



# REDAC

**RIVER ENGINEERING AND URBAN DRAINAGE RESEARCH CENTRE  
UNIVERSITI SAINS MALAYSIA (USM)**

**BULLETIN**

**VOLUME 1- 2002 NO.1 JAN-JUNE**

## **Introduction to River Engineering and Urban Drainage Centre (REDAC)**

A virtual research unit known as River Engineering and Urban Drainage Unit (UKSSB) led by Dr. Nor Azazi Zakaria and Dr. Aminuddin Ab. Ghani has been active in research and consultancy works in River Basin Management (RBM) in particular urban flooding. UKSSB has received several grants from the Department of Irrigation and Drainage (DID) Malaysia and Seberang Perai Municipal Council, Penang towards resolving Urban Drainage and River Engineering related problems since 1997.

With the expected launching of a new urban drainage manual (Urban Stormwater Management Manual for Malaysia or MSMA) effective by 1st January 2001, DID Malaysia has approached Universiti Sains Malaysia (USM) in March 1999 to consider its new engineering campus at Transkrian as the pilot project in implementing a Bio-Ecological Drainage System (BIOECODS), one of alternatives listed in MSMA to create an environmentally friendly urban developments. UKSSB has since been awarded a new research grant (RM 2, 900, 000) to study the effectiveness of using BIOECODS under a close cooperation with Stormwater Unit, River Engineering Section of DID.

UKSSB is also active in postgraduate research funded by IRPA Long-Term Grants and scholarships from government agencies. The students come from different backgrounds including engineers, lecturers and consultants.

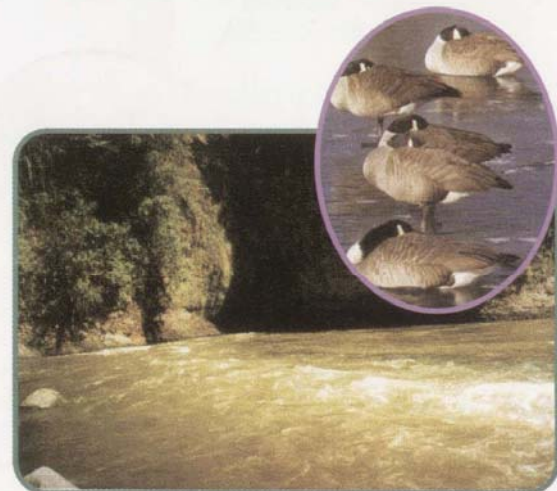
Due to its active role in research and consultancy, The University felt that UKSSB should be operating as a Research Centre leading to Centre of Excellence, the first in Engineering Campus. The University Senate formed a Study Committee in their 145<sup>th</sup> meeting on 22<sup>nd</sup> April 2000 under Clause 22[b], Constitution of USM to consider the proposal to form River Engineering and Urban Drainage Research Centre (REDAC). The committee met on June 9, 2000 and was chaired by Y.Bhg. Dato' Prof. Jamjan Rajikan representing Y.Bhg. Dato' Prof. Vice Chancellor. The committee agreed and fully supported the establishment of REDAC to fulfill the need of the present and future research in River Engineering and Urban Drainage.

In the 146<sup>th</sup> Senate Meeting on June 22, 2000, the resolution to form REDAC was presented and agreed. The University Board of Directors (LPU)'s meeting on July 26, 2000 affirmed the establishment of REDAC. Subsequently a report on the proposal to form REDAC was forwarded to the Department of Higher Education, Ministry of Education for evaluation. On April 17, 2001, the Ministry of Education confirmed the resolution by the Higher Education Committee dated May 13, 2001 for the establishment of REDAC commencing on 2001/2002 Academic Year. Consequently Dr. Nor Azazi Zakaria and Dr. Aminuddin Ab. Ghani were appointed as the Director and Deputy Director of REDAC respectively.



