE OF PAPER AS SOON AS POSSIBLE AND BRING THE COMPLETE PAPER TO THE SEMINAR WITH YOU.

LIST OF PARTICIPANTS

International Seminar Workshop on Advances in Water Resources

Management and Wastewater Treatment Technologies

22-25 July 1996

No.	Name/Institute	Country	Address
1.	Prof. Liang Yihua Dean for International Exchanges Guangxi University.	China	Dean for International Programs Guangxi University Nanning Guangxi P.R.China 530004 Fax:0771 332391
2.	Prof. Zhao Jianhua Chairman, Chemical Engineering Department, Guangxi University	China	Chairman, chemical Engineering Department Guangxi University Nanning Guangxi P.R. China 530004 Fax: 0771 332391
3.	Mr.Zhang Chao Department. of Chemistry Guizhou University.	China	Department of chemistry Guizhou University Guiyang Gz 550025 P.R.china Tel &Fax:0851-3851381
4.	Dr. Suwarsih Madya The Embassy of Indonesia	Indonesia	600 Petchburi Road, Bangkok 10400 thailand Tel 2525135-40 Fax:255-1269
5.	Ms.Luisa Umaly UGAT, Anthropological Association of the Philippines	Philippines	R.M. 208 Philippine Social Science Center Commonwealth Ave. U.P. Diliman, Quezon City Philippines 1101 Fax:920-2197
6.	Dr. Angelina Galang Vice President for Academics	Philippines	
7.	Dr. Lourdes Agbing Graduate Dean Miriam College	Philippines	
8.	Ms. Lennie Borja Miriam College	Philippines	
9.	Ms. Vilma Umaly Miriam College	Philippines	

No.	Name/Institute	Country	Address
10.	Prof. Andriano A. Bordalo Instituto de Ciencias Biomedicas De Abel Salazar - Universidade do Porto Portugal	Portugal	
11.	Ms.Srisuda Dhamwichukorn Department of Microbiology KMIT Thonburi	Thailand	Prachauthid, Bangmod, Ratburana,Bangkok 10140 Tel 4270039 Ext 6252,6253 Fax:4278050 Email Isrikorn @cc.kmitt.ac.th
12.	Assoc. Prof. Dr. Benjavun Ratanasthien Department of Geological Sciences Chiangmai University	Thailand	Department of Geological Sciences, Faculty of science Chiang Mai University, Chiang Mai,50200,Thailand Tel 221699 Ext 3417 Fax:53-892261
13.	Prof. Dr. Smith Kampempool Vice President for Research Siam University	Thailand	
14.	Mr. Thongyoi Srirodbang Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
15.	Mr. Nitat Poovatanakul Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
16.	Mr., Prathaeng Jakthong Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
17.	Mr. Sirichai Sakairikosol Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559

No.	Name/Institute	Country	Address
18.	Mr. Anan Chareonrat Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
19.	Mr. Suksiri Yoosuk Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
20.	Mr. Dheera Oon-Taon Regional Irrigation Office 7, Chaiyanat	Thailand	สำนักงานชลประทานที่ 7 เขื่อนเจ้าพระยา จ.ชัยนาท 17000 Tel (056)411559
21.	Assoc. Prof. Nipon Tangtham Department of Conservation, Kasetsart University	Thailand	Department of Conservation Faculty of forestry kasetsart University Bangkok 10903 Tel 579-0172 Fax:5790172 Email ffornt@ nontri.ku.ac.th
22.	Dr. Chaitawat Saowapon Faculty of Engineering, Chiangmai University	Thailand	Faculty of Engineering Fax 053-217287 Tel 053-221699*4121 Email Saowapon@cmv.chiangmai.ac.th
23.	Dr. Songtam Suksawang Forest Environment Research and Development Division , Royal Forest Department	Thailand	61 phaholyothin Road Bangkok Fax: 579-4336 Tel 579-4336 Email Osts.nontri.ku.ac.th
24.	Ms.Supaporn Junrungreang Soil&Water Conservation Division, Land Development Department	Thailand	Bangkhen Bangkok, 10900 Tel 579-5215 Fax: 579-5215
25.	Mr.Yutthana Tathrakhom Regional Irrigation Office 9, Chonburi	Thailand	สำนักงานชลประทานที่ 9 อ.ศรีราชา จ.ชลบุรี 20210 Tel (038) 341252-4 Fax:(038) 341433

No.	Name/Institute	Country	Address
26.	Mr.Sarithsak Surattithum Regional Irrigation Office 9, Chonburi	Thailand	สำนักงานชลประทานที่ 9 อ.ศรีราชา จ.ชลบุรี 20210 Tel (038) 341252-4 Fax:(038) 341433
27.	Mr. Sumate Wattanayannonth Regional Irrigation Office 9, Chonburi	Thailand	
28.	Mr. Metha Hovarongkura Regional Irrigation Office 5, Ubon Rajathani	Thailand	The Engineering Branch, The Regional Irrigation office 5, 3 Jangsanit Road, muang District, Ubonratchathani 34000 Tel (045)245324 Fax: 245324
29.	Ms. Kittinuch Nanna EGAT	Thailand	53 Charan sanitwong Road : Bang kruai, Nonthaburi 11000 Tel 02-4361186 Fax: 02-4361175 Email envktn@email.egat.or.th
30.	Mr. Banhan Charukalas Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand	Royal Irrigation Department Pakred, Nontaburi 11120 Tel 583-9268 Fax:5839268
31.	Mr. Winai Meemitkit Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand	Royal Irrigation Department Pakred, Nontaburi 11120 Tel 583-9268 Fax:5839268
32.	Mr. Prasit Sithiyos Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand	Royal Irrigation Department Pakred, Nontaburi 11120 Tel 583-9268 Fax:5839268
33.	Mr. Dhiravit Subhadhira Asia Modified Starch Co.Ltd. Nakhon Ratchasima	Thailand	61 Moo 3 Tambol Nongjabok Ratchasima-Pakthongchai Road Amphur Muang, Nakornratchasima 30000 Tel (044)211101-3 Fax: 211104
34.	Mr. Manit Petlam Royal Forest Department	Thailand	กรมป่าไม้ 61 ถนนพหลโยธิน เขตจตุจักร ก.ท.ม.10900 Tel 579-5271 Fax 579-5342
35.	Mr. Kittipong Pongboon Royal Forest Department	Thailand	กรมป่าไม้ 61 ถนนพหลโยธิน เขตจตุจักร ก.ท.ม.10900 Tel 579-5271 Fax 579-5342

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36.	Mr. Supachart Wannawong Royal Forest Department	Thailand	กรมป่าไม้ 61 ถนนพหลโยธิน เขตจตุจักร ก.ท.ม.10900 Tel 579-5271 Fax 579-5342
37.	Ms. Sam-ang Seubsman Community Development Dept. Ministry of Interior	Thailand	Community Development Department Ministry of Interior, Asdang Road Bangkok Tel 222-4266 Fax: 222-9187 Email Samang@loxinfo.co.th
38.	Mr. Sirichai Santiworarak Bangkok Farm Co.Ltd.	Thailand	Bangkok farm Co,Ltd. 11/1 Bangna-Trad Highway km 2.5 Bangna Prakanong Bangkok 12060 Tel (02)746-9731-8 Fax:746-9757
39.	Mr. Mesak Milintawisamai Environmental Research & Training Technopolis, Klongluang	Thailand	Technopolis, Amphoe Klong Luang Pathumthani 12120 Tel 577-1136-7 Fax:577-1138
40.	Ms. Sirirat Suwanidcharoen Sukothai Thammathirat Open University	Thailand	
41.	Mr. Amornthep Ngam-sombat Betagro Hybrid International Co Ltd	Thailand	
42.	Ms. Sansanee Chawanakul Ubon Ratchathani University	Thailand	

LIST OF ~~THAI~~ SPEAKERS (~~PLENARY SESSION~~)

**INTERNATIONAL SEMINAR ON
ADVANCES IN WATER RESOURCES MANAGEMENT
AND WASTEWATER TREATMENT TECHNOLOGY**

22 - 25 JULY,1996

NO	NAME	TITLE	TIME
1.	รัฐมนตรีทบวงมหาวิทยาลัย นายบุญชู ตรีทอง H.E. Mr. Boonchu Trithong Minister of MUA	เปิดงานและเป็นkeynote Speaker Preside over the opening ceremony & keynote speaker	22 July 1000 - 1100
2.	นายปราโมทย์ ไม้กลัด ผู้ตรวจราชการ กระทรวงเกษตร และสหกรณ์ Mr. Pramote Maiklad Inspector-General Ministry of Agriculture & Cooperative	Keynote Speaker : Overall - Advances in Water Resources Management and Wastewater Treatment Technologies	22 July 1100 - 1200
3.	ศ.ดร.เกษม จันทร์แก้ว คณะวนศาสตร์ ม.เกษตรศาสตร์ Prof. Dr. Kasem Jankaew Forestry Department Kasetsart University	Integrated Water Resources Management	22 July 1400 - 1430

NO	NAME	TITLE	TIME
4.	ดร. พิจิตต รัตกุล ผู้ว่าราชการกรุงเทพมหานคร Dr. Bichit Rattakul Governor, BMA	Urban Development Impact on Water and Wastewater Treatment Needs	22 July 1600-1630
5.	นางชวนพิศ ธรรมศิริ ผู้ว่าการประปานครหลวง Mrs. Chuanpit Dhamasiri Governor, Metropolitan Waterwork Authority	Water Use Development Policies and Regulations	22 July 1630-1700
6.	นายสันหัตถ์ สมชีวิตา เลขาธิการสำนักนโยบายและ แผนสิ่งแวดล้อม Mr. Santhad Somchivita Secretary General Office of Environmental Policy and Planning	Environmental Impact Auditing Techniques	23 July 0830-0900
7.	ศ.ดร.จรงักษ์ ผลประเสริฐ สถาบันเทคโนโลยีแห่งเอเชีย Prof. Dr. Chongrak Polprasert Asian Institute of Technology	Treatment Technologies : Experiences and Challenge in Thailand	23 July 1030-1100

Invited Foreign Speakers
**International Seminar Workshop on “Advances in Water Resources Management
& Wastewater Treatment Technologies”**
22-25 July, 1996

No.	Name/ Institute	Country
1.	Mr. Pramote Maiklad Inspector-General, Ministry of Agriculture & Cooperatives	Thailand
2.	Prof. Dr. Kasem Jankaew Forestry Department, Kasetsart University	Thailand
3.	Mrs. Chuanpit Dhamasiri Governor, Metropolitan Waterworks Authority	Thailand
4.	Ms. Nipaporn Watcharasin Office of Environmental Policy and Planning	Thailand
5.	Prof. Dr. Chongrak Polprasert Asian Institute of Technology	Thailand

Invited Foreign Speakers

**International Seminar Workshop on “Advances in Water Resources Management
& Wastewater Treatment Technologies”**

22-25 July, 1996

No.	Name/ Institute	Country
1.	Prof. Dr. Bruce Mitchell Department of Geography University of Waterloo	Canada
2.	Dr. David Swayne Department of Computing and Information Science, University of Guelph	Canada
3.	Ms. Catriona Moir Nova Scotia Department of the Environment	Canada
4.	Dr. John K. Underwood Nova Scotia Power Inc.	Canada
5.	Dr. William Hart Associate Director, Center for Water Resources Studies, TUNS	Canada
6.	Dr. Michel Khalil Director, Liaison Bureau Univ. Industry University of Quebec at Rimouski	Canada
7.	Prof. Jacques Moreau Institute National Polytechnique of Toulouse ENSAT	France

LIST OF PARTICIPANTS

International Seminar Workshop on Advances in Water Resources

Management and Wastewater Treatment Technologies

22-25 July 1996

No.	Name/Institute	Country
1.	Prof. Liang Yihua Dean for International Exchanges Guangxi University.	China
2.	Prof. Zhao Jianhua Chairman, Chemical Engineering Department, Guangxi University	China
3.	Mr. Zhang Chao Department. of Chemistry Guizhou University.	China
4.	Dr. Suwarsih Madya The Embassy of Indonesia	Indonesia
5.	Ms. Luisa Umaly UGAT, Anthropological Association of the Philippines	Philippines
6.	Dr. Angelina Galang Vice President for Academics	Philippines
7.	Dr. Lourdes Agbing Graduate Dean Miriam College	Philippines
8.	Ms. Lennie Borja Miriam College	Philippines
9.	Ms. Vilma Umaly Miriam College	Philippines
10.	Prof. Andriano A. Bordalo Instituto de Ciencias Biomedicas De Abel Salazar - Universidade do Porto Portugal	Portugal
11.	Ms. Srisuda Dhamwichukorn Department of Microbiology KMIT Thonburi	Thailand

No.	Name/Institute	Country
12.	Assoc. Prof. Dr. Benjavun Ratanasthien Department of Geological Sciences Chiangmai University	Thailand
13.	Prof. Dr. Smith Kampempool Vice President for Research Siam University	Thailand
14.	Mr. Thongyoi Srirodbang Regional Irrigation Office 7, Chaiyanat	Thailand
15.	Mr. Nitat Poovatanakul Regional Irrigation Office 7, Chaiyanat	Thailand
16.	Mr.. Prathaeng Jakthong Regional Irrigation Office 7, Chaiyanat	Thailand
17.	Mr. Sirichai Sakairikosol Regional Irrigation Office 7, Chaiyanat	Thailand
18.	Mr. Anan Chareonrat Regional Irrigation Office 7, Chaiyanat	Thailand
19.	Mr. Suksiri Yoosuk Regional Irrigation Office 7, Chaiyanat	Thailand
20.	Mr. Dheera Oon-Taon Regional Irrigation Office 7, Chaiyanat	Thailand
21.	Assoc. Prof. Nipon Tangtham Department of Conservation, Kasetsart University	Thailand
22.	Dr. Chaitawat Saowapon Faculty of Engineering, Chiangmai University	Thailand
23.	Dr. Songtam Suksawang Forest Environment Research and Development Division , Royal Forest Department	Thailand
24.	Ms.Supaporn Junrungreang Soil&Water Conservation Division, Land Development Department	Thailand
25.	Mr.Yutthana Tathrakhom Regional Irrigation Office 9, Chonburi	Thailand

No.	Name/Institute	Country
26.	Mr.Sarithsak Surattithum Regional Irrigation Office 9, Chonburi	Thailand
27.	Mr. Sumate Wattanayannonth Regional Irrigation Office 9, Chonburi	Thailand
28.	Mr. Metha Hovarongkura Regional Irrigation Office 5, Ubon Rajathani	Thailand
29.	Ms. Kittinuch Nanna EGAT	Thailand
30.	Mr. Banhan Charukalas Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand
31.	Mr. Winai Meemitkit Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand
32.	Mr. Prasit Sithiyos Geotechnical Division, Royal Irrigation Department,Pakkred	Thailand
33.	Mr. Dhiravit Subhadhira Asia Modified Starch Co.Ltd. Nakhon Ratchasima	Thailand
34.	Mr. Mani Petlam Royal Forest Department	Thailand
35.	Mr. Kittipong Pongboon Royal Forest Department	Thailand
36.	Mr. Supachart Wannawong Royal Forest Department	Thailand
37.	Ms. Sam-ang Seubsman CommunityDevelopmentDept. Ministry of Interior	Thailand
38.	Mr. Sirichai Santiworarak Bangkok Farm Co.Ltd.	Thailand
39.	Mr. Mesak Milintawisamai Environmental Research & Training Technopolis, Klongluang	Thailand

No.	Name/Institute	Country
40.	Ms. Sirirat Suwanidcharoen Sukothai Thammathirat Open University	Thailand
41.	Mr. Amornthep Ngam-sombat Betagro Hybrid International Co Ltd	Thailand
42.	Ms. Sansanee Chawanakul Ubon Ratchathani University	Thailand

Participants from SUT

International Seminar Workshop on “Advances in Water Resources Management & Wastewater Treatment Technologies”

22-25 July 1996

No.	Name/Institute	Country
1.	Assoc. Prof. Dr. Onnop Wara-Aswapati Institute of Science, SUT	Thailand
2.	Assoc. Prof. Dr. Korakod Indrapichate Institute of Science, SUT	Thailand
3.	Asst. Prof. Dr. Panee Wannitikul Institute of Science, SUT	Thailand
4.	Assoc. Prof. Dr. Tassanee Sukosol Institute of Science, SUT	Thailand
5.	Assoc. Prof. Dr. Siddhichoke Sangsoda Institute of Science, SUT	Thailand
6.	Dr. Nathawut Thanee Institute of Science, SUT	Thailand
7.	Dr. Sureelak Rodtong Institute of Science, SUT	Thailand
8.	Dr. Benjamas Jitsomboon Institute of Science, SUT	Thailand
9.	Assoc. Prof. Dr. Kritsana Sagarik Institute of Science, SUT	Thailand
10.	Dr. Kunwadee Rangsiwatananon Institute of Science, SUT	Thailand
11.	Assoc. Prof. Dr. Kenneth J. Haller Institute of Science, SUT	Thailand
12.	Mr. Manu Omakupt Institute of Science, SUT	Thailand
13.	Dr. Eckart Schulz Institute of Science, SUT	Thailand

No.	Name	Country
14.	Assoc. Prof. Dr. Suwon Tangmanee Institute of Science, SUT	Thailand
15.	Dr. Chongchin Polprasert Institute of Resources Technology, SUT	Thailand
16.	Ms. Kwunkamol Klinsresuk Institute of Social Technology, SUT	Thailand
17.	Mr. Suriya Smutkupt Institute of Social Technology, SUT	Thailand
18.	Ms. Nattaya Puakpong Institute of Social Technology, SUT	Thailand
19.	Assoc. Dr. Prapavadee Suebsonthi Institute of Social Technology, SUT	Thailand
20.	Asst. Prof. Dr. Sunthorn Kanchanatawee Institute of Agricultural Technology	Thailand
21.	Prof. Dr. Vitoon Osathanondh Institute of Medicine	Thailand
22.	Assoc. Prof. Dr. Arporn Prabripataloong Institute of Medicine	Thailand

Invited Foreign Speakers
Water Seminar & Colloquium

No.	Name/ Title/Inst.	Paper Title	Time
	Water Seminar		22 - 25 July
1.	Prof. Dr. Bruce Mitchell Dept. of Geography Univ. of Waterloo, Canada	Integrated Water Management Canada Experiences	22 July 1330-1400
2.	Dr. David Swayne Dept. of Computing and Information Science Univ. of Guelph, Canada	Computer Based Tools for Water Management : Our Experience with the RAISON System	22 July 1430-1500
3.	Ms. Catriona Moir Dept. of Environment, TUNS, Canada	Water Use and Development - Canadian Experience	22 July 1530-1600
4.	Dr. John K. Underwood Environmental Quality Control, TUNS, Canada	Quality Assurance & Environmental Auditing	23 July 0900-0930
5.	Dr. William Hart Associate Director, Center for Water Resources Studies, TUNS, Canada	Minimizing Environmental Impacts In Watersheds : Do It Now Or Do It Late	23 July 0930-1000
6.	Dr. Michel Khalil Director, Liaison Bureau Univ. Industry Univ. of Quebec at Rimouski, Canada	Wastewater Treatment Technologies Used in Quebec (Canada)	23 July 1100-1130
7.	Prof. Jacques Moreau Institute National Polytechnique of Toulouse ENSAT, France	Impact of Eutrophication and other Degradation Process of Water Quality on Tropical Ecosystems	23 July 1130-1200

No.	Science Park		26 July
1.	Dr. E. (Ted) Rhodes President , TUNS., Canada	University Industry Technology Transfer : A Process That Really Works	
2.	Mr. George Hunter Former Chairman, UK. Science Park Assoc. United Kingdom	British Experience in Science Park Operation & Management	
3.	Dr. Alain Gares Director General, SICOVAL (Innopole LABEGE) Toulouse, France	The Science Park of Labège Innopole : From High Tech. Development To Social Integration	
4.	Dr. Christophe Haunold Institut National Polytechnique, Toulouse, France	Industry-University Linkage-INP de Toulouse's Experience	
5.	Dr. Michel Khalil Director, Liaison Bureau Univ.-Industry Univ. of Quebec at Rimouski, Canada	Technology Transfer From Universities & Research Centers To the Private Sector Case Study : Quebec-Canada	
6.	Dr. Peter Brimble Brookers Co. Ltd. Bangkok	University-Industry Linkage in Thailand : Critical Concept of Education	
7.	Dr. Chatri Sripaipan Chulalongkorn University	Reform	

Questionnaire

Please mark with (✓) the appropriate box for each question and drop the accomplished form into the questionnaire box

(1) How did you know of the seminar / colloquium ?

☐ Personal contact ☐ mailed brochure ☐ World Wide Web (www) ☐ others

(2) How did you travel to the seminar site from Bangkok and/or home town?

☐ Coach ☐ Train ☐ Air ☐ Private car ☐ others

(3) How did you find your travel?