## **Contents**

- Foreword .....2
- Organization Chart.....3
- R&D Objectives.....4
- R&D Scopes.....4
- On-going R&D Projects.....4
- Completed R&D Projects.....5
- BIOECODS.....6
- Awards.....7
- Latest Publications.....9
- MSMA Seminar .....11
- Dialogue.....11
- Colloquium.....12
- Exhibition.....12
- Briefing Invitation.....13
- Postgraduate Research.....13
- Conference.....15
- REDAC Album.....17







By Dr Nor Azazi Zakaria, Director of REDAC

The first issue of this bulletin aims to introduce **REDAC**, the first research centre in Engineering Campus, Universiti Sains Malaysia (USM) commencing on 1<sup>st</sup> May 2001. In line with USM's motto "Global Competitiveness: Our Commitment", REDAC has been very actively involved in research on River Engineering and Urban Drainage at national and international levels. Our "Bio-Ecological Drainage System" or "BIOECODS" implemented at the USM's Engineering Campus, Nibong Tebal, Pulau Pinang represents our creativity in solving flash flood problems in urban areas. The project has been recently accorded as a "World Class Research Programme" by the Advisory Committee to the USM's Vice Chancellor. The project has invited interests from both local and international researchers and has won three national awards including the latest "USM's Sanggar Sanjung Gold Award 2001".

Grants from The Ministry of Science, Technology and Environment (MOSTE), Department of Irrigation and Drainage (DID) and private consultants support research at REDAC. The research programmes at REDAC are conducted by contract Research Officers and postgraduate students. REDAC is planning to have several permanent post-doctoral Research Officers in future to support its research programmes. Besides research and consultancy, REDAC also conducts Seminars and Conferences on issues relevant to River Engineering and Urban Drainage. Past events include the Urban Stormwater Management Manual National Dialogue, R & D Colloquium on River Engineering and Urban Drainage, and 9<sup>th</sup> MANCID Annual Conference. All the activities are conducted solely with the aim to provide an avenue for integrated and multi-disciplinary studies leading towards solving problems related to River Engineering and Urban Drainage. REDAC aims to become a one-stop reference centre for the professionals and individuals involved in aspects of River Engineering and Urban Drainage to exchange views and experiences not only in Malaysia but also for the South East Asia region.

Current achievements by REDAC clearly shows that it has succeeded in its efforts to promote a mechanism for mobilizing and integrating the University's considerable expertise and resources in River Engineering and Urban Drainage (which are currently spread over a number of engineering, applied science and non-science teaching schools). Research efforts require a concerted and continuous involvement that is difficult to maintain within a normal teaching faculty or school. REDAC differs from the above since all activities are planned and implemented with the highest priority given to R & D activities.

As a concluding note, I would like to state that full support by the REDAC staffs have made this publication possible. I would also like to take this opportunity to thank all the staff for their concerted effort in making the establishment of REDAC a reality. Finally, I would also welcome any ideas and comments that can enhance the research and development programmes in REDAC.

Dr. Nor Azazi Zakaria

## EDITORIAL

**Advisor:**

Dr. Nor Azazi Zakaria

**Editor-in-Chief:**

Dr. Aminuddin Ab. Ghani

**Members**

Dr. Rozi Abdullah  
Pn. Lariyah Mohd. Sidek  
Shanker Kumar a/l Sinnakaudan  
Lau Tze Liang  
Stephen Tan Boon Kean  
Mohd Fazly Yusof  
Paker Mohamad  
Mohd Fauzi Ahmad Shah  
Azura Jaapar