☐ Excellent ☐ Very Good ☐ Good ☐ others

(4) How much travelling information did you get from the organiser beforehand?

☐ Much ☐ Just enough ☐ Not enough ☐ none

(5) How well were the seminar registration procedures?

☐ Excellent ☐ Very Good ☐ Needs improvement

(6) How appropriate was the seminar theater used for the meeting?

☐ Excellent ☐ Very good ☐ Good ☐ Not appropriate

(7) Facilities in the seminar theater

7.1) Air conditioning

☐ Too cool ☐ Cool ☐ Comfortable ☐ Warm ☐ Too warm

7.2) Audio visual

☐ Excellent ☐ Very good ☐ Good ☐ Could hardly hear/see

7.3) Lighting

☐ Excellent ☐ Very good ☐ Good ☐ Needs improvement

7.4) Presentation Equipment

☐ Excellent ☐ Very good ☐ Good ☐ Needs improvement

(8) How was the time arranged for each session?

☐ Suitable ☐ Too long ☐ Too short

(9) Were the discussion topics appropriate to the seminar's title?

☐ Excellent ☐ Very good ☐ Good ☐ Not appropriate

(10) Qualification of the speakers

☐ Excellent ☐ Very good ☐ Good ☐ others.....

(11) What kind of food did you expect to have?

- ☐ Typical Thai food ☐ Local food ☐ Mixed cuisine ☐ European food
☐ others

(12) For food only

12.1 Quality

- ☐ Excellent ☐ Very good ☐ Good ☐ Needs improvement

12.2 Quantity

- ☐ Excellent ☐ Very good ☐ Good ☐ Needs improvement

12.3 Services

- ☐ Excellent ☐ Very good ☐ Good ☐ Needs improvement

(13) Accommodation

- ☐ Excellent ☐ Very good ☐ Good ☐ Needs Improvement

(14) The benefit you got from the seminar / colloquium was the same as you expected before coming.

- ☐ Yes ☐ No ☐ others

(15) Other comments:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

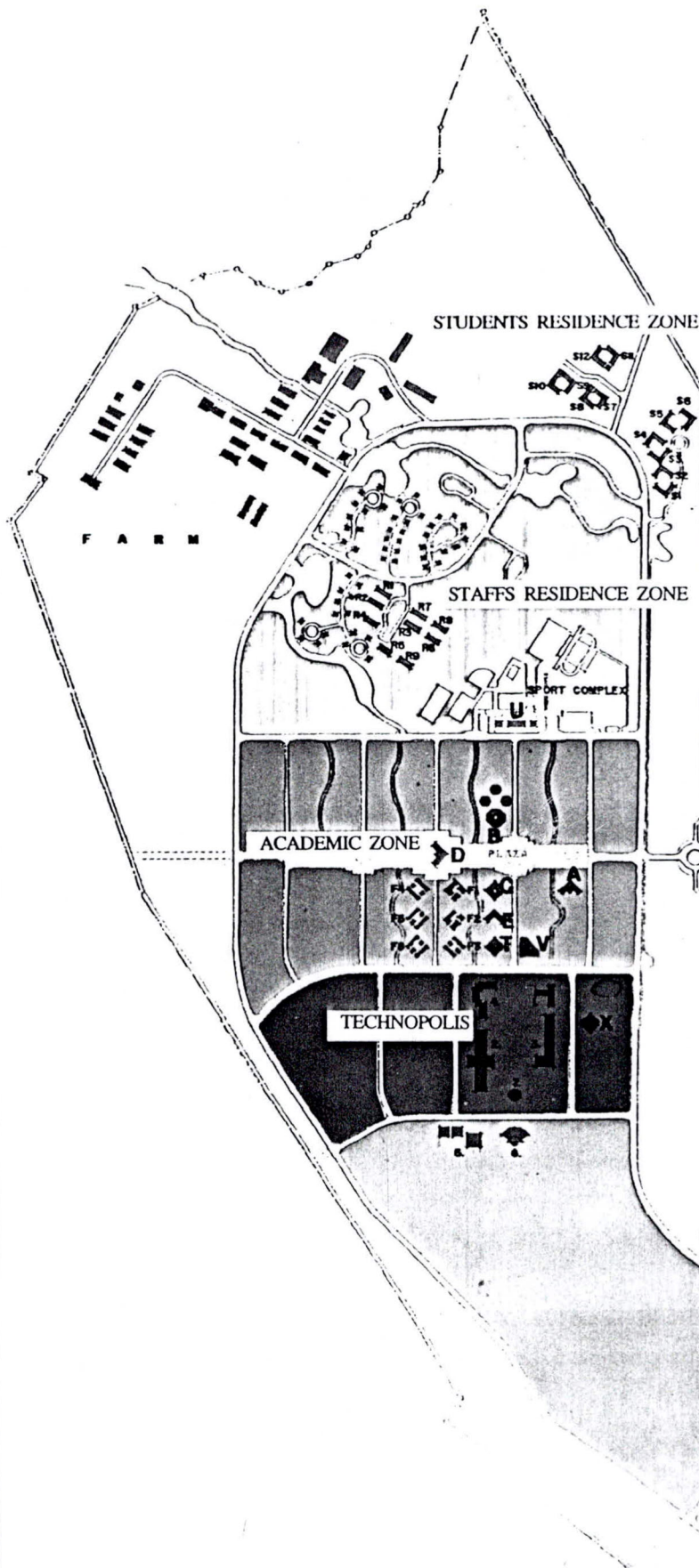
Thank you for your cooperation.

Organisation Committee

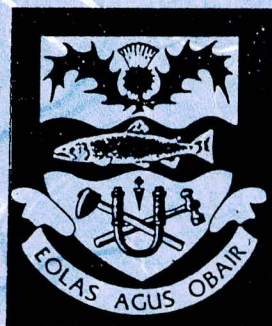


แผนผังมหาวิทยาลัยเทคโนโลยีสุรนารี

MAP OF SURANAREE UNIVERSITY OF TECHNOLOGY



- A อาคารบริหาร
Administrative Building
- B ศูนย์บริการการศึกษา
Educational Services Center
- C อาคารวิชาการ
Academic Building
- D ศูนย์บรรณสารและสื่อการศึกษา
Library Resources and Educational Media Center
- E สถาบันวิจัย
Research Institute
- F1-F6 ศูนย์เครื่องมือวิทยาศาสตร์และเทคโนโลยี
Scientific and Technological Equipment Center
- R1-R9 เรือนพักสุคนิवास
Staff Residences (Sukhanivas 1-9)
- S1-S12 หอพักสุรนิวาส
Student Dormitories (Suranives 1-12)
- T โรงอาหาร
Dining Hall
- U อาคารกิจกรรมนักศึกษา
Student Activities Buildings
- V อาคารสถานีขนส่ง
Bus Terminal
- X สโมสรสมานาคาร
Surasammanakhan Seminar Hall



Sixth Anniversary
Suranaree University of Technology
(SUT)

International Seminar Workshop

*" Advances in Water Resources
Management
and
Wastewater Treatment Technologies "*

Surasammanakhan Hall
Suranaree University of Technology
Nakhon Ratchasima, Thailand
22-25 July 1996

**INTERNATIONAL SEMINAR WORKSHOP ON
ADVANCES IN WATER RESOURCES MANAGEMENT
AND WASTEWATER TREATMENT TECHNOLOGIES
22 -25 JULY, 1996**

PROGRAM

22 July Monday

0830 - 0930 REGISTRATION

0930 -1000 OPENING CEREMONY

Welcome Remarks :

Prof. Dr. Wichit Srisa-an,
Rector, Suranaree University of Technology

Address :

H.E. Mr. Boonchoo Treethong,
Minister of University Affairs

1000 -1045 COFFEE BREAK

1045 -1200 KEYNOTE PAPER PRESENTATION

*Advances in Water Resources Management and
Wastewater Treatment Technologies*

by Mr. Pramote Maiklad,
Inspector General, Ministry of Agriculture and Cooperatives

Chair: Assoc. Prof. Dr. Sam-arng Srimita

Rapporteur:

Prof. Dr. Ruben C. Umaly

1200 - 1330 LUNCH BREAK

**1330 - 1500 PLENARY SESSION I: INVITED PAPERS ON
WATER RESOURCES MANAGEMENT**

Canada Experience

by Dr. Bruce Mitchell, Technical University of Nova Scotia

Thailand Experience

by Prof. Dr. Kasem Jankaew,
Faculty of Forestry, Kasetsart University

Chair: Mr. Manu Omsakupt

Rapporteur:

Assoc. Prof. Dr. Chaiyot Tangsathitkulchai

1500 - 1530 COFFEE BREAK

**1530 - 1700 PLENARY SESSION II: INVITED PAPERS ON
WATER USE AND DEVELOPMENT**

Water Use and Development - Canada Experience

by Ms. Catriona Moir, Technical University of Nova Scotia

*Urban Development Impact on Water
and Wastewater Treatment Needs*

by Mr. Bichit Rattakul,

Governor, Bangkok Metropolitan Authority

Water Use / Development Policies and Regulations

by Ms. Chuanpit Dhamasiri,

Governor, Metropolitan Waterworks Authority,

Chair: Asst. Prof. Dr. Tavee Lertpanyavit

Rapporteur:

Asst. Prof. Dr. Sarawut Sujitjorn

1800 DINNER RECEPTION

23 July Tuesday

**0830 - 1000 PLENARY SESSION III: INVITED PAPERS
ON ENVIRONMENTAL IMPACT AUDITING**

***Environmental Impact Auditing Techniques:
Thailand Experience***

by Ms. Nipaporn Watcharasin,
Office of Environmental Policy and Planning
Quality Assurance and Environmental Auditing:

by Dr. John K. Underwood,
Technical University of Nova Scotia
Minimizing Environmental Impact
by Dr. William Hart, Technical University of Nova Scotia

Chair: Prof. Dr. Ronald Goforth

Rapporteur:

Assoc. Prof. Dr. Amnat Apichatvullop

1000 - 1030 COFFEE BREAK

**1030 - 1200 PLENARY SESSION IV: INVITED PAPERS ON
WASTEWATER TREATMENT TECHNOLOGIES**

Wastewater Treatment Technologies:

Thailand Experience

by Dr. Chongrak Polprasert,
Asian Institute of Technology

Advances in Wastewater Treatment Technologies:

Canada Experience

by Dr. Michel Khalil, University of Quebec at Rimouski

Chair: Prof. Dr. Ruben C. Umaly

Rapporteur:

Assoc. Prof. Dr. Vorapot Khompis

1200 - 1330 LUNCH BREAK

**1330 - 1500 PLENARY SESSION V: INVITED PAPERS ON USE
OF COMPUTER TOOLS FOR WATER MANAGEMENT**

Computer Tools for Water Management

by Dr. David Swayne, Department of Computing and
Information Science, University of Guelph

***Impact of Eutrophication and Other Degradation Processes
on Water Quality of Tropical Ecosystems***

by Dr. Jacques Moreau,
Institut National Polytechnique de Toulouse

Chair: Dr. Angelina Galang

Rapporteur:

Dr. Nathawut Thanee

1500 - 1530 COFFEE BREAK

**1530 - 1730 PLENARY SESSION VI: CONTRIBUTED PAPERS ON
WATER RESOURCES MANAGEMENT**

***Watershed Classification: Macro Land Use Planning for
Sustainable Development of Water Resources***

by Assoc. Prof. Nipon Tangtham,
Faculty of Forestry, Kasetsart University

***Impact of Various Land Uses on Water Quality at
Mae Klong Head Watershed Area, Kanchanaburi***

by Dr. Songtam Suksawang,
Royal Forestry Department
Kok River Diversion Schemes

by Dr. Chaitawat Saowapon,
Faculty of Engineering, Chiangmai University

Chair: Dr. David Swayne

Rapporteur:

Dr. Chongchin Polprasert

1900

DINNER



24 July Wednesday FIELD TRIP

0730 **ASSEMBLY AND DEPARTURE**
0830 - 0930 **JIM THOMPSON'S SILK FACTORY**
1100 - 1400 **LAM TAKONG RESERVOIR**
 LUNCH AT THE RESERVOIR
1430 - 1530 **SEAGATE WASTE TREATMENT PLANT**
1600 - 1700 **DAN KWIAN CERAMICS**
1730 - 1830 **THAI HI-TECH HOUSE, SUT**
1900 **DINNER**

25 July Thursday

**0830 - 1000 PLENARY SESSION VII: CONTRIBUTED PAPERS ON
WATER QUALITY ASSESSMENT**

***Application of Anthropological Assessment in Water
Resources Management***

by Luisa Umaly and Lucas Fernan,
Anthropological Association of the Philippines
Institute of Biology, University of The Philippines

Water Quality of Malabon River

by Dr. Annabelle Herrera,
Institute of Biology, University of the Philippines
***Wastewater in Navotas-Malabon River: Its Impact
on Milkfish (Chanos chanos)***

by Dr. Edna Amparado,
Institute of Biology, University of the Philippines

Chair : Dr. Jacques Moreau
Rapporteur :
Dr. Noppadol Kongsricharoen

1000 - 1030 COFFEE BREAK

**1030 - 1200 PLENARY SESSION VIII: CONTRIBUTED PAPERS
ON WASTEWATER TREATMENT**

Wastewater Treatment in Huaxi

Mr. Zhang Chao,
Department of Chemistry, Guizhou University

Removal of Ca, Cr, Ni, Zn Ions by Amidoximated Cellulose

by Asst. Prof. Winai Somboon,
KMIT Thonburi

***The Treatment of the Scalp Industrial Wastewater Using Its
Solid Waste by Trickling Filter Method***

by Mrs. Endang Srirahayu,
Polytechnic ITB, Ciwaruga, Bandung, Indonesia

Possibility of Narrow-leaved Cattail for Wastewater Treatment

by Ms. Supaporn Junrungreang, et al.
Land Development Department

Chair : Dr. Michel Khalil
Rapporteur :
Dr. Narong Akkarapattanagoon

1200 **CLOSING REMARKS**
 Prof. Dr. Wichit Srisa-an,
 Rector, Suranaree University of Technology

1230 **CLOSING LUNCH**



OPENING ADDRESS
BY
H.E. MINISTER BOONCHU TRITHONG
AT THE INTERNATIONAL SEMINAR WORKSHOP ON
ADVANCES IN WATER RESOURCES MANAGEMENT AND
WASTEWATER TREATMENT TECHNOLOGIES
22 JULY 1996

Prof. Dr. Wichit Srisa-an, Rector of Suranaree University of Technology,
Distinguished Keynote Paper Presenters from Canada and France,
Thai and Foreign Participants
Ladies and Gentlemen

It is with great pleasure that I have accepted the invitation of Suranaree University of Technology to preside over this timely and important international seminar workshop on Advances in Water Resources Management and Wastewater Treatment Technologies. It is however with regret that equally pressing previous commitments in Bangkok have prevented me from being with you in person on this occasion. However, thanks to the wonders of teleconferencing and fiber optics technology, it is possible for me to still be amongst you “virtually and electronically”.

I also would like firstly to congratulate Suranaree University of Technology on its Sixth Foundation Day Anniversary, specially for the great successes and innovations it has pioneered in the new system of university governance and management using the concept of public autonomous university which is characterized by self-governance and accountability.

Secondly, to commend its keen selection of the most appropriate theme of Environment and Technology for the anniversary as well as such most relevant and timely environmental issues as water resources and wastewater management. Even His Majesty the King has expressed interest and attention as manifested in his many projects on sustainable development of watershed areas in the country and for more integrated allocation and management of water resources for the equitable benefit of both rich and poor and of rural and urban communities.

In addition, I would like to also compliment Suranaree University of Technology for including in its mission the promotion of technology adaptation, transfer and development for the greater benefit of society. The strategy of enhancing university-industry linkage through the organization of industry-based seminars would strengthen such cooperation between these two institutions

which is crucial to the sustained economic and industrial development of the country.

In this connection, may I extend the appreciation and gratitude of the Ministry of University of Affairs for the cooperation of universities from Canada and France specially those of the Technical University of Nova Scotia, University of Guelph and the National Polytechnic Institute of Toulouse. I am equally pleased with the participation of experts and friends from China, Indonesia and the Philippines. It is indeed another manifestation of SUT's leadership in the internationalization of higher education in Thailand and the promotion of international cooperation for technical development and self-sufficiency of the region.

Ladies and Gentlemen,

Water is one of the basic requirements for life. It is a single limited resource. The atmospheric, surface and ground waters are not independent but form the same resource in the different phases of the hydrologic cycle. Thus, the disturbance and deterioration in quality of one will also affect all the others. The amount of surface and ground water is dependent on precipitation or rain. Diversion of surface waters may reduce the flow in rivers and the amount that percolates through the soil to recharge the ground water. The waterflow in rivers and streams is not only due to rain water but also the inputs from ground water. These various complex interrelations must therefore be properly understood and considered in the development and management of water resources.

With the ever increasing population and degree of industrialization, there is always competition for the available limited water resources between the use for drinking as well as basic hygiene and sanitation and the other uses like for agriculture, industry, power generation, navigation and transport, recreation, and discharge or carrier of waste. With the abuse and misuse of surface waters for the last function of carrier and discharge of wastes, the other important uses are being endangered or compromised. There must therefore be a rational basis for the equitable allocation of water for its various users.

Water resources development and management need to be approached in a comprehensive and integrated manner with the aim of achieving the best allocation scheme of this limited resource including the appreciation of the economic value of water as used differently by the community.

These are some of the reasons why I consider this seminar workshop of great value to universities, industries, government agencies and the general

public as it provides a forum for sharing of experiences and ideas for water resources planning, allocation, management and sustainable development.

Ladies and Gentlemen,

Most of the water supplied to cities and big towns is derived from river sources. This is true for Bangkok where the greatest bulk of the water is coming from the Chao Phraya river. Ground water is essentially for direct use in small housing subdivisions or rural areas. Extensive extraction of ground water could lead to land subsidence and salt water intrusion and therefore their use must be properly regulated. Excess river waters during rainy season are generally conserved in dams and reservoirs and released based on needs. Construction of dams could however modify the physiography of watershed areas and rivers. The quality and quantity of water available downstream could be reduced to the detriment of aquatic life and human activities in the downstream areas. The change in water flow rate and pattern could also adversely affect the aquatic flora and fauna. Construction of big dams has therefore become controversial and conflicts between interest groups arise.

There is thus a need for knowledgeable technical personnel both in government agencies and industries who could perform unbiased environmental impact assessment of the project and to advise decision makers as to the appropriate measures to be undertaken. Equally, the general population specially those who will be directly affected must be given proper information of the benefits and disbenefits of the project and be allowed to make their own decisions. Again, the university-industry-government partnership in these activities is of prime importance.

Advances in technologies like remote sensing, computer programs on GIS, environment auditing techniques and environmental campaign materials can be made available by universities to various agencies involved in such projects.

There is also a social dimension to water resources management. Many rural areas still do not have piped water supply. Rivers and open dug wells or direct collection of rain water are their only sources of water supply. This subjects the population specially children not only to water-borne diseases like typhoid and diarrhea but also it limits their means for personal hygiene and sanitation. The same is true for slum areas in the cities. The slum dwellers are generally dependent on illicit water connections or on public faucets or fire hydrants for their water supply. As previously mentioned, safe and dependable water resources must be provided for both the rural and urban communities and for both the rich and the poor.

At present, the need for a multidisciplinary, interdisciplinary and multicultural team for water resources management cannot be overemphasized. The economic, social, political and technological components and implications of water resource management must all be properly considered and balanced for the benefit of the greater majority. This international ethos and perspective as reflected in the participants of this seminar is what is needed as model for such undertaking of water resources management.

Ladies and Gentleman,

Corollary to the increase in provision of water supply is also the corresponding increase in the discharge of wastewater with concomitant risk of increased pollution of downstream waters. The pollution of Bangkok's canals and rivers comes from industrial wastes (27%) and domestic wastes (73%) from residential and commercial areas. Some kind of control can be imposed on industrial wastes but not with the domestic wastes. The consequent deterioration of water quality, damage to aquatic life and degradation of the aesthetic value of the river are inevitable. Residents of Bangkok are familiar with the clogged canals, the poor quality of the water in the klongs. Except for the few tolerant larvae of some insects, some worms and slime fungi and bacteria, diversity in the aquatic life is lost.

Equally, when river water passes through agricultural land, excessive use of ecological subsidies in the form of fertilizers and pesticides contaminates the water that flows back to the streams. The resultant eutrophication of the rivers lead to algal blooms and death of fish.

There is therefore an urgent need for integrated domestic sewage treatment system in the big cities and towns. With the application of modern technologies in wastewater treatment, water can be reused or recycled. This can supplement the ever increasing water demand as well as reduce the pollution of rivers and streams.