**Graphic:**

Saidah Abdul Rahman

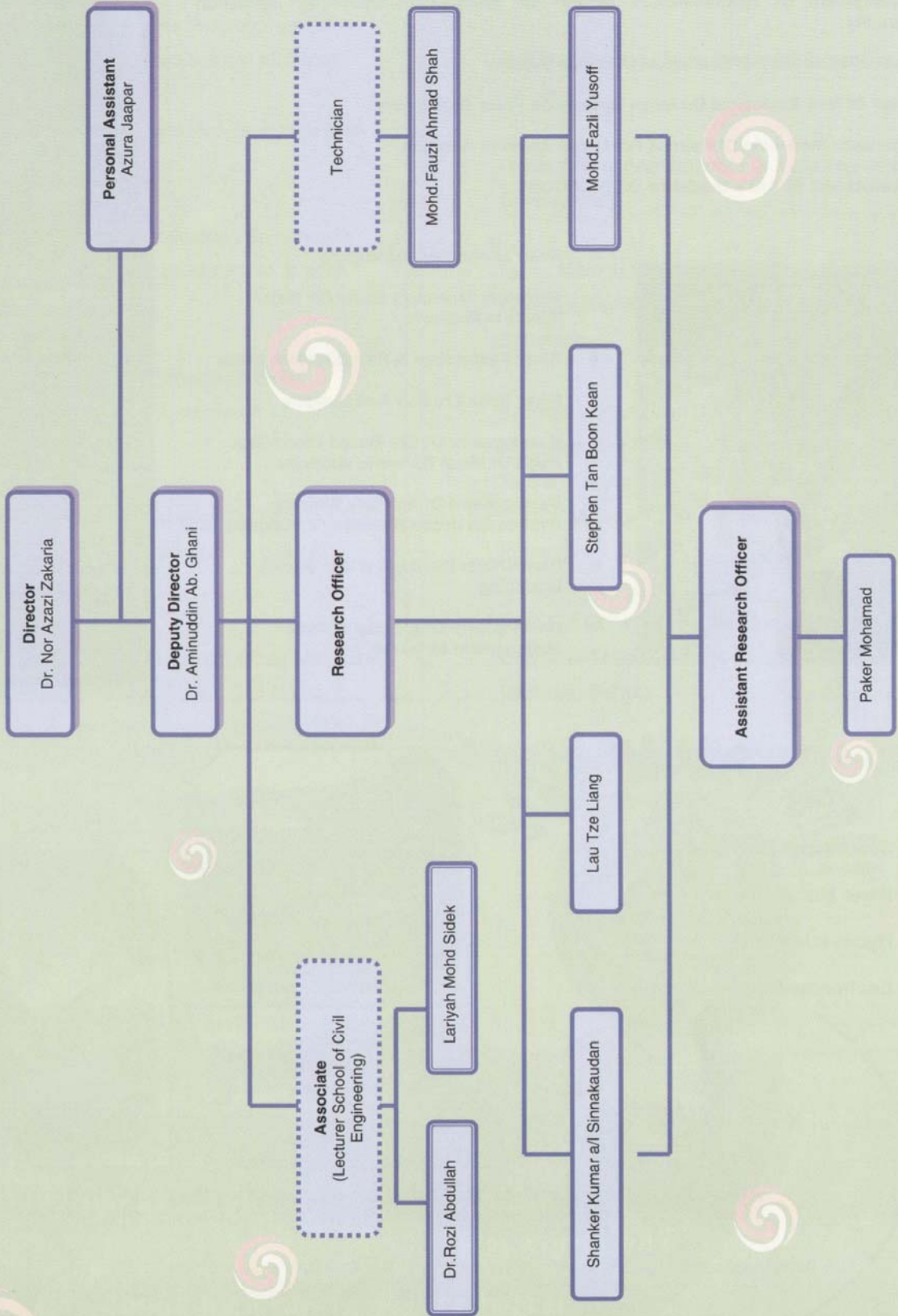
**Editor:**

Siti Sara Ibrahim

River Engineering and Urban Drainage Research Centre (REDAC), Engineering Campus, Universiti Sains Malaysia  
14300 Nibong Tebal, Pulau Pinang, MALAYSIA Tel: +604-5941035 Fax: +604-5941036 H/P: 012-5001405  
e-mail : redac01@eng.usm.my, redac02@eng.usm.my



# ORGANIZATION CHART





## ON-GOING R & D PROJECTS

- ↻ Application of Bio-Ecological Drainage System (BIOECODS) in Malaysia
- ↻ River Sediment Data Collection and Analysis Study
- ↻ Experimental Work for Atlantis Ecological Drainage Component
- ↻ Development Of Rainfall-Runoff Model For Malaysia Incorporating Infiltration Capacity
- ↻ Hydraulic Capacity Of Ecological Drainage System
- ↻ Effect Of New Ecological Drainage System On River Equilibrium
- ↻ Stochastic Modelling Of Rainfall For Urban Areas In Malaysia
- ↻ Development Of CAI's Guideline On BIOECODS



- ↻ River Morphology Modelling
- ↻ Sediment Transport Study On Major Rivers In Malaysia
- ↻ River Restoration & Rehabilitation Study
- ↻ River Bank Erosion And Stability
- ↻ Development Of GIS-Based Flood Risk Maps Of Major Rivers In Malaysia
- ↻ Development Of An Early Warning System On Urban Waterway's Pollution
- ↻ River/Urban Drainage Water Quality Modelling
- ↻ Development Of A Holistic River Management Software

## R & D OBJECTIVES

To accelerate the realization of urban drainage metamorphosis in order to transform the quality of life in urban areas.

To make a holistic research and to develop new technology in River Engineering and Urban Drainage.