Water resources and wastewater management are usually the concern of several ministries and agencies like the Royal Irrigation Department, the Electricity Generating Authority, Department of Mineral Resources of the Ministry of Industry for the development and use of groundwater, the Municipal and Provincial Water Authorities, just to mention a few. There is a need for trained manpower as well as financial and other logistical support for them to undertake their responsibilities. More importantly there is a need to coordinate their activities. A seminar workshop like this would facilitate such exchange of information and coordination of projects.

In conclusion, it is evident in this paper, that the Ministry of University Affairs and myself, fully support the activities of universities like that of Suranaree University of Technology in fostering closer collaboration between various industries and government agencies for a more sustainable development of water resources and its equitable allocation as well as in the application of new technologies for treatment of wastewater so that the water can be reused and recycled.

I am therefore eagerly awaiting the publication of the proceedings of this Seminar Workshop together with recommendations and resolutions for better water resources management.

Lastly, I wish you all a fruitful and productive seminar and for our foreign guests, I hope your short stay at SUT and Thailand would be a very pleasant one and that you would continue your cooperation with your new Thai friends and colleagues.

Thank you.

**WELCOME REMARKS:
PROF. DR. WICHIT SRISA-AN
RECTOR, SURANAREE UNIVERSITY OF TECHNOLOGY**

**SEMINAR WORKSHOP ON” ADVANCES IN WATER
RESOURCES MANAGEMENT AND WASTEWATER
TREATMENT TECHNOLOGIES”**

H.E. Minister Boonchoo Treethong, Ministry of University Affairs
Distinguished Paper Presenters
Thai and Foreign Participants
Ladies and Gentlemen

On behalf of Suranaree University of Technology and on my own behalf, it is with great pleasure that I extend a warm welcome to the distinguished keynote speakers, paper presenters and participants to the International Seminar Workshop on “ Advances in Water Resources Management and Wastewater Treatment Technologies” from the 22nd to 25th of July.

I also would like to express the university’s and my personal appreciation to His Excellency, Minister Boonchoo Treethong for presiding over the occasion.

This seminar workshop is part of the celebration activities of the Sixth Founding Anniversary of Suranaree University of Technology. For this year, the theme of the celebration is Environment and Technology. Aside from the tree planting activity which is part of the greening program of the university, this seminar is a manifestation of our expressed concern for environmental issues specially that of water resources management and aquatic ecosystems sustainable development.

Equally, in pursuance of one of the missions of the University, that of promoting technology adaptation, transfer and development, SUT is organizing a series of industry-based seminars to enhance closer cooperation between university and industry. This seminar is the first of such activity. It is being undertaken in collaboration with the Canadian University of Technology Consortium or CUTC specially with the Technical University of Nova Scotia and the University of Guelph, as well as with the National Polytechnic Institute

of Toulouse, France. SUT is grateful to these institutions for providing the keynote paper presenters in this seminar.

I am equally pleased to report the participation of Thai experts from other universities, industries and government agencies as well as representatives from China, Indonesia and the Philippines.

This seminar would provide the rare opportunity for specialists from Canada and France to interact with counterparts from Asian countries and share experiences as well as ideas on ways of addressing the important issues of water resources management and wastewater treatment. I hope it would be the beginning of continued collaboration among the participants.

Specifically, the Seminar Workshop aims to present the Canadian experience in comprehensive and integrated watershed management techniques including Canadian methods of environmental impact assessment used in water-related developments as well as industrial environmental auditing techniques. It also aims to survey and analyze the status, issues, strategies and policies concerning uses and management of water resources in the northeast region of Thailand specially the role of industry and estate development companies. The seminar would also provide a forum to present advances in wastewater treatment technologies and identify wastewater management options as well as policies which could be applicable to the participating countries in the region. As already mentioned, it aims to foster cooperation between various national and international sectors concerned with sustainable water resources development and wastewater management.

To attain these objectives, Suranaree University has invited experts in water resources management and wastewater treatment from Canada, France and Thailand to present keynote papers covering the major subthemes of the seminar, namely: integrated water resources management; environmental impact assessment used in water related developments including industrial environmental auditing techniques; urban development and its impact on water and wastewater treatment needs; advances in wastewater treatment technologies; water use/development policies and regulations; and aquatic ecosystems management including impact of industry.

Scientists from Indonesia, the Philippines and Thailand will also be presenting country-specific invited and contributed papers on the same subthemes. I am pleased that the participants will also have the opportunity to see some scenic sites of northeastern Thailand during their fieldtrip to a nearby

reservoir and see an example of a modern sewage treatment plant in a private industrial establishment as well as purchase some silk and ceramics, two of the major handicrafts of Nakhon Ratchasima. We are equally looking forward to the resolutions and recommendations for follow-up activities that would result from the discussions. It is anticipated that strategies and practical solutions could be proposed to at least tackle if not solve the major issues affecting our aquatic ecosystems and watersheds.

I therefore wish you all a fruitful and productive four-day seminar and I look forward to the results of your discussions. Please let us know specially the organizers and staff of the university, how we could further make your short stay at SUT and Nakhon Ratchasima an enjoyable and memorable one.

Today, on this occasion of the opening of the Seminar Workshop on “Advances in Water Resources Management and Wastewater Treatment Technologies”, we have the distinct honor of hearing from his excellency the Minister of University Affairs, Mr. Boonchoo Treethong. However since it was impossible for him to travel to SUT, we have arranged that he could be with us through teleconferencing. May therefore have the honour of inviting the Minister of University Affairs, His Excellency Mr. Boonchoo Treethong, to speak to us live from Bangkok.

Thank you.

**WELCOME REMARKS:
PROF. DR. WICHIT SRISA-AN
RECTOR, SURANAREE UNIVERSITY OF
TECHNOLOGY**

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Once again, a very warm welcome to all.

Thank you.

**R. SAM-ARNG SRINILTA, Vice Rector for
Iemics**

INTRODUCTION OF MR. PRAMOTE MAIKLAD

for the SEMINAR ON WATER RESOURCES MANAGEMENT AND
WASTEWATER TREATMENT

Mr. Pramote Maiklad is presently an Inspector General from the Office of the Permanent Secretary, Ministry of Agriculture and Cooperatives, Thailand. He hails from Bangkok.

After obtaining an honors Bachelor's degree in Irrigation Engineering from Kasetsart University, he pursued an M.S. degree in the same field of Irrigation Engineering at the University of California.

He started his professional career in 1968 as an Engineer of the Academic Division of the royal Irrigation Department of the Ministry of Agriculture and Cooperatives. With his strong academic preparation and dedication to work, he climbed the professional ladder and in recognition for his achievements, he was appointed in 1993, Chief Engineer for Special Affairs of the Royal Irrigation Department where he took responsibility for the Water Resources Development Project of the Royal Initiative Project. He will include in his presentation some of the major activities of the said project.

His work has brought him for training and study tours to many countries like Australia, Japan, Chile, Canada, Korea and Spain, just to mention a few. He is a member of many government committees involved in water resources development.

As an adherent of the value of life-long education, he still found time inspite his heavy schedule, to further his studies and in 1994 he was awarded a Ph.D. degree in Engineering by King Mongkut Institute of Technology, North Bangkok.

Ladies and Gentlemen, it is my pleasure to request Mr. Pramote Maiklad to present his keynote address.

Thank you.

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REMARKS: Prof. Dr. Wichit Srisa-an

DINNER RECEPTION FOR THE SPEAKERS AND PARTICIPANTS OF THE INTERNATIONAL SEMINAR ON ADVANCES IN WATER RESOURCES MANAGEMENT AND WASTEWATER TREATMENT TECHNOLOGIES.

Allow me to reiterate my warm welcome to the paper presenters and participants of the international seminar on advances in water resources management and wastewater treatment technologies.

I hope you are enjoying the Thai buffet dinner tendered in your honour by the University as token of our appreciation of your participation in the seminar and visit to Thailand.

I was informed that the paper presentation during the rest of the day had been most informative and useful for the planning of water resources development and management in the region.

I wish you all a pleasant stay for the remaining days of the seminar and most of all enjoy the country side and handicraft stores during your field trip on Wednesday.

Once again, thank you for honouring our invitation and enjoy the rest of evening making new friends and renewing the old ones.

Thank you.

**FOR DR. SAM-ARNG SRINILTA, Vice Rector for
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Abstracts

Seminar Workshop on

“Advances in Water Resources Management

and

Wastewater Treatment Technologies”

at

Surasammanakhan Hall

Suranaree University of Technology, Nakhon Ratchasima

Thailand

22-25 July 1996



**QUALITY ASSURANCE AND DUE DILIGENCE
IN WATERSHED PROTECTION PROGRAMS:
USING ENVIRONMENTAL MANAGEMENT
SYSTEMS TO STRENGTHEN ENVIRONMENTAL
PROGRAMS**

*John K. Underwood, Ph.D.
Nova Scotia Power Inc.,
Halifax, Nova Scotia, Canada*

*William C. Hart, Ph.D.
TUNS, Halifax, Nova Scotia
Canada*

Abstract

Canadian governments are increasingly moving from “end of pipe” and “command and control” regulatory strategies to “emission control programs at source” via voluntary industrial programs for managing pollution problems of watersheds. This trend is advantageous for both government and industry as it not only reduces requirements for rigorous and costly inspections, but also provides industry with more flexibility to develop cost-effective environmental protection programs. In order to attain this measure of trust, it is necessary to implement strong Environmental Management Systems to demonstrate effective Due Diligence.

Quality Assurance programs and Environmental Audit are two of the tools that are described by the authors as they outline the importance of Environmental Management Systems in watershed protection programs. Standardization of the process is occurring through the International Organization for Standardization, and the authors conclude their paper with comments on developments in the ISO 14000 series of environmental management documents.

MINIMIZING ENVIRONMENTAL IMPACTS IN WATERSHEDS: DO IT NOW OR DO IT LATER?

William C. Hart, Ph.D.
TUNS, Halifax, Nova Scotia, Canada

John K. Underwood, Ph.D.
Nova Scotia Power Inc.,
Halifax, Nova Scotia, Canada

Abstract

It is an expectation of industry, government, and the general public that comprehensive Environmental Assessment will be required for new or significantly altered developments in Canadian watersheds. The objective is to predict potential environmental impacts of developments, and to adjust development strategies to minimize these impacts.

Existing developments which are entering decommissioning stages have similar regulatory constraints. The decommissioning process can, however, be much more complicated and much more costly.

Using several case studies, the authors will compare both approaches to providing protection for watersheds. They will outline steps and time frames associated with both of these environmental planning tools and they will discuss some of the problems and benefits associated with them.

WASTEWATER TREATMENT TECHNOLOGIES: EXPERIENCES AND CHALLENGE IN THAILAND

*Chongrak Polprasert, Thammarat Kootatep and Nawa Raj Chatiwada
Environmental Engineering Program,
Asian Institute of Technology
PO.Box 4, Klong Luang, Pathumthani, Thailand 12120*

Abstract

Due to rapid urbanization and industrialization, water pollution has become increasing problems in Thailand during the past decades. Technologies for wastewater treatment employed in Thailand range from energy-intensive process such as activated sludge, rotating biological contactors, and oxidation ditches, etc., to less energy-intensive processes such as waste stabilization ponds and on-site septic tanks and cesspools. Although the energy-intensive processes can achieve high treatment performances and requiring less land area, they are expensive to operate and maintain and produce sludge residues which need to be properly stabilized prior to disposal. Because Thailand is located in tropical region and land areas in suburbs and provinces are still not very expensive, wastewater technologies that allow for the recycling of nutrients contained in the wastes should be considered. Examples of these waste recycling technologies are: waste-fed fish ponds, constructed wetlands, composting and land treatment. These technologies are low-cost to operate and the recycled products become incentives for the plant operators. Waste recycling technologies should be considered as alternatives for the conventional technologies of wastewater treatment, wherever possible.

WASTEWATER TREATMENT TECHNOLOGIES USED IN QUEBEC (CANADA)

Dr. Michel Khalil
UQAR-QUENECO
QUENECO ENVIRONMENT INTERNATIONAL
Montreal (Quebec) Canada

Abstract

Wastewater from different sources as domestic sewage, commercial, industrial or storm water are treated. We will discuss the properties of wastewater as physical, chemical, biological and microbiological characteristics depending on their origin. Parameters such as total suspended solids, BOD, COD, TOC, organic nitrogen, phosphorus, ammonia content, etc, will be elucidated. Primary, secondary and advanced or tertiary treatments will be discussed.

A special emphasis of the conference will be made on wastewater recycling for aquaculture purposes using biofilters. A follow-up of the evolution of Ammonia, Nitrites and Nitrates concentrations in a recycling system are indications of performance. Finally an example of aquacultured trout and/or salmon using completely recycled water will be shown.

COMPUTER BASED TOOLS FOR WATER MANAGEMENT: OUR EXPERIENCE WITH THE RAISON SYSTEM

D.A Swayne and D.C.L. Lam
Department of Computing and Information Science
University of Guelph, Canada

Abstract

One of the greatest sources of difficulty in water and watershed management is the management of data and knowledge. Since water management is not a new concept, there is much available in print, and a large body of experts with whom to consult. The measurement of data and information is also well-understood. Quantity and quality measurements are increasing in accuracy and sophistication..

What is not well-understood, it appears, is the need for comprehensive, computer-based storage and recall of the data, information and knowledge required for the management process to be sustained for long periods.

Spatial information, such as elevations, land-use, soil types, water-courses, presence of man-made hazards, form one aspect of good management. A good inventory of industry in a watershed, particularly of those which pollute (such as animal feedlots, electro-chemical industries, urbanizing zones) is a prerequisite. Such an inventory can lead to a better deployment of scarce monitoring resources.

Temporal information is also critical. In many places long time-series of data may not be present. Current conditions may serve to give good expert opinion about the past. Even where the long time series data are present, they are inevitably changes in measurement, and statistical techniques are available for "smoothing out" transitions which are apparent, but are artifacts of changing technology.

Models for both point source and nonpoint source pollution have been built, and are of high quality. They allow a peek "into the future". They are often difficult to use, and require the utmost care if they are to make sense.

IMPACT OF EUTROPHICATION AND OTHER DEGRADATION PROCESS OF WATER QUALITY ON TROPICAL ECOSYSTEMS

Jacques Moreau
Institut National Polytechnique
Ecole Nationale Supérieure Agronomique de Toulouse
Toulouse Cedex, France

Abstract

Tropical aquatic ecosystems are threatened by various processes of water quality degradation: increasing human settlement near the shores, inappropriate water treatment, use of fertilizers for agriculture development leading to eutrophication, deforestation and erosion and associated siltation increasing of fishing effort, introduction of fish species.

The first part of this paper is a presentation of the situation in some particular places of interest: Laguna de Bay (Philippines), Ubolratana reservoir (Thailand) Parakrama Samudra Lake (Sri Lanka). Some examples are also provided from Africa: Lake Victoria, Lake Tanganyika, Kariba Man made lake.

For these aquatic ecosystems review of the general situation of living communities and of their possible evolution is given in relation to the type of water quality degradation they experience.

A software called ECOPATH 2 is briefly presented which allows to describe the trophic relationships among the various groups of living organisms inside aquatic ecosystems. This software also helps to identify disfunctioning of these ecosystems and to relate them to water quality.

In addition, because of recent improvements, this software allow to simulate possible changes and evolution which could take place after significant modifications of the general conditions: eutrophication, increasing fishing effort towards a particular species, decreasing biodiversity... Some examples are provided in order to illustrate this approach on well known and investigated tropical ecosystems, mainly in Asia.

The conclusion points out the necessary multidisciplinary researches for a proper management of aquatic environment.

WATERSHED CLASSIFICATION THE MACRO LAND USE PLANNING FOR THE SUSTAINABLE DEVELOPMENT OF WATER RESOURCES

*Assoc.Prof.Nipon Tangtham
Faculty of Forestry, Kasetsart University Bangkok,Thailand*

Abstract

Water resources development and watershed management are recognized as unseparated activities for Thailand's socio-economic and environmental development plan. Problems of water resources in terms of water shortage in dry season and flood with unfavorable water quality during the wet season caused by watershed degradation led the government to promulgate the Cabinet Regulation namely "Watershed Classification". This regulation classified watershed area in Thailand into 5 zones with the first (WSC1) and the second (WSC2) are preserved for protection and commercial forests respectively and the rests belong to agricultural and other purposes with appropriate conservation and mitigation measures. Although it was designed as macro land-use planning for better quality of environment, water quality and flow regiment are the main aim of water resources development project in the future if it can be efficiently implemented. It will not only to reduce reservoir sedimentation but also to help decrease chemical pullutants contamination of stream water supply to downstream.

IMPACTS OF VARIOUS LAND USES ON WATER QUALITY AT MAE KLONG HEAD WATERSHED AREA KANCHANABURI

*Dr. Songtam Suksawang
Mr. Warin Jirasuktaweekul*

*Ms. Boonma Deesaeng
Mrs. Nittaya Purivirajkul*

*Watershed Research Section, Forest Environment Research and Development
Division, Forest Research Office, Royal Forest Department, Bangkok 10900
THAILAND*

Abstract

The study on the impacts of various land uses on water quality in Mae Klong head watershed area, Kanchanaburi was conducted from April 1993 to March 1994. Water samples have been collected in certain small disturbed sub-watershed which had been partially converted by local people for various uses such as residential and agricultural uses in upland area, shifting cultivation, animal raising and temporary housing in lower part. The water samples had also been collected from undisturbed areas as well. Analytical activities of water quality have been done at the Department of Agriculture and Department of Fishery, Ministry of Agriculture and Cooperatives in Bangkok.

The results obtained from this study indicated that after the small forested watershed have been disturbed at certain level by human activities, there still be no evident sign to indicate that physical water quality and soil nutrient being affected discernibly. However, its biological quality has been affected in some areas near or within residential premise, grazing area and agricultural and where number of fecal coliform, fecal streptococi and other coliform bacteria were higher than natural level.

THE KOK RIVER BASIN DEVELOPMENTS: PAST AND PRESENT

Chaithawat Saowapon

Lecturer

Faculty of Engineering

Chiang Mai University, Chiang Mai, THAILAND 50200

Abstract

Located in the northern part of Thailand, the Kok River is a tributary of the Mekong River. Thirty percent of the Kok River Basin is irrigable, the rest is mountainous. The oldest development project in the Kok Basin went into operation in 1963. Since 1972, several independent groups have proposed a variety of "stand alone" development schemes. It was not until 1982 that such groups started move in the direction of integrated proposals and transbasin development schemes. Interestingly enough, all of the development proposals for this basin tend to involve the diversion of water from the Kok Basin to other Thai basins where irrigation water shortages exist. However to date, none of the proposed diversion schemes have been implemented because substantial pressures have been put forth by both local and national pressure groups. This study seeks to review all the development proposals for the Kok River Basin.

ANTHROPOLOGICAL METHODOLOGIES IN ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

*Luisa Umaly & Lucas Fernan
Anthropological Association of the Philippines
Philippines Social Science Center (PSSC)
Quezon City, Philippines*

Abstract

The paper aims to present the various methods employed by the UGAT Research Team in gathering ethnographic data on the community. The information generated intends to enable the Team to make a well-founded and sound assessment of the potential impact of specific infrastructure projects (e.g., hydroelectric power generation).

Review of Documents

Libraries are consulted on relevant ethnographies, published papers and articles regarding the communities in areas where projects are to be implemented. Other sources of secondary data could be any of the following: government offices (GO-provincial, municipal, and barangay levels); local academic institutions, non-governmental agencies (NGOs) and peoples organizations (POs).

The information generated can provide a historical and general context by which to build on and analyze additional data gathered.

Ocular Visit

The Research Team visits the area prior to actual full-scale data gathering to : establish coordinative efforts with local officials; explain the objectives, activities, and plans of the Study to the communities; seek permission to conduct research activities; document available resources in the community; gather initial feedback regarding the project to be implemented; and arrange for the future logistic needs of the Team.

Focused Walk

The method aims to observe the different activities in the areas of functional relevance to resource access and use: locations: on-going activities; work at different times of the day; and the individuals involved in these tasks.

The Team members walk with local residents who can adequately point out and explain aspects of the functional areas and those to be affected by the Project (e.g. rice fields, swiddens, irrigation systems, drinking sources, pathways, the barangay hall, school, churches, playground, as well as the different sitios).

Community Mapping and Profiling

A sketch of the community is made, preferably by local residents. Located and identified are infrastructures, residential units, schools, medical facilities, water supply, waste disposal system, and resource locations.

Focus Group Discussion (FGD)

The FGD gathers different individuals with social characteristics and activities which predispose them to discuss specific issues.

For example, household heads could be convened to discuss their views on resettlement. Or health practitioners engaged in both Western and indigenous medical services may gather to talk about the health issues currently confronting the community.

Unstructured Interview

The term “unstructured” refers to its being “opportunistic”. The researcher seizes the chance to engage residents in a conversation or simply exchange pleasantries. The purpose, in addition to data gathering, is to establish rapport. Questions asked are meant more to stimulate discussion on a significant subject.