To become a Centre of Excellence in River Engineering and Urban Drainage for engineers and scientists from Malaysia and South East Asia region

To promote research network and international cooperation in River Engineering and Urban Drainage Research

## R&D SCOPES

- ↻ Stormwater Management
- ↻ River Management
- ↻ Hydro Informatic
- ↻ Environmental Management Plan



"The future is not completely beyond our control  
It is the work of our own hands"

Robert F. Kennedy



## COMPLETED R & D PROJECTS

- Stochastic Modelling of Daily Streamflow under Environmental /Climatic Change
- The Development of HEC-Series Programmes to Predict Sediment Movement for Rivers in Malaysia
- Stormwater Management Master Plan Study For Ipoh City
- Peak Flow Attenuation Using Infiltration Engineering Systems and Storage Tank At USM's Perak Branch Campus
- Pump Modelling for Proposed Design of Flood Mitigation and Construction of Pam House at Taman Chai Leng, Perai
- Feasibility Study and Detailed Design Of Flood Mitigation And Drainage Improvement in Valdor, Penang
- Feasibility Study and Detail Design Of Flood Mitigation And Drainage Improvement in Taman Seri Rambai, Taman Makok & Taman Desa Damai, Seberang Perai Tengah, Penang
- Feasibility Study and Detail Design of Flood Mitigation and Drainage Improvement in Chain Ferry, Seberang Perai, Penang
- Soil Stabilization Using Reversed Auger Dry Grouting
- Geotechnical Assessment For Kinta Highlands Development
- Pump Modeling for Proposed Design and Construction of Pump House at Bagan Terap, Selangor.
- Feasibility Study and Detail Design of Flood Mitigation and Drainage Improvement in Taman Sentul, Taman Sentul Jaya, Taman Pinang & Taman Mangga, Juru, Seberang Perai Tengah, Penang
- Post-EIA Consultancy Services for The Proposed Universiti Teknologi Petronas in Bandar Sri Iskandar, Perak



- The U.N report estimates that 20% of freshwater species have vanished or being driven towards extinction in recent decades
- Humans already use 54% of Earth's rainfall, says the U.N. report, and 70% of that goes to agriculture.
- Deforestation, which releases carbon from trees, accounts for 20% of the human-caused carbon emissions that spur climate change
- Based on new data and analysis, the U.N report asserts 2.3 billion people faced water shortages , 60% more than in previous estimate

Source : Time Magazines Special Edition  
April/May 2001

## Bio-Ecological Drainage Systems (BIOECODS) For USM, Engineering Campus : A Pilot Project For Malaysia

Client: **Department of Irrigation and Drainage Malaysia (DID)**

Project Period: **1<sup>st</sup> August 2000 – 31<sup>st</sup> March 2003**

A pilot project in USM Engineering Campus known as Bio-Ecological Drainage Systems (BIOECODS) is one of the alternatives listed in MSMA to create an environmentally friendly urban development as a result of a smart partnership between USM-DID. This new environmental-friendly system is based on "Control-at- Source" concepts combining infiltration, detention storage, conveyance as well as delay flow.

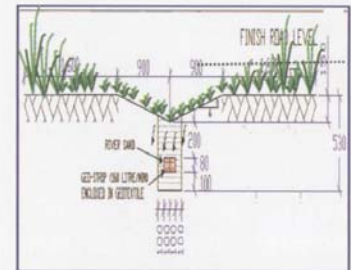
The components of the BIOECODS are perimeter swale, eco-swale, subsurface detention and dry pond. The main feature of BIOECODS is the use of subsurface drainage modules acting as both stormwater conveyor and attenuation agent. When the rain falls, the stormwater will be collected by the perimeter swale from individual building whilst the flow from impermeable surface will be directed to the individual lot swale. The flow from perimeter swale will be conveyed to the inter-lot swale (ecological swale) as main conveyor.

The ecological swale is a grass-earth channel combined with a subsurface module enclosed within a permeable geotextile. The excess stormwater is stored in the sub-surface detention storage. The storage module have been designed to be placed at the connecting point, junction and the critical point of the system. The excess stormwater is also stored on the dry pond constructed with a storage function.

Dry pond is a detention basin, which has been integrated with ecological swale to temporarily store the storm runoff. For water quality improvement purpose, flow from ecological swale goes into wetland or wet pond for further water treatment. Wetland is constructed to pass water through an area supporting growing plant material. Contaminant are removed either by direct absorption into plant tissues (soluble nutrients) or by physical entrapment and subsequent settlement on the wetland bed. The end product is expected to improve the aesthetic values for surrounding area with the existence of the "Crystal Clear Blue Water Lake" at the downstream end.