Key Informant Interview

The key informant has a good knowledge of the community and its culture. The individual may be an elder with strong roots in the area. He/she may also have a specialized knowledge about a particular aspect of the culture (e.g. In dispute settlement, the elders or the local officials would be the best informants; for rituals and ceremonies, the local priests/priestesses could be tapped to provide the data).

Participant Observation

The method involves observing and recording the behavior of the community as well as participating in as many activities with the permission of the residents. In addition to data gathering the method enables the Team to establish rapport with the respondents.

Community Meeting or Assembly of Relevant Groupings

Before finalizing the results of the study, the Research Team presents the report to the community for comments and additional insights. The method ensures that the perceptions of communities are fairly documented. In addition, the meeting may enable the residents to pursue a program of action in the light of the results presented.

REPRODUCTIVE TOXICOLOGY IN FISH

*Dr. Annabelle Herrera
Institute of Biology, College of Science
UP Diliman, QC, Philippines*

Abstract

By the process of industrialization, numerous potential environmental toxins have been introduced to aquatic ecosystems. Fish reproduction is at risk. Effects of various heavy metals such as cadmium, lead, nickel, manganese and of pesticides such as organophosphates and pyrethroids were analyzed in different fish species. Invariably, the reproductive system was always affected. Gonadogenesis was delayed, sex cells were reduced and neurotic signs were always observed.

MALABON RIVER TRIBUTARIES IN METRO MANILA, PHILIPPINES: ASSESSMENT OF WATER QUALITY

River monitoring results showed that this river is heavily polluted due to domestic refuse of 11,000 squatter families and more than 1,000 industries along its banks. The river exceeded the standards set by the National Pollution Control Commission. Because of the poor water quality, macrofauna have disappeared except for a tolerant species of mosquito fish and a mollusc.

WASTEWATER TREATMENT IN HUAXI

Zhang Chao
Department of Chemistry
Guizhou University
Guiyang 550025, China

Abstract

A survey of the situation of surface water and wastewater treatment in Huaxi district of Guiyang city has been made. The article has discussed the processes in use and their effects, the impact of industry development on water resources, and the increasing need for environment protection.

POSSIBILITY OF CATTAIL FOR WASTE-WATER TREATMENT

*Supaporn Junrungreang, Pitsabu Jutvapornvani
Sukanjanawadee Maneeratanat and Methee Maneewon
Department of Land Development
Ministry of Agriculture and Cooperative
Bangkok, Thailand*

Abstract

Cattail (*Typha* sp.) is perennial aquatic weed which grows and spreads very fast in the pond, canal and reservoirs throughout in tropical and temperate zone. It can tolerate in some degree of salinity, acidity and alkaline environment. The important properties of cattail is high natural productivity and has the ability to absorb the large amount of nutrients and heavy metals. So the possibility of cattail utilization to waste-water treatment was investigated. Cattail proves to be produce large quantities of biomass due to it produces the total annual productivity approximately 56.6 ton/ha. The biomass above ground and below ground are 3.8-52.7 and 9.7-101.4 ton/ha respectively. Cattail is effective in nutrients removal and tolerate to the environment. The removal nutrients capacity of nitrogen and phosphorus by cattail are 760 and 60 kg/ha respectively. The comparison study of the elements content in organ of broad-leaf cattail (*Typha latifolia*) and narrow-leaved cattail (*Typha angustifolia*) indicated that above ground and below ground of *Typha* species are different. N content is the highest in leaf-blade about 2.5-2.9% but lowest P concentration in both leaf-blade and leaf-sheath. The elements accumulated in broad-leaf cattail more larger than narrow-leaved cattail. Seasonal dynamic also has affected to chemical elements and biomass in cattail. The maximum leaf-area of broad-leaf cattail and narrow-leaved cattail are in August which resulted the largest N,P and K content of above ground organ in summer. The peak of nutrient content of N,P and K below ground organ is in winter. The biomass above ground of broad-leaf cattail is more larger than narrow-leaved cattail but biomass ground of broad-leaf cattail is smaller than narrow-leaved cattail. The maximum biomass above ground of *Typha* sp. is in summer and the largest biomass below ground is in the begining of winter. Cattail can be used as water purification and it should be harvest during summer.

WATER RESOURCES MANAGEMENT STRATEGIES IN THAILAND

*Mr. Pramote Maiklad
Inspector General
Ministry of Agriculture and Cooperatives
Bangkok, Thailand*

Abstract

The paper presents some of the pressing water problems in Thailand including water scarcity facing many provinces throughout the country, flood and degradation of water quality together with some problems encountered in water resources development and management. Among the latter are: water shortage, increasing demand due to rapid growth rates in economic development, difficulty in construction of dams with emphasis on environmental conservation, lack of integration of the many agencies responsible for the activity.

Policies and measures to solve the above mentioned water problems and management issues are proposed including those of water resources development policy, water resources allocation policy, flood mitigation policy and polluted water treatment policy.

Case study of His Majesty's activities on water resources management is also presented.

INTEGRATED WATER MANAGEMENT

*Bruce Mitchell
Department of Geography
University of Waterloo
Waterloo, ON, Canada*

Abstract

In Canada, many water management agencies have designed their objectives programs and activities to achieve a "vision" of sustainable development through "mean" which include an ecosystem approach, partnerships and participatory approaches, and adaptive management. "Integrated water management" combines aspects of ends and means, and is being applied at both watershed and sub-watershed scales.

Integrated water management is endorsed in the first principle from the Dublin Conference of 1992. This approach also received support at the meeting in Stockholm in December, 1995 to create a "Global Water Partnership". The interim mission statement of the GWP states that it will seek "to support integrated approaches to sustainable water management, consistent with the Dublin and Rio principles, by encouraging stakeholders at appropriate levels to work together in more effective, efficient and collaborative ways". The Canadian Water Resources Association's "Sustainability Principles for Water Management in Canada" also identifies integrated management as one of three general principles to guide water management in Canada.

Integrated water management seeks to incorporate and balance economic, environmental and social considerations; to apply a systems perspective; to include the public and private sector, including non-governmental organizations; to include those who will be affected by decisions in planning and management; and to build in capacity for adaptation based on experience.

The integrated approach represents one interpretation of a holistic approach. When a holistic approach had been interpreted to mean a "comprehensive" approach, managers were often dissatisfied because unrealistically high expectations were created, the planning process was too long, and the product or plan was often completed too late to be helpful. An "integrated" approach is more focused. While it gives attention to a system, its component parts and their interrelationships, it also deliberately focuses on a smaller number of variables judged to cause most of the variation in a system. In that manner, it reflects the spirit of a holistic approach, but also is more practical and effective, relative to the comprehensive interpretation.

WATER USE AND DEVELOPMENT

Catriona Moir
Department of Environment
Technical University of Nova Scotia
Halifax, NS, Canada

Abstract

Balancing the needs of competing water users for access to the resource is a major challenge for all water managers. Historically, in Canada, access to the resource has been based on principles of first come, first served and on common-law riparian rights. Problems with these systems are well recognised and documented in literature. They include administrative issues related to adequacy of records, license requirements and timeframes, and resource issues related to over-allocation and cumulative impacts. Balance can only be achieved where both the administrative and resource concerns are successfully resolved.

These administrative and resource issues will be reviewed using initiatives underway in three Canadian provinces (British Columbia, Alberta and Nova Scotia) as examples. The potential to examine these issues and to achieve balance through integrated approaches to management will then be considered.

Computer Based Tools for Water Management: Our Experience with the RAISON System

D.A.Swayne[†] and D.C.L. Lam[‡]

ABSTRACT

In this paper, we will elaborate on the research, carried out jointly with Canada's National Water Research Institute, on Regional Analysis by Intelligent Systems ON computer (RAISON), where we have attempted, to the best of our resources, to build the tools necessary for bringing spatial, temporal and expert information into a single decision support framework for water management on various (local, regional) scales.

1. Introduction and Background

One of the greatest sources of difficulty in water and watershed management is the management of data and knowledge. Since water management is not a new concept, there is much available in print, and a large body of experts with whom to consult. The measurement of data and information is also well-understood. Quantity and quality measurements are increasing in accuracy and sophistication.

What is less well-understood, it appears, is the need for comprehensive, computer-based storage and recall of the data, information and knowledge required for the management process to be sustained for long periods.

Our experiences in developing various versions of RAISON have given us considerable insight into the problems of computer-based environmental management and decision support.

2. Hardware and Software Considerations

In the eleven years that we have been developing modelling, monitoring and decision support systems for the environment, the hardware and software inventories have changed tremendously. We started with Personal Computers (PCs) with very limited memory and disk capability to what is now available. We evolved through the growth in the personal computer (speed, memory and storage, networking) and the UNIX workstation, to arrive at our current Windows based systems. Each growth cycle left us wanting something which was not yet achievable. Such is the nature of applied research - the best system is slightly larger than the one currently being developed, and when it is

[†] Department of Computing and Information Science and School of Engineering, University of Guelph, Guelph, N1G 2W1, CANADA, email: dswayne@uoguelph.ca

[‡] New Technologies Research Branch, National Water Research Institute, Environment Canada, Burlington, L7R 4A6, CANADA, email: David.Lam@cciw.ca

completed, somehow the needs are expanded ever so slightly into the next generation, for which the hardware tools are still not yet sufficient for a completely satisfactory implementation.

The following Table 1. Summarizes the changes, and one or two key features of the good side and the bad side of the hardware / software involved as our system grew.

Historical Period	Hardware / Software	Main Problems	Good side / bad side
1985-1988	PC/AT, CGA/EGA graphics 10MEG hard drive, DOS operating system, no networking	Insufficient memory, coarse graphics. compilers and graphics libraries not compatible, software development largely concentrated on larger mainframes and minicomputers.	Tight limits on size of computer system, number of different functions graphical objects (e.g. maps) very coarse, shortage of good models and data management systems
1988-1991	PC/386 or 486, VGA graphics, 30-100MEG hard drive, file sharing networks, limited extended / expanded memory	Memory fragmented by DOS and PC architecture, graphics still very difficult, print engines not standardized.	good maps and pictures now possible, <u>but</u> limits on size of each application, and on overall system, most major engineering models occupy whole machine - no room for our system and models to co-exist.
1989-1993	UNIX domain (IBM, SGI, HP, Wang)	Lack of finished word processor, spreadsheet. Expensive software and hardware	Engineering models well-established, Graphics engines standardized, <u>but</u> shortage of productivity tools for general programmer base, limited audience for system
1993-1996	Windows 3.1 and 3.11, Visual Basic, beginnings of World-Wide Web, Windows NT and Windows 95.	Security, stability (until NT and 95), size of computer code.	Many products now available for personal computers (Oracle, Microsoft and Borland Development kits), good expert systems shells transported down from UNIX world, Many models implemented (e.g., AGNPS, SWMM4) for PCs.
1996-?	??	??	??

3. Data, Information and Knowledge

The availability, transportability and storage of data, information and knowledge is an important aspect of computer-based management of the environment.

Data collections do not often receive wide distribution. They are single-purpose collected and may indeed remain with their collecting organization. As a result there is

much duplication and little of a common standard. Many times, data is not even transcribed into electronic format, but rather left in paper form.

As important as the data is the *meta-data*, the data about the data. Who collected it, when, where ? By what method or methods was analysis carried out? These questions may have several answers **within a single data set!** As data moves around, the meta-data may get “detached” from the original data. This occurs when data re consolidated, or rolled into a new system from an old one.

Automated data collection more widely used, but it can produce large amounts of data which has no important result.

Inexpensive sources of data are also possible: schools, volunteers. This is being tried extensively in Canada, as the money for organized data gathering is lost to budget cutting. The amount of data is greater, but new quality problems may arise.

Information and knowledge, whether descriptive or in the form of **rules**, can permit inclusion in a management system of “deep” or traditional knowledge or the advice of experts. We have had experience with this, in the selecting of the appropriate models for acidification of lakes, in the assessment of the impact of acid rain in Eastern Canada.

The next three sub-sections outline the added role that a modern information system can give to the data and information input to decision making. The management of water is not the only place where these principles and tools can be applied, but that is where most of our experience lies.

Data manipulation tools in a comprehensive system must consist of: database / data storage software / hardware, data manipulation (spreadsheet), visualization / presentation, data transmission, and (finally) word processing tools. The internal data formats for each of these software units must in some sense be *inter-operable*. We have had to construct, in the RAISON system, translation utilities for a large number of GIS, database, communications, spreadsheet and decision support packages. As well, data modification tools have also had to be constructed. Some of our work has required the construction of “tight package wrapping” - a tight line encompassing a set of data points in space or on a graph. Another required a tenfold reduction of the number of points in the outline of a map of soil types, without loss of features. When these utilities become a requirement in many systems (as each of these have) then they are incorporated into the RAISON systems data management modules.

3.1 Spatial Data

Spatial information, such as elevations, land-use, soil types, water-courses, presence of man-made hazards, form one aspect of good management. A good inventory of industry in a watershed, particularly of those which pollute (such as animal feedlots, electro-chemical industries, urbanizing zones) is a prerequisite. Such an inventory can lead to a better deployment of scarce monitoring resources.

The simple act of recording where a piece of data or information has been gathered can vastly increase its worth. Geographical referencing of data is at the same time part of

the meta-data *and* an important added bit of knowledge. Together with background information on the geography, the location of the data source can give major insight into the state of things.

3.2 Temporal Data and Information

Temporal information is also critical. In many places long time-series of data may not be present. Current conditions may serve to give good expert opinion about the past. Even where the long time series data are present, they are inevitably changes in measurement, and statistical techniques are available for "smoothing out" transitions which are apparent, but are artifacts of changing technology.

There is an urgent need for analysis tools for temporal data. The data are often noisy. Changes in techniques of measurement (which might lower the detection limit) may give a false impression that some pollutant is being reduced, when this is merely an artifact of the lowered limit. Therefore, besides the typical statistical (parametric and non-parametric) tests, a combination of trend analysis and changing-point analysis is indispensable. Combining these tools can give the person doing the time-series analysis the option of determining whether the trend line is continuous or a jump caused by a change in measurement.

Missing data, caused by equipment outages or corruption in a data set over time, can sometimes be "healed" by the application of expert systems or neural networks. The noise characteristics of the data may be modelled by a neural network. Then a simulated data replacement has similar characteristics to real, measured data, so that statistical tests are not invalidated by some form of auto-correlation.

This replacement approach can also be used with spatial data. The analogy lies in the field of image-processing, but rather than visual images of a scene, we have *visualizations* of a state of some entity.

3.3 Models

Models for both point source and nonpoint source pollution have been built in many research projects, and are of high quality. They allow a peek "into the future". They are often difficult to use, and require the utmost care if they are to make sense.

There are many levels and classes of models which are applicable in the water management field. We propose to classify at least some that we have encountered, and built into our computer system. We have basically two types of models, prescriptive and normative.

Prescriptive models have some underlying physical principle for production or transport of chemical species. Prescriptive models may be continuous, stochastic or discrete. They may be qualitative or quantitative. There is usually a well-defined set of inputs, and these inputs may be introduced into the models at more than one point in the model running.

For prescriptive, quantitative modelling, we have incorporated a layered database into our system for geographical visualization. Thus, the inputs to an agricultural model such as soil type, land use, crops, neighbouring farming and other land use, terrain and hydrology, are all available to engineering models such as AGNPS.

Prescriptive, qualitative modelling usually requires the use of a so-called *expert system*. We are using several: rule based (ID3 and C4.5, fuzzy), and probabilistic (Bayesian Belief Network).

For normative and statistical modelling, we have incorporated contouring, boxplots, statistical tests, expert systems and text processing tools into our system. Scale changes (either up or down) require normative modelling approaches. Pollution models do which do not typically work on the point scale treat a whole **grid cell** as an entity which trades concentration or flow with its neighbours in some systematic way. Scaling up or down requires a management of uncertainty about a predicted, cell-based value. Thus the model is **constrained** to follow the results of the grid cell in a point-by point fashion in a consistent or **normative** way. Even the outputs can be tested for "reality" and the choice of model altered *a posteriori* (which operation is certainly a normative one).

4. Interface

The "look and feel" of each sub-section of a comprehensive modelling, monitoring and decision support system must be consistent across several different sub-systems. That comes with experience.

The Windows environment is very helpful with that consistency. Even colour choice is not a decision.

Help becomes an important consideration in a comprehensive system. Instructions must include not only the "which buttons to push" type of instructions, but also a discussion of the validity of statistical tests, the quality of the results, the applicability of models, and so forth. Even data dependent help is possible with expert systems. Advice on whether to accept a trend line or impose a changing point or jump in the analysis can be accomplished with expert systems support.

5. Conclusion

The short time and space for this workshop, the issues must be treated rather generically. They all are "common sense". However they have been traditionally neglected in favour of the physical scientific discussion. To maximize the value of data which is often produced at great expense, and to present findings in a most efficient way, systems such as RAISON must continue to be fore-runners in the design of computer-based water management and decision support.

1 ☐ **Computer Based Tools for Water Management: Our Experience with RAISON**

D.A.Swayne and D.C.L. Lam

University of Guelph and National Water Research Institute

CANADA

2 ☐ **Organization of Talk**

- Hardware and Software for Information Systems
- Data, information, knowledge
- Spatial data
- Temporal data
- Models
- Conclusions

3 ☐ **Hardware and Software**

Most common platform - PC

Most common operating system - Windows 3.11 / Windows 95 / Windows NT

Most common information system tools - Microsoft Office

Most common communication tool - World-Wide Web

4 ☐ **Hardware and Software**

Most common database system - Oracle

Most common GIS?

large systems - ArcInfo, Grass

small systems IDRISI, MapInfo, Spans

Many high quality models available for urban and rural pollution modelling eg.

AGNPS, SWMM4

5 ☐ **Development Software**

C/C++, Visual Basic, Delphi

ODBC / InterBase (SQL)

Client / Server

Cold Fusion

Internet Assistant

EasyHelp

6 ☐ **Data, Information. Knowledge**

Data from many sources, registry needed (a data *catalogue*)

Data format in one of many database formats or spreadsheet formats

Our own generic database / spreadsheets must converse with all of the formats

Lotus, dBase 4, SQL

7 ☐ **Data and Meta-Data**

Difficult questions - who created the data, how was it measured, were there special remarks? (e.g. below detection limits)

Denzer and Guettler (Saarbruecken) Sirius system. - metacatalogue.

Often lost in the conversions, from lack of documentation or understanding

8 ☐ **Forensic Tools**

Example - ionic balance

There is always noise

Miss one item, can't sum the others - auto-correlation. Neural networks can learn a "satisfactory" noise pattern to make the dataset useable

9 ☐ **Geo-referencing**

We use our own vector / raster system

Map system requires input - use existing Geographical Information System

Added value - where did the data come from

can display and see conclusions - just like descriptive statistics

our interface to AGNPS - uses "grid-cell", but

10 ☐ **Geographical Information**

We are NOT a GIS!

Project jointly with University of Waterloo - Map Mosaic - a Geographical interface to the World Wide Web.

heritage properties

volunteers

customers

11 ☐ **Time Series**

Is it a trend, or is it a change-point?

What about missing data?

Smoothing, seasonal adjustment

Visualization, descriptive statistics

Parametric and non-parametric testing

Sophisticated help file

12 ☐ **Models**

Many steps to input

A lot of engineering parameters

Mix of soil and land use types within a grid (as in AGNPS)

Automated system

Sample problem - map file of 15M must be pruned by factor of 10 without data loss.

13 ☐ **Models**

Use of "wizards" to assist in step-by-step preparation

Expert systems - a form of model

assertions, which if true cause particular outcomes

IF (wetland) THEN apply_wetland-correction

Many rules - which can combine

14 ☐ **Conclusion**

All preparatory and organizational work involves similar activity

Spreadsheet, GIS, Database and expert systems do not assist in combining the various aspects of decision support

That's what we (Environment Canada, University of Guelph and Waterloo) are attempting to do

Abstracts

Seminar Workshop on
**“Advances in Water Resources Management
and
Wastewater Treatment Technologies”**

at
Surasammanakhan Hall
Suranaree University of Technology, Nakhon Ratchasima
Thailand

22-25 July 1996



WATER RESOURCES MANAGEMENT STRATEGIES IN THAILAND

*Mr. Pramote Maiklad
Inspector General
Ministry of Agriculture and Cooperatives
Bangkok, Thailand*

Abstract

The paper presents some of the pressing water problems in Thailand including water scarcity facing many provinces throughout the country, flood and degradation of water quality together with some problems encountered in water resources development and management. Among the latter are: water shortage, increasing demand due to rapid growth rates in economic development, difficulty in construction of dams with emphasis on environmental conservation, lack of integration of the many agencies responsible for the activity.

Policies and measures to solve the above mentioned water problems and management issues are proposed including those of water resources development policy, water resources allocation policy, flood mitigation policy and polluted water treatment policy.