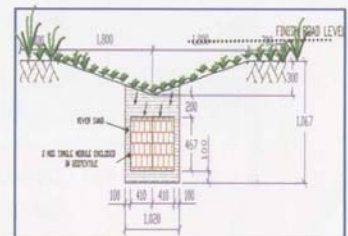
*Perimeter Swale*



*Typical Cross Section  
for Perimeter Swale*



*Ecological Swale  
Type B*



*Typical Cross Section for  
Ecological Swale Type B*



# Awards

**Universiti Sains Malaysia Hall of Fame Gold Award 2001**

**Perak State Foundation Excellence in Engineering Research Award 2001**

**CIDB Construction Innovation and Invention Award  
for Bio-Ecological Drainage System 2001**

**Invited Speaker for Roadshow on Urban  
Stormwater Management Manual  
for Malaysia (2000)**

**Exco, Malaysian National Committee on  
Irrigation and Drainage  
(MANCID) (1998-2002)**

**Exco, Sewer System and Processes Working Group,(SSPWG)  
IWA-IAHR Joint Committee on Urban Drainage (1998 - )**

**Exco, Malaysian Hydrological Society  
(MHS) (2000-2002)**

**Exco, Young Professional Forum, Malaysian National Committee on  
Irrigation and Drainage (MANCID) (1999-2001)**



## **CIDB CONSTRUCTION INNOVATION & INVENTION AWARD 2001**

Research & Development Expo 2001  
Public Institution of Higher Learning  
25-28 October 2001  
Putra World Trade Centre

## **PERAK STATE FOUNDATION EXCELLENCE IN ENGINEERING RESEARCH AWARD 2001**

1<sup>st</sup> November 2001  
University Hall USM Engineering Campus





# Ball of Fame Gold Award 2001 (Anugerah Sanggar Sanjung)



*Anugerah*

**SANGGAR SANJUNG 2001**

*dianggerahkan kepada*

**DR. NOR AZAZI ZAKARIA**

atas pencapaian cemerlang dalam  
Penyelidikan & Pembangunan

Seri Paduka Baginda Yang di-Pertuan Agong  
Tuanku Syed Sirajuddin Putra Jamalullail  
Canselor, Universiti Sains Malaysia

11 Januari 2002



*Anugerah*

**SANGGAR SANJUNG 2001**

*dianggerahkan kepada*

**DR. AMINUDDIN AB GHANI**

atas pencapaian cemerlang dalam  
Penyelidikan & Pembangunan

Seri Paduka Baginda Yang di-Pertuan Agong  
Tuanku Syed Sirajuddin Putra Jamalullail  
Canselor, Universiti Sains Malaysia

11 Januari 2002



*Anugerah*

**SANGGAR SANJUNG 2001**

*dianggerahkan kepada*

**DR. ROZI ABDULLAH**

atas pencapaian cemerlang dalam  
Penyelidikan & Pembangunan

Seri Paduka Baginda Yang di-Pertuan Agong  
Tuanku Syed Sirajuddin Putra Jamalullail  
Canselor, Universiti Sains Malaysia

11 Januari 2002



*Anugerah*

**SANGGAR SANJUNG 2001**

*dianggerahkan kepada*

**PUAN LARIYAH SIDEK**

atas pencapaian cemerlang dalam  
Penyelidikan & Pembangunan

Seri Paduka Baginda Yang di-Pertuan Agong  
Tuanku Syed Sirajuddin Putra Jamalullail  
Canselor, Universiti Sains Malaysia