Case study of His Majesty's activities on water resources management is also presented.

INTEGRATED WATER MANAGEMENT

*Bruce Mitchell
Department of Geography
University of Waterloo
Waterloo, ON, Canada*

Abstract

In Canada, many water management agencies have designed their objectives programs and activities to achieve a “vision” of sustainable development through “mean” which include an ecosystem approach, partnerships and participatory approaches, and adaptive management. “Integrated water management” combines aspects of ends and means, and is being applied at both watershed and sub-watershed scales.

Integrated water management is endorsed in the first principle from the Dublin Conference of 1992. This approach also received support at the meeting in Stockholm in December, 1995 to create a “Global Water Partnership”. The interim mission statement of the GWP states that it will seek “to support integrated approaches to sustainable water management, consistent with the Dublin and Rio principles, by encouraging stakeholders at appropriate levels to work together in more effective, efficient and collaborative ways”. The Canadian Water Resources Association’s “Sustainability Principles for Water Management in Canada” also identifies integrated management as one of three general principles to guide water management in Canada.

Integrated water management seeks to incorporate and balance economic, environmental and social considerations; to apply a systems perspective; to include the public and private sector, including non-governmental organizations; to include those who will be affected by decisions in planning and management; and to build in capacity for adaptation based on experience.

The integrated approach represents one interpretation of a holistic approach. When a holistic approach had been interpreted to mean a “comprehensive” approach, managers were often dissatisfied because unrealistically high expectations were created, the planning process was too long, and the product or plan was often completed too late to be helpful. An “integrated: “approach is more focused. While it gives attention to a system, its component parts and their interrelationships, it also deliberately focuses on a smaller number of variables judged to cause most of the variation in a system. In that manner, it reflects the spirit of a holistic approach, but also is more practical and effective, relative to the comprehensive interpretation.

WATER USE AND DEVELOPMENT

*Catriona Moir
Department of Environment
Technical University of Nova Scotia
Halifax, NS, Canada*

Abstract

Balancing the needs of competing water users for access to the resource is a major challenge for all water managers. Historically, in Canada, access to the resource has been based on principles of first come, first served and on common-law riparian rights. Problems with these systems are well recognised and documented in literature. They include administrative issues related to adequacy of records, license requirements and timeframes, and resource issues related to over-allocation and cumulative impacts. Balance can only be achieved where both the administrative and resource concerns are successfully resolved.

These administrative and resource issues will be reviewed using initiatives underway in three Canadian provinces (British Columbia, Alberta and Nova Scotia) as examples. The potential to examine these issues and to achieve balance through integrated approaches to management will then be considered.

QUALITY ASSURANCE AND DUE DILIGENCE IN WATERSHED PROTECTION PROGRAMS: USING ENVIRONMENTAL MANAGEMENT SYSTEMS TO STRENGTHEN ENVIRONMENTAL PROGRAMS

*John K. Underwood, Ph.D.
Nova Scotia Power Inc.,
Halifax, Nova Scotia, Canada*

*William C. Hart, Ph.D.
TUNS, Halifax, Nova Scotia
Canada*

Abstract

Canadian governments are increasingly moving from “end of pipe” and “command and control” regulatory strategies to “emission control programs at source” via voluntary industrial programs for managing pollution problems of watersheds. This trend is advantageous for both government and industry as it not only reduces requirements for rigorous and costly inspections, but also provides industry with more flexibility to develop cost-effective environmental protection programs. In order to attain this measure of trust, it is necessary to implement strong Environmental Management Systems to demonstrate effective Due Diligence.

Quality Assurance programs and Environmental Audit are two of the tools that are described by the authors as they outline the importance of Environmental Management Systems in watershed protection programs. Standardization of the process is occurring through the International Organization for Standardization, and the authors conclude their paper with comments on developments in the ISO 14000 series of environmental management documents.

MINIMIZING ENVIRONMENTAL IMPACTS IN WATERSHEDS: DO IT NOW OR DO IT LATER?

*William C. Hart, Ph.D.
TUNS, Halifax, Nova Scotia, Canada*

*John K. Underwood, Ph.D.
Nova Scotia Power Inc.,
Halifax, Nova Scotia, Canada*

Abstract

It is an expectation of industry, government, and the general public that comprehensive Environmental Assessment will be required for new or significantly altered developments in Canadian watersheds. The objective is to predict potential environmental impacts of developments, and to adjust development strategies to minimize these impacts.

Existing developments which are entering decommissioning stages have similar regulatory constraints. The decommissioning process can, however, be much more complicated and much more costly.

Using several case studies, the authors will compare both approaches to providing protection for watersheds. They will outline steps and time frames associated with both of these environmental planning tools and they will discuss some of the problems and benefits associated with them.

WASTEWATER TREATMENT TECHNOLOGIES: EXPERIENCES AND CHALLENGE IN THAILAND

*Chongrak Polprasert, Thammarat Kootatep and Nawa Raj Chatiwada
Environmental Engineering Program,
Asian Institute of Technology
PO.Box 4, Klong Luang, Pathumthani, Thailand 12120*

Abstract

Due to rapid urbanization and industrialization, water pollution has become increasing problems in Thailand during the past decades. Technologies for wastewater treatment employed in Thailand range from energy-intensive process such as activated sludge, rotating biological contactors, and oxidation ditches, etc., to less energy-intensive processes such as waste stabilization ponds and on-site septic tanks and cesspools. Although the energy-intensive processes can achieve high treatment performances and requiring less land area, they are expensive to operate and maintain and produce sludge residues which need to be properly stabilized prior to disposal. Because Thailand is located in tropical region and land areas in suburbs and provinces are still not very expensive, wastewater technologies that allow for the recycling of nutrients contained in the wastes should be considered. Examples of these waste recycling technologies are: waste-fed fish ponds, constructed wetlands, composting and land treatment. These technologies are low-cost to operate and the recycled products become incentives for the plant operators. Waste recycling technologies should be considered as alternatives for the conventional technologies of wastewater treatment, wherever possible.

WASTEWATER TREATMENT TECHNOLOGIES USED IN QUEBEC (CANADA)

Dr. Michel Khalil
UQAR-QUENECO
QUENECO ENVIRONMENT INTERNATIONAL
Montreal (Quebec) Canada

Abstract

Wastewater from different sources as domestic sewage, commercial, industrial or storm water are treated. We will discuss the properties of wastewater as physical, chemical, biological and microbiological characteristics depending on their origin. Parameters such as total suspended solids, BOD, COD, TOC, organic nitrogen, phosphorus, ammonia content, etc, will be elucidated. Primary, secondary and advanced or tertiary treatments will be discussed.

A special emphasis of the conference will be made on wastewater recycling for aquaculture purposes using biofilters. A follow-up of the evolution of Ammonia, Nitrites and Nitrates concentrations in a recycling system are indications of performance. Finally an example of aquacultured trout and/or salmon using completely recycled water will be shown.

COMPUTER BASED TOOLS FOR WATER MANAGEMENT: OUR EXPERIENCE WITH THE RAISON SYSTEM

*D.A Swayne and D.C.L. Lam
Department of Computing and Information Science
University of Guelph, Canada*

Abstract

One of the greatest sources of difficulty in water and watershed management is the management of data and knowledge. Since water management is not a new concept, there is much available in print, and a large body of experts with whom to consult. The measurement of data and information is also well-understood. Quantity and quality measurements are increasing in accuracy and sophistication..

What is not well-understood, it appears, is the need for comprehensive, computer-based storage and recall of the data, information and knowledge required for the management process to be sustained for long periods.

Spatial information, such as elevations, land-use, soil types, water-courses, presence of man-made hazards, form one aspect of good management. A good inventory of industry in a watershed, particularly of those which pollute (such as animal feedlots, electro-chemical industries, urbanizing zones) is a prerequisite. Such an inventory can lead to a better deployment of scarce monitoring resources.

Temporal information is also critical. In many places long time-series of data may not be present. Current conditions may serve to give good expert opinion about the past. Even where the long time series data are present, they are inevitably changes in measurement, and statistical techniques are available for "smoothing out" transitions which are apparent, but are artifacts of changing technology.

Models for both point source and nonpoint source pollution have been built, and are of high quality. They allow a peek "into the future". They are often difficult to use, and require the utmost care if they are to make sense.

IMPACT OF EUTROPHICATION AND OTHER DEGRADATION PROCESS OF WATER QUALITY ON TROPICAL ECOSYSTEMS

Jacques Moreau
Institut National Polytechnique
Ecole Nationale Supérieure Agronomique de Toulouse
Toulouse Cedex, France

Abstract

Tropical aquatic ecosystems are threatened by various processes of water quality degradation: increasing human settlement near the shores, inappropriate water treatment, use of fertilizers for agriculture development leading to eutrophication, deforestation and erosion and associated siltation increasing of fishing effort, introduction of fish species.

The first part of this paper is a presentation of the situation in some particular places of interest: Laguna de Bay (Philippines), Ubolratana reservoir (Thailand) Parakrama Samudra Lake (Sri Lanka). Some examples are also provided from Africa: Lake Victoria, Lake Tanganyika, Kariba Man made lake.

For these aquatic ecosystems review of the general situation of living communities and of their possible evolution is given in relation to the type of water quality degradation they experience.

A software called ECOPATH 2 is briefly presented which allows to describe the trophic relationships among the various groups of living organisms inside aquatic ecosystems. This software also helps to identify disfunctioning of these ecosystems and to relate them to water quality.

In addition, because of recent improvements, this software allow to simulate possible changes and evolution which could take place after significant modifications of the general conditions: eutrophication, increasing fishing effort towards a particular species, decreasing biodiversity... Some examples are provided in order to illustrate this approach on well known and investigated tropical ecosystems, mainly in Asia.

The conclusion points out the necessary multidisciplinary researches for a proper management of aquatic environment.

WATERSHED CLASSIFICATION THE MACRO LAND USE PLANNING FOR THE SUSTAINABLE DEVELOPMENT OF WATER RESOURCES

*Assoc.Prof.Nipon Tangtham
Faculty of Forestry, Kasetsart University Bangkok,Thailand*

Abstract

Water resources development and watershed management are recognized as unseparated activities for Thailand's socio-economic and environmental development plan. Problems of water resources in terms of water shortage in dry season and flood with unfavorable water quality during the wet season caused by watershed degradation led the government to promulgate the Cabinet Regulation namely "Watershed Classification". This regulation classified watershed area in Thailand into 5 zones with the first (WSC1) and the second (WSC2) are preserved for protection and commercial forests respectively and the rests belong to agricultural and other purposes with appropriate conservation and mitigation measures. Although it was designed as macro land-use planning for better quality of environment, water quality and flow regiment are the main aim of water resources development project in the future if it can be efficiently implemented. It will not only to reduce reservoir sedimentation but also to help decrease chemical pullutants contamination of stream water supply to downstream.

THE KOK RIVER BASIN DEVELOPMENTS: PAST AND PRESENT

Chaithawat Saowapon

Lecturer

Faculty of Engineering

Chiang Mai University, Chiang Mai, THAILAND 50200

Abstract

Located in the northern part of Thailand, the Kok River is a tributary of the Mekong River. Thirty percent of the Kok River Basin is irrigable, the rest is mountainous. The oldest development project in the Kok Basin went into operation in 1963. Since 1972, several independent groups have proposed a variety of “stand alone” development schemes. It was not until 1982 that such groups started move in the direction of integrated proposals and transbasin development schemes. Interestingly enough, all of the development proposals for this basin tend to involve the diversion of water from the Kok Basin to other Thai basins where irrigation water shortages exist. However to date, none of the proposed diversion schemes have been implemented because substantial pressures have been put forth by both local and national pressure groups. This study seeks to review all the development proposals for the Kok River Basin.

ANTHROPOLOGICAL METHODOLOGIES IN ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

*Luisa Umaly & Lucas Fernan
Anthropological Association of the Philippines
Philippines Social Science Center (PSSC)
Quezon City, Philippines*

Abstract

The paper aims to present the various methods employed by the UGAT Research Team in gathering ethnographic data on the community. The information generated intends to enable the Team to make a well-founded and sound assessment of the potential impact of specific infrastructure projects (e.g., hydroelectric power generation).

Review of Documents

Libraries are consulted on relevant ethnographies, published papers and articles regarding the communities in areas where projects are to be implemented. Other sources of secondary data could be any of the following: government offices (GO-provincial, municipal, and barangay levels); local academic institutions, non-governmental agencies (NGOs) and peoples organizations (POs).

The information generated can provide a historical and general context by which to build on and analyze additional data gathered.

Ocular Visit

The Research Team visits the area prior to actual full-scale data gathering to : establish coordinative efforts with local officials; explain the objectives, activities, and plans of the Study to the communities; seek permission to conduct research activities; document available resources in the community; gather initial feedback regarding the project to be implemented; and arrange for the future logistic needs of the Team.

Focused Walk

The method aims to observe the different activities in the areas of functional relevance to resource access and use: locations: on-going activities; work at different times of the day; and the individuals involved in these tasks.

The Team members walk with local residents who can adequately point out and explain aspects of the functional areas and those to be affected by the Project (e.g. rice fields, swiddens, irrigation systems, drinking sources, pathways, the barangay hall, school, churches, playground, as well as the different sitios).

Community Mapping and Profiling

A sketch of the community is made, preferably by local residents. Located and identified are infrastructures, residential units, schools, medical facilities, water supply, waste disposal system, and resource locations.

Focus Group Discussion (FGD)

The FGD gathers different individuals with social characteristics and activities which predispose them to discuss specific issues.

For example, household heads could be convened to discuss their views on resettlement. Or health practitioners engaged in both Western and indigenous medical services may gather to talk about the health issues currently confronting the community.

Unstructured Interview

The term “unstructured” refers to its being “opportunistic”. The researcher seizes the chance to engage residents in a conversation or simply exchange pleasantries. The purpose, in addition to data gathering, is to establish rapport. Questions asked are meant more to stimulate discussion on a significant subject.

Key Informant Interview

The key informant has a good knowledge of the community and its culture. The individual may be an elder with strong roots in the area. He/she may also have a specialized knowledge about a particular aspect of the culture (e.g. In dispute settlement, the elders or the local officials would be the best informants; for rituals and ceremonies, the local priests/priestesses could be tapped to provide the data).

Participant Observation

The method involves observing and recording the behavior of the community as well as participating in as many activities with the permission of the residents. In addition to data gathering the method enables the Team to establish rapport with the respondents.

Community Meeting or Assembly of Relevant Groupings

Before finalizing the results of the study, the Research Team presents the report to the community for comments and additional insights. The method ensures that the perceptions of communities are fairly documented. In addition, the meeting may enable the residents to pursue a program of action in the light of the results presented.

REPRODUCTIVE TOXICOLOGY IN FISH

*Dr. Annabelle Herrera
Institute of Biology, College of Science
UP Diliman, QC, Philippines*

Abstract

By the process of industrialization, numerous potential environmental toxins have been introduced to aquatic ecosystems. Fish reproduction is at risk. Effects of various heavy metals such as cadmium, lead, nickel, manganese and of pesticides such as organophosphates and pyrethroids were analyzed in different fish species. Invariably, the reproductive system was always affected. Gonadogenesis was delayed, sex cells were reduced and neurotic signs were always observed.

MALABON RIVER TRIBUTARIES IN METRO MANILA, PHILIPPINES: ASSESSMENT OF WATER QUALITY

River monitoring results showed that this river is heavily polluted due to domestic refuse of 11,000 squatter families and more than 1,000 industries along its banks. The river exceeded the standards set by the National Pollution Control Commission. Because of the poor water quality, macrofauna have disappeared except for a tolerant species of mosquito fish and a mollusc.

WASTEWATER TREATMENT IN HUAXI

Zhang Chao
Department of Chemistry
Guizhou University
Guiyang 550025, China

Abstract

A survey of the situation of surface water and wastewater treatment in Huaxi district of Guiyang city has been made. The article has discussed the processes in use and their effects, the impact of industry development on water resources, and the increasing need for environment protection.

POSSIBILITY OF CATTAIL FOR WASTE-WATER TREATMENT

*Supaporn Junrungreang, Pitsabu Jutvapornvani
Sukanjanawadee Maneeratanat and Methee Maneewon
Department of Land Development
Ministry of Agriculture and Cooperative
Bangkok, Thailand*

Abstract

Cattail (*Typha* sp.) is perennial aquatic weed which grows and spreads very fast in the pond, canal and reservoirs throughout in tropical and temperate zone. It can tolerate in some degree of salinity, acidity and alkaline environment. The important properties of cattail is high natural productivity and has the ability to absorb the large amount of nutrients and heavy metals. So the possibility of cattail utilization to waste-water treatment was investigated. Cattail proves to be produce large quantities of biomass due to it produces the total annual productivity approximately 56.6 ton/ha. The biomass above ground and below ground are 3.8-52.7 and 9.7-101.4 ton/ha respectively. Cattail is effective in nutrients removal and tolerate to the environment. The removal nutrients capacity of nitrogen and phosphorus by cattail are 760 and 60 kg/ha respectively. The comparison study of the elements content in organ of broad-leaf cattail (*Typha latifolia*) and narrow-leaved cattail (*Typha angustifolia*) indicated that above ground and below ground of *Typha* species are different. N content is the highest in leaf-blade about 2.5-2.9% but lowest P concentration in both leaf-blade and leaf-sheath. The elements accumulated in broad-leaf cattail more larger than narrow-leaved cattail. Seasonal dynamic also has affected to chemical elements and biomass in cattail. The maximum leaf-area of broad-leaf cattail and narrow-leaved cattail are in August which resulted the largest N,P and K content of above ground organ in summer. The peak of nutrient content of N,P and K below ground organ is in winter. The biomass above ground of broad-leaf cattail is more larger than narrow-leaved cattail but biomass ground of broad-leaf cattail is smaller than narrow-leaved cattail. The maximum biomass above ground of *Typha* sp. is in summer and the largest biomass below ground is in the beginning of winter. Cattail can be used as water purification and it should be harvest during summer.

WATER RESOURCES MANAGEMENT STRATEGIES IN THAILAND

BY PRAMOTE MAIKLAD

The paper presents some of the pressing water problems in Thailand including water scarcity facing many provinces throughout the country, flood and degradation of water quality together with some problems encountered in water resources development and management. Among the latter are: water shortage, increasing demand due to rapid growth rates in economic development, difficulty in construction of dams with emphasis on environmental conservation, lack of integration of the many agencies responsible for the activity.

Policies and measures to solve the above mentioned water problems and management issues are proposed including those of water resources development policy, water resources allocation policy, flood mitigation policy and polluted water treatment policy.

Case study of His Majesty's activities on water resources management is also presented.

hartwc@tuns.ca, 07:56 AM 27/06/19, Re: WATI

Pia:
Pls consult
R

Return-Path: <hartwc@tuns.ca>
Date: Thu, 27 Jun 1996 07:56:44 -0300 (ADT)
From: hartwc@tuns.ca
X-Sender: hartwc@newton.ccs.tuns.ca
To: Center for International Affairs <cenintaf@ccs.sut.ac.th>
Subject: Re: WATER SEMINAR

Centre for Water Resources Studies
Technical University of Nova Scotia
902-420-7611 (Voice) 902-420-7551 (Fax)

Via E-Mail

From: William Hart, Ph.D., Associate Director
Internet address: hartwc@tuns.ca

Date: June 24, 1996

To: Dr. Ruben Umaly, SUT

Re: Abstract and profile.

1. I did not include abstracts of the papers in my last e-mail, because I had sent them to you some time ago. If you do not have them, please let me know, and I will send another copy.

2. The full names of the speakers are:

Dr. Bruce Mitchell, Dr. John K. Underwood, Ms. Catrionia Moir, Dr. David Swayne, Dr. William Hart.

3. Dr. Swayne's profile is as follows:

Dr Swayne is a Professor of Computer Science in the Department of Computing and Information Science, University of Guelph. He is also an Adjunct Professor at the University of Waterloo, and holds a joint appointment with the School of Engineering at Guelph. His speciality is environmental decision support systems and environmental software engineering, principally the incorporation of uncertainty management

environmental decision support systems and environmental software engineering. He is a principal investigator in Environment Canada's RAISON project. Application areas for the RAISON research have included: acid rain reduction, climate change, well water assessment, mining effluent modelling, and long range transport of atmospheric pollutants. Dr. Swayne is also active in agricultural and environmental applications of the World-Wide Web for information dissemination, and crisis management expert systems for police tactical teams involved with hostage takings.

4. The abstract of his paper follows: *: Swayne*

Talk title: Computer Based Tools for Water Management: Our Experience with the RAISON System

Authors: D.A.Swayne and D.C.L. Lam

Abstract: One of the greatest sources of difficulty in water and watershed management is the management of data and knowledge. Since water management is not a new concept, there is much available in print, and a large body of experts with whom to consult. The measurement of data and information is also well-understood. Quantity and quality measurements are increasing in accuracy and sophistication.

What is not well-understood, it appears, is the need for comprehensive, computer-based storage and recall of the data, information and knowledge required for the management process to be sustained for long periods.

Spatial information, such as elevations, land-use, soil types, water-courses, presence of man-made hazards, form one aspect of good management. A good inventory of industry in a watershed, particularly of those which pollute (such as animal feedlots, electro-chemical industries, urbanizing zones) is a prerequisite. Such an inventory can lead to a better deployment of scarce monitoring resources.

Temporal information is also critical. In many places long time-series of data may not be present. Current conditions may serve to give good expert opinion about the past. Even where the long time series data are present, they are inevitably changes in measurement, and statistical techniques are available for "smoothing out" transitions which are apparent, but are artifacts of changing technology.

Models for both point source and nonpoint source pollution have been built, and are of high quality. They allow a peek "into the future". They are often difficult to use, and require the utmost care if they are to make sense.

In my talk, I will elaborate on the research, carried out jointly with Canada's National Water Research Institute, on Regional Analysis by Intelligent Systems ON computer (RAISON), where we have attempted, to the best of our resources, to build the tools necessary for bringing spatial, temporal and expert information into a single decision support framework for water management on various (local, regional) scales.

File:

COMPUTER BASED TOOLS FOR WATER MANAGEMENT: OUR EXPERIENCE WITH THE RAISON SYSTEM

*D.A Swayne and D.C.L. Lam
Department of Computing and Information Science
University of Guelph, Canada*

Abstract

One of the greatest sources of difficulty in water and watershed management is the management of data and knowledge. Since water management is not a new concept, there is much available in print, and a large body of experts with whom to consult. The measurement of data and information is also well-understood. Quantity and quality measurements are increasing in accuracy and sophistication..

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Models for both point source and nonpoint source pollution have been built, and are of high quality. They allow a peek "into the future". They are often difficult to use, and require the utmost care if they are to make sense.

Mr. Chao Zhang, 11:17 AM 29/06/19, no subject (file transmission)

Return-Path: <czhang@chem.gzu.edu.cn>
From: "Mr. Chao Zhang" <czhang@chem.gzu.edu.cn>
Subject: no subject (file transmission)
To: cenintaf@ccs.sut.ac.th
Date: Sat, 29 Jun 1996 11:17:09 +0900 (CDT)

Department of Chemistry
Guizhou University
Guiyang, Guizhou 550025
P. R. China
Email:
czhang@chem.gzu.edu.cn
June 29, 1996

The Director
Center for International Affairs
Suranaree University of Technology
Nakhon Ratchasim, Thailand

Dear Sir,

Thank you very much for your letter of June 27.
Enclosed is the title and abstract of my paper. I would
be very happy to provide further information if you should
require.

Yours sincerely,
Zhang Chao

Wastewater Treatment in Huaxi
Zhang Chao
(Dept. of Chem., Guizhou Univ., Guiyang 550025, China)

A survey of the situation of surface water and wastewater
treatment in Huaxi district of Guiyang city has been made.
The article has discussed the processes in use and their
effects, the impact of industry development on water resources,
and the increasing need for environment protection.

IMPACTS OF VARIOUS LAND USES ON WATER QUALITY AT MAE KLONG HEAD WATERSHED AREA KANCHANABURI

*Dr.Songtam Suksawang
Mr.Warin Jirasuktaweekul*

*Ms.Boonma Deesaeng
Mrs.Nittaya Purivirajkul*

*Watershed Research Section, Forest Environment Research and Development
Division, Forest Research Office, Royal Forest Department, Bangkok 10900
THAILAND*

Abstract

The study on the impacts of various land uses on water quality in Mae Klong head watershed area, Kanchanaburi was conducted from April 1993 to March 1994. Water samples have been collected in certain small disturbed sub-watershed which had been partially converted by local people for various uses such as residential and agricultural uses in upland area, shifting cultivation, animal raising and temporary housing in lower part. The water samples had also been collected from undisturbed areas as well. Analytical activities of water quality have been done at the Department of Agriculture and Department of Fishery, Ministry of Agriculture and Cooperatives in Bangkok.

The results obtained from this study indicated that after the small forested watershed have been disturbed at certain level by human activities, there still be no evident sign to indicate that physical water quality and soil nutrient being affected discernibly. However, its biological quality has been affected in some areas near or within residential premise, grazing area and agricultural and where number of fecal coliform, fecal streptococci and other coliform bacteria were higher than natural level.

No. 882

Date 3-7-39

Time 15.25

Environmental Engineering Program, Asian Institute of Technology P.O. Box 4, Klong Luang, Pathumthani, Thailand 12120

FAX

Date: 07/02/96

Number of pages including cover sheet: 2

To:

Dr. Chongchin Polprasert

Phone: 044-216-117

Fax phone: 044-216-191

CC: Dr. Noppadol Kongsrichareern

From:

Thammarat Koottatep

Phone: 66-2-524-5630

Fax phone: 66-2-524-5625

REMARKS:

☐ Urgent☒ For your review☐ Reply ASAP☐ Please comment

Dear Dr. Chongchin,

Please find the abstract entitled "Wastewater Treatment Technologies: Experiences and Challenge in Thailand" enclosed herewith. This topic will be presented on July 23, 1996 by Prof. Chongrak.

Thank you,

Best regards,

Thammarat Koottatep

Thammarat Koottatep

From no. 882 CIA.

Dr. Chongchin Polprasert fax for Abstract of A= in 6. 100

for Conference/Workshop.

Dr. Chongchin Polprasert

3-7-39

WASTEWATER TREATMENT TECHNOLOGIES: EXPERIENCES AND CHALLENGE IN THAILAND

*Chongrak Polprasert, Thammarat Kootatep and Nawa Raj Chatiwada
Environmental Engineering Program,
Asian Institute of Technology
PO.Box 4, Klong Luang, Pathumthani, Thailand 12120*

Abstract

Due to rapid urbanization and industrialization, water pollution has become increasing problems in Thailand during the past decades. Technologies for wastewater treatment employed in Thailand range from energy-intensive process such as activated sludge, rotating biological contactors, and oxidation ditches, etc., to less energy-intensive processes such as waste stabilization ponds and on-site septic tanks and cesspools. Although the energy-intensive processes can achieve high treatment performances and requiring less land area, they are expensive to operate and maintain and produce sludge residues which need to be properly stabilized prior to disposal. Because Thailand is located in tropical region and land areas in suburbs and provinces are still not very expensive, wastewater technologies that allow for the recycling of nutrients contained in the wastes should be considered. Examples of these waste recycling technologies are: waste-fed fish ponds, constructed wetlands, composting and land treatment. These technologies are low-cost to operate and the recycled products become incentives for the plant operators. Waste recycling technologies should be considered as alternatives for the conventional technologies of wastewater treatment, wherever possible.

THE KOK RIVER BASIN DEVELOPMENTS: PAST AND PRESENT

Chaithawat Saowapon

Lecturer

Faculty of Engineering

Chiang Mai University, Chiang Mai, THAILAND 50200

Abstract

Located in the northern part of Thailand, the Kok River is a tributary of the Mekong River. Thirty percent of the Kok River Basin is irrigable, the rest is mountainous. The oldest development project in the Kok Basin went into operation in 1963. Since 1972, several independent groups have proposed a variety of “stand alone” development schemes. It was not until 1982 that such groups started move in the direction of integrated proposals and transbasin development schemes. Interestingly enough, all of the development proposals for this basin tend to involve the diversion of water from the Kok Basin to other Thai basins where irrigation water shortages exist. However to date, none of the proposed diversion schemes have been implemented because substantial pressures have been put forth by both local and national pressure groups. This study seeks to review all the development proposals for the Kok River Basin.

Return-Path: <ffornpt@nontri.ku.ac.th>
Date: Fri, 28 Jun 1996 16:10:16 -0700 (GMT)
From: Nipon Tangtham <ffornpt@ku.ac.th>
To: Center for International Affairs <cenintaf@ccs.sut.ac.th>
Subject: Re: SUT 6 th Anniversary Seminar/International Workshop

Dear Khun Mantana

The following is an ABSTRACT of my paper to be presented at 6 th Anniversary Seminar/International Workshop

Watershed Classification
The Macro Landuse Planning for the Sustainable
Development of Water Resources

Nipon Tangtham

ABSTRACT: —————>

Water resources development and watershed management are recognized as unseparated activities for Thailand's socio-economic and environmental development plan. Problems of water resources in terms of water shortage in dry season and flood with unfavorable water quality during the wet season caused by watershed degradation led the government to promulgate the Cabinet Regulation namely "Watershed Classification". This regulation classified watershed area in Thailand into 5 zones with the first (WSC1) and the second (WSC2) are preserved for protection and commercial forests respectively and the rests belong to agricultural and other purposes with appropriate conservation and mitigation measures. Although it was designed as macro land-use planning for better quality of environment, water quality and flow regiment are the main aim of water resources development project in the future if it can be efficiently implemented. It will not only to reduce reservoir sedimentation but also to help decrease chemical pullutants contamination of stream water supply to downstream.

On Fri, 21 Jun 1996, Center for International Affairs wrote:

> Dear Assoc. Prof. Nipon Tangtham,
>

Ref. No. 5136/



GIRISH S. MAYYA

Senior Consultant

Environmental Consultants

200 Robinson road

#04-01A Robinson Towers

Singapore 01104

SURANAREE UNIVERSITY OF TECHNOLOGY 28 June 1996

CENTRE FOR INTERNATIONAL AFFAIRS

111 University Avenue, Muang District, Nakhon Ratchasima , Thailand

Tel. (66.44) 216191-8 Ext. 1156, 1159

Fax : (66.44) 216122 Email : cenintaf@ccs.sut.ac.th

FAX: 227 9400

RE: DISTANCE LEARNING PROGRAMS

Thank you very much for your letter of 18 June which was referred to my office by the Rector.

Distance education through multimedia is one of the major concerns of our University but at the moment we already have partners in Australia. We are also negotiating directly with other universities in other fields. At present the university already has the competency to develop distance education materials on our own or with our partner universities.

We do appreciate your kind offer and hope you will be able to link with other universities in Thailand.

Yours sincerely,

Dr. Prasart Suebka

Vice Rector for Planning

> Thank you very much for your attention and your registration form
> sent us recently. Your title of paper " Watershed Classification-The Macro
> Land-Use Planning for Sustainable Development of Water Resources" has been
> accepted. Please send the abstract at the latest the end of June and bring
> the complete paper to the seminar with you.

> Best regards.

>

>

>

> Thammachoti

>

> Dr. Ruben C. Umaly

>

>

Yours sincerely,
Mantana

for Prof.

FRONT OFFICE MANAGEMENT
HOTEL COMPUTER SYSTEMS
HOSPITALITY MARKETING

CONVENTION/EXHIBITION OPERATIONS/MANAGEMENT
TRAVEL AGENCY OPERATION
AIRLINE RESERVATION AND TICKETING
HOTEL ENGINEERING AND SAFETY

SCIENCE AND TECHNOLOGY

INTERNET
MULTIMEDIA TECHNOLOGY
GEOGRAPHICAL INFORMATION SYSTEM
MANAGEMENT INFORMATION SYSTEM
ENVIRONMENTAL IMPACT ASSESSMENT
INFORMATION TECHNOLOGY AND MANAGEMENT

SPECIALIZED CORPORATE TRAINING PROGRAMS BY ARRANGEMENT

FOR FURTHER INFORMATION CONTACT:

DR. VU NOC TU

Director, International Relations Department
Vietnam National University, Hanoi
19 Le Thanh Tong St., Hanoi
Tel: (84.4) 245164
FAX: (84.4) 245507
Email: vandao@vnu.ac.vn

DR. RUBEN C. UMALY

Director, Center for International Affairs
Suranaree University of Technology
111 University Avenue
Nakhon Ratchasima, Thailand
Tel. 044. 216191- Extn.1154
FAX: 044.216122
Email: ruben@ccs.sut.ac.th
a:vnu-sut:p.1-8:PSO.1:28/6/96

WATERSHED CLASSIFICATION THE MACRO LAND USE PLANNING FOR THE SUSTAINABLE DEVELOPMENT OF WATER RESOURCES

*Assoc.Prof.Nipon Tangtham
Faculty of Forestry, Kasetsart University Bangkok,Thailand*

Abstract

Water resources development and watershed management are recognized as unseparated activities for Thailand's socio-economic and environmental development plan. Problems of water resources in terms of water shortage in dry season and flood with unfavorable water quality during the wet season caused by watershed degradation led the government to promulgate the Cabinet Regulation namely "Watershed Classification". This regulation classified watershed area in Thailand into 5 zones with the first (WSC1) and the second (WSC2) are preserved for protection and commercial forests respectively and the rests belong to agricultural and other purposes with appropriate conservation and mitigation measures. Although it was designed as macro land-use planning for better quality of environment, water quality and flow regiment are the main aim of water resources development project in the future if it can be efficiently implemented. It will not only to reduce reservoir sedimentation but also to help decrease chemical pullutants contamination of stream water supply to downstream.

WASTEWATER TREATMENT TECHNOLOGIES USED IN QUEBEC (CANADA)

*Dr. Michel Khalil
UQAR-QUENECO
QUENECO ENVIRONMENT INTERNATIONAL
Montreal (Quebec) Canada*

Abstract

Wastewater from different sources as domestic sewage, commercial, industrial or storm water are treated. We will discuss the properties of wastewater as physical, chemical, biological and microbiological characteristics depending on their origin. Parameters such as total suspended solids, BOD, COD, TOC, organic nitrogen, phosphorus, ammonia content, etc, will be elucidated. Primary, secondary and advanced or tertiary treatments will be discussed.

A special emphasis of the conference will be made on wastewater recycling for aquaculture purposes using biofilters. A follow-up of the evolution of Ammonia, Nitrites and Nitrates concentrations in a recycling system are indications of performance. Finally an example of aquacultured trout and/or salmon using completely recycled water will be shown.

POSSIBILITY OF CATTAIL FOR WASTE-WATER TREATMENT

*Supaporn Junrungreang, Pitsabu Jutvapornvani
Sukanjanawadee Maneeratanat and Methee Maneewon
Department of Land Development
Ministry of Agriculture and Cooperative
Bangkok, Thailand*

Abstract

Cattail (*Typha* sp.) is perennial aquatic weed which grows and spreads very fast in the pond, canal and reservoirs throughout in tropical and temperate zone. It can tolerate in some degree of salinity, acidity and alkaline environment. The important properties of cattail is high natural productivity and has the ability to absorb the large amount of nutrients and heavy metals. So the possibility of cattail utilization to waste-water treatment was investigated. Cattail proves to be produce large quantities of biomass due to it produces the total annual productivity approximately 56.6 ton/ha. The biomass above ground and below ground are 3.8-52.7 and 9.7-101.4 ton/ha respectively. Cattail is effective in nutrients removal and tolerate to the environment. The removal nutrients capacity of nitrogen and phosphorus by cattail are 760 and 60 kg/ha respectively. The comparison study of the elements content in organ of broad-leaf cattail (*Typha latifolia*) and narrow-leaved cattail (*Typha angustifolia*) indicated that above ground and below ground of *Typha* species are different. N content is the highest in leaf-blade about 2.5-2.9% but lowest P concentration in both leaf-blade and leaf-sheath. The elements accumulated in broad-leaf cattail more larger than narrow-leaved cattail. Seasonal dynamic also has affected to chemical elements and biomass in cattail. The maximum leaf-area of broad-leaf cattail and narrow-leaved cattail are in August which resulted the largest N,P and K content of above ground organ in summer. The peak of nutrient content of N,P and K below ground organ is in winter. The biomass above ground of broad-leaf cattail is more larger than narrow-leaved cattail but biomass ground of broad-leaf cattail is smaller than narrow-leaved cattail. The maximum biomass above ground of *Typha* sp. is in summer and the largest biomass below ground is in the begining of winter. Cattail can be used as water purification and it should be harvest during summer.

IMPACT OF EUTROPHICATION AND OTHER DEGRADATION PROCESS OF WATER QUALITY ON TROPICAL ECOSYSTEMS

Jacques Moreau
Institut National Polytechnique
Ecole Nationale Supérieure Agronomique de Toulouse
Toulouse Cedex, France

Abstract

Tropical aquatic ecosystems are threatened by various processes of water quality degradation: increasing human settlement near the shores, inappropriate water treatment, use of fertilizers for agriculture development leading to eutrophication, deforestation and erosion and associated siltation increasing of fishing effort, introduction of fish species.

The first part of this paper is a presentation of the situation in some particular places of interest: Laguna de Bay (Philippines), Ubolratana reservoir (Thailand) Parakrama Samudra Lake (Sri Lanka). Some examples are also provided from Africa: Lake Victoria, Lake Tanganyika, Kariba Man made lake.

For these aquatic ecosystems review of the general situation of living communities and of their possible evolution is given in relation to the type of water quality degradation they experience.

A software called ECOPATH 2 is briefly presented which allows to describe the trophic relationships among the various groups of living organisms inside aquatic ecosystems. This software also helps to identify disfunctioning of these ecosystems and to relate them to water quality.

In addition, because of recent improvements, this software allow to simulate possible changes and evolution which could take place after significant modifications of the general conditions: eutrophication, increasing fishing effort towards a particular species, decreasing biodiversity... Some examples are provided in order to illustrate this approach on well known and investigated tropical ecosystems, mainly in Asia.

The conclusion points out the necessary multidisciplinary researches for a proper management of aquatic environment.

Center for International Affairs
No. 659/89
Date 3 June 98
Time 10:30

Institute of Biology
College of Science
UP Diliman, QC
Philippines
May 22, 1996

Dr. Ruben C. Umaliy
Director
Center for International Affairs
Suranaree University of Technology
111 University Avenue
Nakhon Ratchasima 30000
Thailand

Dear Sir:

I would like to attend the Seminar Workshop on July 22-25, 1996. May I request that my roommate will be Dr. Teresita Perez.

These are the abstracts of my poster papers:

REPRODUCTIVE TOXICOLOGY IN FISH

By the process of industrialization, numerous potential environmental toxins have been introduced to aquatic ecosystems. Fish reproduction is at risk. Effects of various heavy metals such as cadmium, lead, nickel, manganese and of pesticides such as organophosphates and pyrethroids were analyzed in different fish species. Invariably, the reproductive system was always affected. Gonadogenesis was delayed, sex cells were reduced and neurotic signs were always observed.

MALABON RIVER TRIBUTARIES IN METRO MANILA, PHILIPPINES: ASSESSMENT OF WATER QUALITY

River monitoring results showed that this river is heavily polluted due to domestic refuse of 11,000 squatter families and more than 1,000 industries along its banks. The river exceeded the standards set by the National Pollution Control Commission. Because of the poor water quality, macrofauna have disappeared except for a tolerant species of mosquito fish and a mollusc.

Thank you, Sir. I hope these merit your kind approval. I will wait for your answer which I will need in looking for the travel grant.

Very truly yours,

Annabelle
Annabelle Herrera

REPRODUCTIVE TOXICOLOGY IN FISH

*Dr. Annabelle Herrera
Institute of Biology, College of Science
UP Diliman, QC, Philippines*

Abstract

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ANTHROPOLOGICAL METHODOLOGIES IN ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

*Luisa Umaly & Lucas Fernan
Anthropological Association of the Philippines
Philippines Social Science Center (PSSC)
Quezon City, Philippines*

Abstract

The paper aims to present the various methods employed by the UGAT Research Team in gathering ethnographic data on the community. The information generated intends to enable the Team to make a well-founded and sound assessment of the potential impact of specific infrastructure projects (e.g., hydroelectric power generation).

Review of Documents

Libraries are consulted on relevant ethnographies, published papers and articles regarding the communities in areas where projects are to be implemented. Other sources of secondary data could be any of the following: government offices (GO-provincial, municipal, and barangay levels); local academic institutions, non-governmental agencies (NGOs) and peoples organizations (POs).

The information generated can provide a historical and general context by which to build on and analyze additional data gathered.

Ocular Visit

The Research Team visits the area prior to actual full-scale data gathering to : establish coordinative efforts with local officials; explain the objectives, activities, and plans of the Study to the communities; seek permission to conduct research activities; document available resources in the community; gather initial feedback regarding the project to be implemented; and arrange for the future logistic needs of the Team.

Focused Walk

The method aims to observe the different activities in the areas of functional relevance to resource access and use: locations: on-going activities; work at different times of the day; and the individuals involved in these tasks.

The Team members walk with local residents who can adequately point out and explain aspects of the functional areas and those to be affected by the Project (e.g. rice fields, swiddens, irrigation systems, drinking sources, pathways, the barangay hall, school, churches, playground, as well as the different sitios).

Community Mapping and Profiling

A sketch of the community is made, preferably by local residents. Located and identified are infrastructures, residential units, schools, medical facilities, water supply, waste disposal system, and resource locations.

Focus Group Discussion (FGD)

The FGD gathers different individuals with social characteristics and activities which predispose them to discuss specific issues.

For example, household heads could be convened to discuss their views on resettlement. Or health practitioners engaged in both Western and indigenous medical services may gather to talk about the health issues currently confronting the community.

Unstructured Interview

The term “unstructured” refers to its being “opportunistic”. The researcher seizes the chance to engage residents in a conversation or simply exchange pleasantries. The purpose, in addition to data gathering, is to establish rapport. Questions asked are meant more to stimulate discussion on a significant subject.

Key Informant Interview

The key informant has a good knowledge of the community and its culture. The individual may be an elder with strong roots in the area. He/she may also have a specialized knowledge about a particular aspect of the culture (e.g. In dispute settlement, the elders or the local officials would be the best informants; for rituals and ceremonies, the local priests/priestesses could be tapped to provide the data).

Participant Observation

The method involves observing and recording the behavior of the community as well as participating in as many activities with the permission of the residents. In addition to data gathering the method enables the Team to establish rapport with the respondents.

Community Meeting or Assembly of Relevant Groupings

Before finalizing the results of the study, the Research Team presents the report to the community for comments and additional insights. The method ensures that the perceptions of communities are fairly documented. In addition, the meeting may enable the residents to pursue a program of action in the light of the results presented.

Return-Path: <hartwc@tuns.ca>
Date: Wed, 3 Jul 1996 11:32:54 -0300 (ADT)
From: hartwc@tuns.ca
X-Sender: hartwc@newton.ccs.tuns.ca
To: Center for International Affairs <cenintaf@ccs.sut.ac.th>
Subject: Mantana Thammachoti

Centre for Water Resources Studies
Technical University of Nova Scotia
902-420-7611 (Voice) 902-420-7551 (Fax)

Via E-Mail

From: William Hart, Ph.D., Associate Director
Internet address: hartwc@tuns.ca

Date: July 3, 1996

To: Mantana Thammachoti, Program Officer, SUT

Re: Schedule and Abstracts

Thank you for your e-mail of 3 July regarding our travel plans and the abstracts.

First, I did not request visits with industry or agency personnel, so you do not have to worry about their schedules--I am sure they will be busy preparing for the conference and we will have opportunities to meet them there.

I had asked Dr. Umaly if someone would be available to assist us in seeing the area around Korat. We are particularly interested in seeing the countryside, perhaps visiting some of the ruins of old cities that I understand are very impressive, visiting the area where I understand silk is produced, getting a better understanding of land use and the way people use water. In other words, we would like to do tourist things that have some relationship to water, but we do not want to do them in an

"official" capacity. Therefore, someone who could help us with language and directions would be very much appreciated.

As I indicated in earlier messages, Dr. Underwood, Dr. Mitchell, Ms. Moir, and I will be arriving on 18 July and would like to stay at the airport hotel. Dr. Swayne will be arriving on 17 July and would also like to stay at the airport hotel. All of us will travel to Korat on 19 July and would like to spend the next two or three days preparing our talks and being tourists. We would prefer to have the minimum of "fuss" made of our visit during those days, knowing that all of you will be very busy preparing for the conference. We will be pleased (and would prefer) to make our own plans, with the help of the student or other person who might be available, and would not expect CIA staff to be concerned with us. I hope this meets with your approval.

The abstracts of the papers follow. I can send them to you in Microsoft Word, or WordPerfect format if you prefer.

ABSTRACTS

Bruce Mitchell
Department of Geography
Environment
University of Waterloo
Waterloo, ON

Catriona Moir
Nova Scotia Department of the
Halifax, NS

INTEGRATED WATER MANAGEMENT

Abstract

In Canada, many water management agencies have designed their objectives, programs and activities to achieve a "vision" of sustainable development through "means" which include an ecosystem approach, partnerships and participatory approaches, and adaptive management. "Integrated water management" combines aspects of ends and means, and is being applied at both watershed and sub-watershed scales.

Integrated water management is endorsed in the first principle from the Dublin Conference of 1992. This approach also received support at the meeting in Stockholm in December, 1995 to create a "Global Water Partnership". The interim mission statement of the GWP states that it will seek "to support integrated approaches to sustainable water management, consistent with the Dublin and Rio principles, by encouraging stakeholders at appropriate levels to work together in more effective, efficient and collaborative ways". The Canadian Water Resources Association's "Sustainability Principles for Water Management in Canada" also identifies integrated management as one of three general principles to guide water management in Canada.

Integrated water management seeks to incorporate and balance economic, environmental and social considerations; to apply a systems perspective; to include the public and private sector, including non-governmental organizations; to include those who will be affected by decisions in planning and management; and to build in capacity for adaptation based on experience.

The integrated approach represents one interpretation of a holistic approach. When a holistic approach had been interpreted to mean a "comprehensive" approach, managers were often dissatisfied because unrealistically high expectations were created, the planning process was too long, and the product or plan was often completed too late to be helpful. An "integrated" approach is more focused. While it gives attention to a system, its component parts and their interrelationships, it also deliberately focuses on a smaller number of variables judged to cause most of the variation in a system. In that manner, it reflects the spirit of a holistic approach, but also is more practical and effective, relative to the comprehensive interpretation.

WATER USE AND DEVELOPMENT *main*

Abstract

Balancing the needs of competing water users for access to the resource is a major challenge for all water managers. Historically, in Canada, access to the resource has been based on principles of first come, first served and on common-law riparian rights. Problems with these systems are well recognised and documented in literature. They include administrative issues related to adequacy of records, license

requirements and timeframes, and resource issues related to over-allocation and cumulative impacts. Balance can only be achieved where both the administrative and resource concerns are successfully resolved.

These administrative and resource issues will be reviewed using initiatives underway in three Canadian provinces (British Columbia, Alberta and Nova Scotia) as examples. The potential to examine these issues and to achieve balance through integrated approaches to management will then be considered.

Minimizing Environmental Impacts in Watersheds: Do it Now or Do it Later?

William C. Hart, Ph.D. TUNS, Halifax, Nova Scotia, Canada.

John K. Underwood, Ph.D. Nova Scotia Power Inc., Halifax, Nova Scotia, Canada.

It is an expectation of industry, government, and the general public that comprehensive Environmental Assessment will be required for new or significantly altered developments in Canadian watersheds. The objective is to predict potential environmental impacts of developments, and to adjust development strategies to minimize these impacts.

Existing developments which are entering decommissioning stages have similar regulatory constraints. The decommissioning process can, however, be much more complicated and much more costly.

Using several case studies, the authors will compare both approaches to providing protection for watersheds. They will outline steps and time frames associated with both of these environmental planning tools, and they will discuss some of the problems and benefits associated with them.

Quality Assurance and Due Diligence in Watershed Protection Programs: Using Environmental Management Systems to Strengthen Environmental Programs.

John K. Underwood, Ph.D. Nova Scotia Power Inc., Halifax, Nova Scotia, Canada.

William C. Hart, Ph.D. TUNS, Halifax, Nova Scotia, Canada.

Canadian governments are increasingly moving from "end of pipe" and "command and control" regulatory strategies to "emission control programs at source" via voluntary industrial programs for managing pollution problems of watersheds. This trend is advantageous for both government and industry as it not only reduces requirements for rigorous and costly inspections, but also provides industry with more flexibility to develop cost-effective environmental protection programs. In order to attain this measure of trust, it is necessary to implement strong Environmental Management Systems to demonstrate effective Due Diligence.

Quality Assurance programs and Environmental Audit are two of the tools that are described by the authors as they outline the importance of Environmental Management Systems in watershed protection programs. Standardization of the process is occurring through the International Organization for Standardization, and the authors conclude their paper with comments on developments in the ISO 14000 series of environmental management documents.

File:

INTEGRATED WATER MANAGEMENT

*Bruce Mitchell
Department of Geography
University of Waterloo
Waterloo, ON, Canada*

Abstract

In Canada, many water management agencies have designed their objectives programs and activities to achieve a “vision” of sustainable development through “mean” which include an ecosystem approach, partnerships and participatory approaches, and adaptive management. “Integrated water management” combines aspects of ends and means, and is being applied at both watershed and sub-watershed scales.

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A Combine Treatment for Selenium Elemination using Bacterium and Algae

Dr. Lieke Riadi

Abstract

about
Selenium oxyanions (selenate and selenite) are known as toxicants. This environmental problem is detrimental to public health and requires effective management at such sites. The ability of microorganisms to breakdown inorganic or organic contaminants led to an investigation of the feasibility of microbial processes to remediate or reduce toxic metals from contaminated area.

about
A process bioremediation of selenium oxyanions from a selenium contaminated area using indigenous microorganisms was studied. An organism (*S.putrefaciens*) and *Chlorella* sp. *10/10/10* (alga) have been isolated from a site contaminated with selenium. The algae and the bacterium have potential to take up selenate and reduce selenite respectively. *Chlorella* sp. were grown at room temperature for 24 h in light (55700 lx) whereas *S.putrefaciens* were grown in nutrient media at $T = 28^{\circ}\text{C}$, $\text{pH} = 7.2$ under oxygen limiting condition.

about
In this paper, the fundamental kinetic data of these organisms are presented and a novel bioremediation process for selenium was proposed. *d*

A Combine Treatment for Selenium Elemination using Bacterium and Algae

L.Riadi¹, J.P.Barford²

—————→ Dr. Lieke Riadi

¹)Department of Chemical Engineering, The University of Surabaya, Surabaya, Indonesia

²)Department of Chemical Engineering, The University of Sydney, NSW 2006, Australia

ABSTRACT

Selenium oxyanions (selenate and selenite) are known as toxicants. This environmental problem is detrimental to public health and requires effective management at such sites. The ability of microorganisms to breakdown inorganic or organic contaminants led to an investigation of the feasibility of microbial processes to remediate or reduce toxic metals from contaminated area.

A process bioremediation of selenium oxyanions from a selenium contaminated area using indigenous microorganisms was studied. An organism (*S.putrefaciens*) and *Chlorella sp.*(alga) have been isolated from a site contaminated with selenium. The algae and the bacterium have potntial to take up selenate and reduce selenite respectively. *Chlorella sp.* were grown at room temperature for 24 h in light (55700 lx) whereas *S.putrefaciens* were grown in nutrient media at $T = 28^{\circ}\text{C}$, $\text{pH} = 7.2$ under oxygen limiting condition.

In this paper, the fundamental kinetic data of these organisms are presented and a novel bioremediation process for selenium was proposed.

สำเนา

บันทึกข้อความ

มหาวิทยาลัยเทคโนโลยีสุรนารี

หน่วยงาน ศูนย์กิจการนานาชาติ

โทร 1155-6 1159

ที่ ทม. 5136/8๕๖

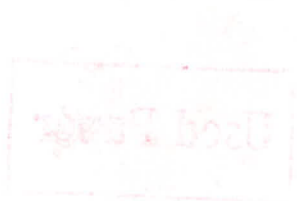
วันที่ 17 ธันวาคม 2539

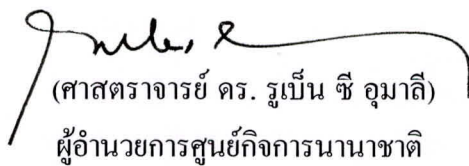
เรื่อง ขออนุมัติจัดพิมพ์หนังสือรวบรวมบทความจากการสัมมนาทางวิชาการเรื่อง “Advanced in Water Resources Management and Wastewater Treatment Technologies”

เรียน ท่านอธิการบดี ผ่านรองอธิการบดีฝ่ายวางแผน

ตามที่มหาวิทยาลัยเทคโนโลยีสุรนารี ได้จัดให้มีการสัมมนาวิชาการเรื่อง Advanced in Water Resources Management and Wastewater Treatment Technologies ขึ้นเมื่อวันที่ 22-25 กรกฎาคม 2539 ในโอกาสที่มหาวิทยาลัยฯ มีอายุครบ 6 ปีนี้ บัดนี้ศูนย์กิจการนานาชาติได้จัดเตรียมต้นฉบับสำหรับการจัดพิมพ์หนังสือรวบรวมบทความจากการสัมมนาวิชาการดังกล่าวเรียบร้อยแล้ว จึงใคร่ขออนุมัติจัดพิมพ์หนังสือดังกล่าว จำนวน 500 เล่ม ในวงเงิน 120,000 บาท (หนึ่งแสนสองหมื่นบาทถ้วน)

จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติด้วย จักขอบคุณยิ่ง




(ศาสตราจารย์ ดร. รุเบ็น ชี อุมาลี)
ผู้อำนวยการศูนย์กิจการนานาชาติ

ไบเสนราคา

เลขที่

บริษัท สมบูรณ์การพิมพ์ จำกัด

สำนักงานใหญ่ 313 ถนนสุรนารี ตำบลในเมือง อำเภอเมือง จังหวัดนครราชสีมา

โทร. (044) 243042, 253496, 259277 โทรสาร. (044) 254920

เลขประจำตัวผู้เสียภาษี

โรงงานสาขาที่ 1 254/1 ซอยมิตรภาพ 4 ตำบลในเมือง อำเภอเมือง จังหวัดนครราชสีมา

3 30 10090 6 2

โทร. (044) 261232

๑๕๐๓

วันที่ 22 พฤศจิกายน 2539

เรียน อธิการบดี มหาวิทยาลัยเทคโนโลยีสุรนารี

ทางบริษัท มีความยินดีขอเรียนเสนอราคามายังท่าน เพื่อพิจารณาดังมีรายละเอียดต่อไปนี้

[illegible]

(หนึ่งแสนสองหมื่นบาทถ้วน)

ชาตาสินค้า

112,149 | 53

จำนวนเงินรวมทั้งสิ้น (ตัวอักษร)

ภาษีมูลค่าเพิ่ม 7%

7.850	47
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กำหนดส่งมอบได้ภายใน 25 วัน (หลังจากได้รับต้นฉบับและใบสั่งซื้อ)

จำนวนเงินรวมทั้งสิ้น

120.000	-
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ราคานี้ยืนอยู่ได้ภายใน.....30.....วัน

ขอแสดงความนับถือ

จึงเรียนมาเพื่อโปรดทราบ ซึ่งทางบริษัทฯ หวังว่าคงจะได้รับการพิจารณาในเรื่องนี้จากท่าน และคงจะได้มีโอกาสรับใช้ท่านต่อไปตามสมควร จึงขอขอบพระคุณเป็นอย่างยิ่ง

(นางรัตนา บริษัทกุล)

ด่วนมาก

บันทึกข้อความ
มหาวิทยาลัยเทคโนโลยีสุรนารี

หน่วยงาน ศูนย์กิจการนานาชาติ โทร. 216191 ต่อ 1155,1156

ที่ ทม 5136/ 438

วันที่ 26 มิถุนายน 2539

เรื่อง ขออนุมัติจัดประชุมสัมมนาทางวิชาการนานาชาติ

เรียน อธิการบดี

ตามที่การสถาปนามหาวิทยาลัยเทคโนโลยีสุรนารีจะครบ 6 ปี ในวันที่ 27 กรกฎาคม 2539 และมหาวิทยาลัยเทคโนโลยีสุรนารี ได้กำหนดให้การประชุมสัมมนาทางวิชาการเป็นกิจกรรมเฉลิมฉลองโอกาสดังกล่าวกิจกรรมหนึ่ง ประกอบกับสภาวิชาการของมหาวิทยาลัย ได้ให้ความเห็นชอบให้กิจกรรมดังกล่าวนี้ประกอบด้วย การสัมมนาทางวิชาการนานาชาติ เรื่อง ความก้าวหน้าด้านการจัดการทรัพยากรน้ำและเทคโนโลยีการบำบัดน้ำเสีย (International Seminar Workshop on Advances in Water Resources Management and Wastewater Treatment Technologies) และ การประชุมนานาชาติ เรื่อง อุทยานวิทยาศาสตร์เพื่อตอบสนองความท้าทายทางเทคโนโลยีในศตวรรษที่ 21 (International Colloquium on Science Park for Meeting Technological Challenges of the Twenty-first Century) นั้น

โดยที่การประชุมสัมมนาทางวิชาการนานาชาติดังกล่าวนี้จะเป็นประโยชน์อย่างยิ่งต่อบุคลากรของหน่วยงานและองค์กรที่เกี่ยวข้องต่าง ๆ ทั้งในภาครัฐและภาคเอกชน จากการได้มีโอกาสแลกเปลี่ยนความรู้ ความคิดเห็น และประสบการณ์กับผู้เชี่ยวชาญในแต่ละเรื่องจากทั่วโลก กระผม ในฐานะที่ได้รับมอบหมายให้กำกับดูแลกิจกรรมดังกล่าวนี้ จึงขออนุมัติดังต่อไปนี้

1. จัดสัมมนาทางวิชาการนานาชาติ เรื่อง ความก้าวหน้าด้านการจัดการทรัพยากรน้ำและเทคโนโลยีการบำบัดน้ำเสีย (International Seminar Workshop on Advances in Water Resources Management and Wastewater Treatment Technologies) ในวันที่ 22-25 กรกฎาคม 2539 ณ สุรสัมมนาการ มหาวิทยาลัยเทคโนโลยีสุรนารี อำเภอเมือง จังหวัดนครราชสีมา โดยมีรายละเอียดพื้นฐานตามเอกสารที่แนบ 1



บันทึกข้อความ
มหาวิทยาลัยเทคโนโลยีสุรนารี

Translation

ส่วนราชการ.....

ที่.....

วันที่ 14 Dec 96

เรื่อง Request approval to publish the proceeding of the Intl.
Seminar on Advanced in Water Resources Management and
Wastewater Treatment Technologies"

Attn: Rector through VP. for Planning

Please refer to the Intl. Seminar on "Advanced in water
" held on 22-25 July 96. At present the
manuscript for proceeding publication is ready.

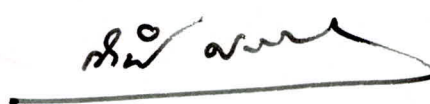
CIA, therefore, request for your approval to publish
500 copies of proceeding in the amount of 120,000 Baht

For your consideration.

2. จัดประชุมนานาชาติ เรื่อง อุทยานวิทยาศาสตร์เพื่อตอบสนองความท้าทายทางเทคโนโลยีในศตวรรษที่ 21 (Science Park for Meeting Technological Challenges of the Twenty-First Century) ในวันที่ 26-27 กรกฎาคม 2539 ณ สหรัชมณณการ มหาวทยาลัทยเทคโนโลยีสุรนารล อําเภอมลลอง จัังหวดันครราชสลมา โดยมลลรายลละเลลยคพ้ันฐานตามเอกสารที่แนบ 2

3. ล้ให้ข้าราชการ ลูกจ้าง และพนักงงานรัฐวlsaหกลจ เข้าร่วมการสัมนนาตามข้อ 1 และหรลือการประชุมาตามข้อ 2 ได้ โดยล้ถือเป้นวันลาและเบลกค่าล้จ่ายที่จําเป้นในการเข้าร่วมกิจกรรมดั่งกล่าวได้ตามสลทรล หลังจากได้รลอบนุ้ฒลจากต้นสัangkัดตามระเบลยบสํานักนายกรัฐมนตรลว่าด้วยการอนุ้ฒลให้เดันทางไปราชการและการจัคประชุมของทางราชการ พ.ศ. 2534

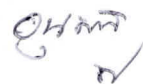
จล้งเรลยนมาเพื่อโปรคพลการณานุ้ฒล


(รองศาสตราจารย์ ดร. สําง สรรลนลทา)
รองอธการบดีฝ่ายวlsaการ

ศูนย์ถลการณานานาชาติ

โทรศัพทล (044) 216191-8 ตอ 1155,1156

โทรสาร (044) 216122



26 ส.ย. 2539

INTERNATIONAL SEMINAR WORKSHOP ON "ADVANCES IN WATER RESOURCES MANAGEMENT AND WASTEWATER TREATMENT TECHNOLOGIES"

RATIONAL AND OBJECTIVES

In pursuance of the mission of Suranaree University of Technology (SUT) of providing academic service to the public and various units, both government and private, the Center for International Affairs (CIA) is launching its International Life Long Education Program (ILLEP). Its aim is to provide continuing education opportunities to the general public but specially the engineers, scientists, entrepreneurs, and managers through short-term courses, seminars, conference, workshops, study tours and other forms of educational activities

With the collaboration of the Canadian University of Technology Consortium (CUTC) and partial financial assistance of the Canadian International Development Agency (CIDA), SUT is organizing its first ILLEP seminar workshop on "Advances in Water Resources Management and Wastewater Treatment Technologies".

Freshwater, either as surface or ground water, is a vital renewable community resource that is limited in amount and is subject to conflicting and ever increasing demand. An equitable distribution for domestic, industrial, agricultural, municipal and recreational uses is not always easy to attain

Proper water resources management which involves both quality and quantity assurance is a complex and enormous task requiring integrated activities of many sectors of the community and various government agencies. It involves different activities from provision of high quality potable water supply for domestic consumption to management of dams and reservoirs for agricultural and energy generation purposes, control of canals and drainage systems to prevent floods and conserve rain water, protection of ground water from salt water intrusion and seepage of wastes to even forest conservation.

Although there are usually local, national and regional water authorities, the integrated water resource management is a concern of many institutions and agencies. Data must be collected and analysed, researches undertaken, policies formulated, resources managed and wastewater treated. All these activities and many more would require corresponding trained manpower, a management information system and efficiently functioning organizational structure

Equally important is the issue of wastewater management. Sewage and industrial waste effluents must not pollute the aquatic ecosystems which are usually used as discharge points of these wastes. Technologies must be developed and applied so that polluting properties of wastewater could be minimized if not completely removed. It is through these recovery and treatment processes that sufficient quantity and good quality water can be assured.

The present seminar workshop which would also coincide with the celebration of the Sixth Founding Anniversary of Suranaree University of Technology, would provide a forum for the academe, industry, the government agencies and the general public

- to present the Canadian experience in comprehensive and integrated watershed management techniques including Canadian methods of environmental impact assessment used in water-related developments as well as industrial environmental auditing techniques;
- to survey and analyse the status, issues, strategies and policies concerning uses and management of water resources in the northeast and eastern seaboard regions of Thailand specially the role of industry and estate development companies;
- to present advances in wastewater treatment technologies and identify wastewater management options as well as policies applicable to the region, country and Southeast Asia;
- to foster close cooperation between various national and international sectors concerned with sustainable water resources development and wastewater management

MAJOR TOPICS

- Integrated Water Resources Management
- Environmental Impact Assessment used in Water Related Developments
including Industrial environmental auditing techniques
- Urban Development : Impact on Water and Wastewater Treatment Needs
- Advances in Wastewater Treatment Technologies
- Water Use / Development Policies & Regulations
- Aquatic Ecosystems Management, including Impact of Industry

TENTATIVE PROGRAM

The tentative program would include :

21- Arrival and Registration

22- July - Monday - Opening Ceremony

a.m. - Presentation of Keynote paper :

p.m. - Plenary Session

- Presentation of major Papers

23- July - Tuesday - Concurrent Round Table Discussions and WORKSHOPS

24- July - Wednesday - Field Trip

25- July - a.m. - Presentation of Results of Round Table Discussions

- Conclusions and Resolutions/Closing Ceremony

p.m. - Post Conference Cultural Trips and Discussions

BUDGET

Arrival & Registration 21 July	Dinner	200.00
Seminar 22, 23, 24 July	breakfast	150.00
	snacks	100.00
	lunch	200.00
	dinner	250.00
Total		700.00
25 July check out	breakfast	150.00
	snack	50.00
	lunch	200.00
Total		400.00
Total : 4 night at Surasammanakarn = 4 x 800		3,200.00
	All meals	1,300.00
	Miscellaneous	500.00
Total		5,000.00
Participation Fee		U\$ 200.00

Suggested Registration Fee : US\$ 250*

* Cost may be reduced by US\$ 50 if participant is willing to share a room with another participant

TARGET PARTICIPANTS

ACADEMIC

Deans and staff of

- Faculty of Engineering
(Schools of Civil & Environmental Engineering)
- Faculty of Science
(Schools of Environmental Science, Biology Ecology, Geology,
Geography)
- Faculty of Technology
(Schools of Geotechnology)
- Faculty of Public Health

INDUSTRIES: National & International Industries

- Urban Development Agencies
- Waste Water Industries
- Water-related Industries

GOVERNMENT AGENCIES

- Water Authorities - local, provincial, national
- Irrigation Department
- Industrial Estates
- EGAT
- Ministry of Science, Technology and Environment
- Office of Environment Policy and Planning
- Ministry of Agriculture (Department of Fisheries)
- Environmental Centers

EMBASSIES & INTERNATIONAL ORGANIZATIONS :

- MRC, APEC, UNDP ILO, UNEP, ESCAP, UNESCO, SEAMEO,
ASEAN

CALL FOR PAPERS AND POSTERS

During the seminar / workshop one day will be devoted to six concurrent Round

Table Discussions in the following topics :

- Integrated Water Resources Management
- Environmental Impact Assessment Used in Water Related Development
including Industrial Environment Auditing Techniques
- Urban Development : Impact on Water and Wastewater Treatment Needs
- Advances in Wastewater Treatment Technologies
- Water Use / Development Policies and Regulations
- Aquatic Ecosystems Management, including Impact of Industry

Invitations are being called for short (15 minutes) paper presentation. Deadline for submission of title is on 15 APRIL and abstract of accepted paper / poster on 1 JUNE.

Text of a complete paper / poster (or diskette) must be submitted on or before 28 JUNE 1996

PRE - REGISTRATION FORM

Title.....Name.....

.Agency : Name.....

Address.....

Fax:.....Tel.....Email.....

Please check and fill the blanks.

I will ☐ / will not ☐ present a paper or poster

I am willing ☐ / not willing ☐ to share Hotel Room

I will arrive in Korat on.....(date) at.....(time)

by ☐ Plane ☐ Bus ☐ Train ☐ Private Car

I will ☐ / will not ☐ stay on for the Colloquium

SCIENCE PARK FOR MEETING TECHNOLOGICAL CHALLENGES OF THE 21ST CENTURY

WORLDTECH'95 Thailand has provided a showcase for the latest international advances in agriculture, industrial technologies and environmental management. It gave a glimpse of present developments and future technologies that could be available for food security, sustainable economic progress through industrial technologies that maintained ecological balance and thus assuring better quality of life, equitable economy and living in harmony with nature.

However, these will not happen without concerted and sustained efforts in Research and Development by universities, industries, business enterprises and government agencies as well as informed and concerned general public. In answer to these challenges for technological needs of the next century and with the spirit of Worldtech'95 as guide, Suranaree University of Technology is converting some of the buildings and facilities of Worldtech'95 into TECHNOPOLIS, a Science Park for technology innovation and fine-tuning, technology transfer and exhibition.

Suranaree University of Technology has therefore chosen as the theme of an international colloquium to mark its 6th Founding Anniversary on 26-27 July 1996, TECHNOPOLIS: SUT SCIENCE PARK FOR MEETING TECHNOLOGICAL CHALLENGES OF THE 21ST CENTURY."

The Colloquium aims to provide a forum for representatives of universities, industries, business enterprises and relevant government agencies to :

1. present comparative paradigms and experiences from America, Europe and Asia on Science Park operation and management.;
2. discuss the various strategies and activities for better cooperation in technology innovation, fine-tuning, and dissemination;
3. provide an opportunity for SUT to dialogue with representatives of industries in the northeast and eastern seaboard regions to determine areas of collaboration in the operation of Technopolis; and
4. develop a framework for the strategic and operational management of TECHNOPOLIS.

TENTATIVE PROGRAM

Keynote Address: Paradigms of Technology Transfer-by President of TUNS

Panel Discussion on Paradigms of Science Park Operation and Management by

representatives from:

France

USA

Australia

Japan

Round Table Discussions

For International Participants: Strategies for Industry-University Cooperation

For SUT and Thai Participants: Areas of concern or technological needs for the 21st century in Thailand specially the northeast and eastern seaboard regions; role of TECHNOPOLIS

Closing Paper : Paradigm for SUT TECHNOPOLIS Operation and Management

Expected Participants

University Administrators from Thailand and the SEA regions specially those responsible for Research and Development.

Deans of Colleges of Engineering in Thailand and SEA countries

Representatives of Foreign Industries in Thailand

Representatives of Thai Industries specially those from the northeast and eastern seaboard regions

Representatives of the Ministry of Science and Ministry of Trade and Investment of Thailand and the neighboring SEA countries

Members of AUAP

Representatives of Embassies, International Organizations like UNESCO-UNISPAR, ILO, ESCAP, SEAMEO, ASEAN, APEC etc. in Thailand

SUT Faculty and Administrators

Participation Fee: \$200 or 5,000 ฿ (Including Registration fee, all meals and two nights stay at Surasammanakarn.

TENTATIVE PROGRAM

Colloquium		
Thur. Arrival 25 July check in at Surasammanakarn.	Supper - single buffet.	200.00
Fri. 26	26 July Colloquium	
	Breakfast	150.00
	Snacks	100.00
	Lunch	250.00
	Gala Dinner	350.00

Stay at Surasammanakarn

Sat. 27	Departure and participate in Anniversary by invitation.	
	Buffet	150.00
	Two nights at Surasammanakarn 800 x 2	1,600.00
	Meals	1,200.00
	Miscellaneous	500.00
	Total	3,800.00

TARGET PARTICIPANTS

ACADEMIC

1. Universities administrators especially in charged of Development Projects and Research

2. Deans and staff of

Faculty of Engineering

Faculty of Applied Science

Faculty of Business Management

3. AUAP Members

INDUSTRIES

1. National and International Industries - those in charge of Research and Development (R&D) and

2. Commercial Organizations / Chamber of Commerce

3. Private Enterprises / Entrepreneur

GOVERNMENT AGENCIES

1. Ministry of Commerce

2. Ministry of Industry

3. Ministry of Science, Technology and Environment

4. Ministry of University Affairs

5. Industrial Estates

EMBASSIES AND INTERNATIONAL ORGANIZATIONS

1. ILO, ESCAP, APEC, ASEAN

2. Science and Commercial Attaches

บันทึกข้อความ

มหาวิทยาลัยเทคโนโลยีสุรนารี

หน่วยงาน ศูนย์กิจการนานาชาติ

โทร. 1155, 1156

ที่ ทม.5136/ ๔๕๖

วันที่ 1๖ กรกฎาคม 2539

เรื่อง ขออนุมัติในหลักการเงินค่าใช้จ่ายในการจัดประชุมสัมมนาทางวิชาการในการฉลองวันสถาปนามหาวิทยาลัย

เรียน อธิการบดี

ตามที่มหาวิทยาลัยได้อนุมัติให้จัดประชุมสัมมนาทางวิชาการเรื่อง ความก้าวหน้าด้านการจัดการทรัพยากรน้ำและเทคโนโลยีการบำบัดน้ำเสีย (International Seminar Workshop on Advances in Water Resources management and Wastewater Treatment Technologies ในวันที่ 22-25 ก.ค.และเรื่อง อุทยานวิทยาศาสตร์เพื่อตอบสนองความท้าทายทางเทคโนโลยีในศตวรรษที่ 21 (Science Park for Meeting Technological Challenges of the Twenty First Century) ในวันที่ 26-27 ก.ค. ณ สุรสัมมนาการ มทส. เพื่อเป็นกิจกรรมเฉลิมฉลองในโอกาสครบรอบการสถาปนามทส. 6 ปี (ในวันที่ 27 ก.ค. 39)

ในการจัดสัมมนาวិทยาการและประชุมนานาชาติดังกล่าว คาดว่าจะมีรายรับและรายจ่ายในการดำเนินงาน ดังนี้

รายรับ

ค่าลงทะเบียน

จากผู้เข้าร่วมสัมมนา ทั้ง 2 เรื่อง (ประมาณ 70 คน) 380,000 บาท

รายจ่าย

- ค่าของขวัญสำหรับวิทยากร 11,000 บาท
- ค่าที่พักสำหรับวิทยากรต่างประเทศในกรุงเทพฯ 35,000 บาท
- ค่าเดินทาง กท.- นม. - กท. สำหรับวิทยากร 19 คน (รวมภาษีสนามบิน)
 $(19คน \times 1,110บาท) + (19คน \times 60บาท) = 22,230$ บาท
- ค่าที่พักสำหรับวิทยากร 19 คน x 6 วัน ในสุรสัมมนาการ
 $(19คน \times 6วัน \times 800บาท) = 91,200$ บาท
- ค่าที่พักแกร็บเชิญ 7 คน x 1 วัน
 $(7คน \times 800บาท) = 5,600$ บาท

6. ค่าที่พักแกรับเชิญคนไทย 2 คน x 6 วัน		
	(2คนx800บาทx6วัน)	= 9,600 บาท
7. ค่าอาหาร		263,250 บาท
8. ค่าวัสดุ ครุภัณฑ์		20,000 บาท
9. ค่าสถานที่สุรสมมนาการ (7,000บาทx5วัน)		35,000 บาท
10. ค่าเช่ารถ + ค่าน้ำมันรถ		57,000 บาท
11. ค่าปฏิบัติงานนอกเวลา		15,000 บาท
12. รายจ่ายอื่น ๆ		20,000 บาท
รวม		584,880 บาท

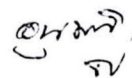
อนึ่ง เนื่องจากงบประมาณค่าใช้จ่ายสูงกว่าได้รับ จึงจำเป็นต้องได้รับการสนับสนุนจากมหาวิทยาลัย

จึงเรียนมาเพื่อโปรดอนุมัติในหลักการให้ใช้เงินค่าใช้จ่ายในการจัดประชุมสัมมนาทางวิชาการและ
ประชุมนานาชาติ ดังกล่าวภายในวงเงิน 584,880 บาท จะขอขอบคุณยิ่ง



(รองศาสตราจารย์ ดร. ลำอาง ศรีนิลทา)

รองอธิการบดีฝ่ายวิชาการ



17 ก.ค. 2539

สำนักงาน,

Sheet1

INTERNATIONAL SEMINARON
ADVANCES WATER RESOURCES MANAGEMENT
AND WASTEWATER TREATMENT TECHNOLOGIES

22-26 JULY 1996

AT SURASAMMANAKHAN

วันที่	มื้อ	ราคา/ท่าน	จำนวนคน/ครั้ง	จำนวนเงิน(บาท)	หมายเหตุ
21	อาหารเย็น	200	50X1	10,000	
22	อาหารเช้า	150	100X1	15,000	
	อาหารว่าง	50	100x2	10,000	
	อาหารกลางวัน	170	100x1	17,000	
	อาหารเย็น	200	100x1	20,000	
23	อาหารเช้า	150	100X1	15,000	
	อาหารว่าง	50	100x2	10,000	
	อาหารกลางวัน	170	100x1	17,000	
	อาหารเย็น	200	100x1	20,000	
24	อาหารเช้า	150	100X1	15,000	นอกสถานที่
	อาหารว่าง	50	100x2	10,000	นอกสถานที่
	อาหารกลางวัน	—	—	—	ไม่มี
	อาหารเย็น	200	100x1	20,000	
25	อาหารเช้า	150	100X1	15,000	
	อาหารว่าง	50	100x2	10,000	
	อาหารกลางวัน	170	100x1	17,000	
	อาหารเย็น	200	50x1	10,000	
26	อาหารเช้า	150	50x1	7,500	
	อาหารว่าง	50	50x1	2,500	
	อาหารกลางวัน	170	50x1	8,500	
	อาหารเย็น	—	—	—	ไม่มี
27	อาหารเช้า	150	25x1	3,750	
รวมเป็นเงิน				253,250	

หอประชุม วันที่ 24 กค: อาหารกลางวัน = 10,000 บาท
 สำหรับประมาณ 100 คน

Fax 216-122

อ. มิ่งพันธ์ ใจ
 11/7/39



บันทึกข้อความ
มหาวิทยาลัยเทคโนโลยีสุรนารี

หน่วยงาน.....

ที่..... วันที่.....

เรื่อง.....

ขอขออนุมัติ/ทรัพยากรทำ - มีบัดทำไป
21-26 ต.ค. 39. = 6 วัน.

ขอ. ทรัพยากรรวมรวมทำ.

1

ค่าเช่ารถ 3 คัน $1500 \times 3 \times 6 = 27,000.-$

ค่าเช่ารถใช้เพื่อ 3 คัน $500 \times 3 \times 6 = 9,000.-$

ค่าเช่ารถ 3 คัน $7000 \times 3 = 21,000.-$
(18 ต.ค. 39. 24 ต.ค. 39. 30 ต.ค. 39.)
(7.30 - 20.00 น.)

= 57,000.-

เขียน TO: *ผู้อำนวยการบริหาร*

จาก From: *นางสาว อรุณ/ท.*
แผนกงานบุคคล

- | | |
|--|--|
| ☐ Kindly be informed เพื่อโปรดทราบ | ☐ Please contact me โปรดติดต่อข้าพเจ้า |
| ☐ For your comments เพื่อขอความคิดเห็นของท่าน | ☐ Please forward โปรดส่งต่อ |
| ☐ For your approval เพื่อพิจารณาอนุมัติ | ☐ Please reply โปรดตอบ |
| ☐ For your signature เพื่อลงนาม | ☐ Please follow up โปรดติดตาม |
| ☐ Please handle โปรดดำเนินการ | ☐ As you requested ตามที่ท่านต้องการ |
| ☐ Please return โปรดส่งคืน | ☐ Return with thanks ส่งคืน ขอบคุณ |
| ☐ Please inform us of results โปรดแจ้งผลให้ทราบ | ☐ For Circulation เพื่อให้เวียนในหน่วยงาน |
| ☐ Please attend เพื่อโปรดเข้าร่วม | ☐ Please confirm โปรดยืนยัน |
| ☐ For dissemination เพื่อเผยแพร่ | |

Remarks:

หมายเหตุ

ขอเรียนเรื่อง: สืบค้นข้อมูล, เรื่อง นร. 15
ตามที่ได้อธิบายไว้ (วันที่ 15 ก.ค. 35)
ขอเรียน:

บันทึกข้อความ

มหาวิทยาลัยเทคโนโลยีสุรนารี

หน่วยงาน คณะกรรมการดำเนินงานจัดสัมมนาทางวิชาการ

ที่ ทม. 5145/4

วันที่ 15 กรกฎาคม พ.ศ. 2539

เรื่อง ขอใช้สถานที่ในการจัดสัมมนาทางวิชาการ

เรียน รองอธิการบดีฝ่ายพัฒนา

มหาวิทยาลัยเทคโนโลยีสุรนารีได้อนุมัติให้จัดกิจกรรมทางวิชาการเพื่อเป็นการเฉลิมฉลองการสถาปนามหาวิทยาลัยครบ 6 ปี ระหว่างวันที่ 22-26 กรกฎาคม 2539 โดยกิจกรรมดังกล่าวประกอบด้วย การสัมมนาทางวิชาการนานาชาติเรื่องความก้าวหน้าด้านการจัดการทรัพยากรน้ำและเทคโนโลยีการบำบัดน้ำเสีย (International Seminar Workshop on Advances in Water Resources Management and Wastewater Treatment Technologies) และการประชุมนานาชาติเรื่อง อุทยานวิทยาศาสตร์ เพื่อตอบสนองความท้าทายทางเทคโนโลยีในศตวรรษที่ 21 (International Colloquium on Science Park for Meeting Technological Challenges of the 21st Century)

ดังรายละเอียดปรากฏตามเอกสารแนบ

ในการนี้ ศูนย์กิจกรรมนานาชาติใคร่ขอความร่วมมือผู้ร่วมสัมมนาในการดำเนินการ ดังนี้

1. จัดห้องพักประมาณ 80 ห้อง โดยขอให้จัดเตรียมห้องพักตั้งแต่วันที่ 21 กรกฎาคม 2539
2. ห้องสัมมนาพร้อมโสตทัศนูปกรณ์ (เครื่องพร้อมจอฉายสไลด์และเครื่องฉายแผ่นใส ฯลฯ)

สำหรับผู้เข้าร่วมสัมมนาประมาณ 100 คน ในการสัมมนาเรื่องความก้าวหน้าด้านการจัดการทรัพยากรน้ำ ระหว่างวันที่ 22-25 กรกฎาคม 2539

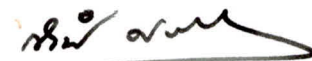
3. ห้องสัมมนาพร้อมโสตทัศนูปกรณ์ (เช่นเดียวกับข้อ 2) สำหรับผู้เข้าร่วมสัมมนาประมาณ 50 คน ในการการสัมมนาเรื่องอุทยานวิทยาศาสตร์ ระหว่างวันที่ 25-26 กรกฎาคม 2539

4. ห้องทำงานของคณะเลขานุการ

5. อื่นๆที่จำเป็น

ทั้งนี้ ขอให้ผู้ร่วมสัมมนาเรียกเก็บค่าใช้จ่ายในการสัมมนาทั้งสองเรื่องจากมหาวิทยาลัย

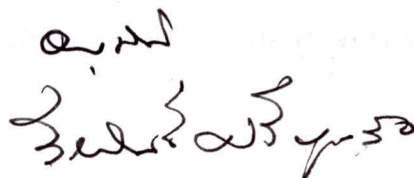
จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติการขอใช้สถานที่ของผู้ร่วมสัมมนาดังกล่าว จะขอบคุณยิ่ง



(รองศาสตราจารย์ ดร. สำอาง ศรีนิลทา)

รองอธิการบดีฝ่ายวิชาการ

ประธานกรรมการดำเนินงานฯ



15 ก.ค. 39

21 ก.ค. 12 ก.ค.