11 Januari 2002



## LATEST PUBLICATIONS

No.	Title	Publisher/Journal (vol. no. & year)	Author	Type of Publication
1	Sediment Size Characteristics of Urban Drains In Malaysian Cities	Journal of Urban Water, Elsevier Science. Vol 2, No.4, pp.335-341, 2000	Ab. Ghani, A., Zakaria, N.Z., Kassim, M., & Ahmad Nasir, B.	Journal
2	Ecological Drainage System for Malaysia and South-East Asia: A Pilot Case Study at Science University, Malaysia	Journal of Urban Water, Elsevier Science. (Under Review)	Zakaria, N.A., Ab. Ghani, A., Mohd Sidek, L., Abdullah, R., Kassim, A.H. and Ainan, A	Journal
3	Flood Risk Mapping for Pari River Incorporating Sediment Transport	Journal of Environmental Modelling & Software, Elsevier Science (Under Review)	Sinnakaudan, S.K., Ab. Ghani, A., Ahmad, M.S.S. & Zakaria, N.A.	Journal
4	Streamflow Forecasting Using Artificial Neural Networks for Urban Catchment	Journal of Hydraulic Research, International Association for Hydraulic Engineering and Research (Under Review)	Mashor, M.Y., Abdullah, R., Ab. Ghani, A. & Zakaria, N.A	Journal
5	Promoting New Ecological Drainage System in Malaysia	Journal Malaysian Technology (to be published).	Zakaria, N.A., Mohd Sidek, L., Ab. Ghani, A., Abustan, I., Abdullah, R., & Mohd Nordin, A.	Journal
6	Sediment Deposition in Storm Drains of Raja Catchment, Alor Setar	Bulletin Institution Of Engineers Malaysia, pp.43-48, May, 2001	Ab. Ghani, A., Kassim, M., Abdullah, R., Mohd Sidek, L., and Zakaria, N.A.	Journal
7	New Ecological Drainage System as An Alternative to Reduce Flood Problem in Malaysia	Journal Malaysian Technology (to be published)	Mohd Sidek, L., Zakaria, N.A., Ab. Ghani, A., Abustan, I., Abdullah, R., & Mohd Nordin, A.	Journal
8	Field Data Collection on Sedimentation in Combined Sewer Systems: Overseas experience	Bulletin Institution Of Engineers Malaysia, pp.40-47, November, 1997	Ab. Ghani, A	Journal
9	Evaluation of Equations on Total Bed Material Load	8 <sup>th</sup> International Symposium on River Sedimentation, Cairo, Egypt, 5-9 November 2001	Ariffin, J., Ab. Ghani, A., Zakaria, N.A. & Yahaya, A.S.	Proceeding
10	Transverse Velocity Distribution in Relation to Bed Load Movement in Natural Channels	First International Conference on River Basin Management, Cardiff University, Wales, UK, 11-13 September 2001	Ariffin, J., Ab. Ghani, A., Zakaria, N.A., Yahaya, A.S. & Abdul Talib, S.	Proceeding
12	Constructed Wetland for Water Quality Improvement Under Tropical Climates	Asia- Pacific Workshop on Ecohydrology, Cibinong – Bogor, West Java - Indonesia, 20-22 March, 2001	Mohd Sidek, L., Ab. Ghani, A., Zakaria, N.A., Abustan, I., Abdullah, R. & Ashaari, F.A.H.	Proceeding
13	Modelling Of New Ecological Drainage Systems Under Malaysian Condition	IHP's International Symposium on Freshwater Perspectives, Christchurch, New Zealand, 20-24 November, 2000	Mohd Sidek, L., Takara, K., Desa, M.N., Zakaria, N.A., Ab. Ghani, A., Abustan, I., & Abdullah, R.	Proceeding
14	Inlet and Sewer Traps for Sediment Control in Stormwater Drainage: A Malaysian Case Study	ASCE's Joint Conference on Water Resources Engineering & Water Resources Planning and Management, Minneapolis, USA, 30 July - 2 August, 2000	Fraser, A.G., Ashley, R.M., & Ab. Ghani, A	Proceeding
15	Incipient Motion of Sediment Particles Over Deposited Loose Beds in a Rectangular Channel	8 <sup>th</sup> International Conference On Urban Storm Drainage, IWA/IAHR Joint Committee on Urban Drainage, Sydney, Australia, Vol.1, pp.157-163, 30 August-3 September 1999.	Ab. Ghani, A., Salem, A.M., Abdullah, R., Yahaya, A.S., and Zakaria, N.A	Proceeding
16	BIOECODS Construction Experience	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Ab. Manap, A.A., Bardan, H., & Yusoff, M.F.	Proceeding
17	An Evaluation of On-Site Detention Facility for Residential Development	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Abdullah, R., Ab. Ghani, A., Zakaria, N.A., & Mohd Sidek, L.	Proceeding
18	Concept and Design of an Ecological Ponds for Treatment of Stormwater Runoff: Case Study, USM Engineering Campus	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Mohd Sidek, L., Ab. Ghani, A., Zakaria, N.A., & Abdullah, R.	Proceeding
19	Study Of Effectiveness Of Permeable Infiltrating Channel (With Sub-Surface Conveyance) For Peak-Flow And Runoff Volume Control	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Kean, S.T.B., Ab. Ghani, A., Zakaria, N.A.Z. & Abdullah, R.	Proceeding



No.	Title	Publisher/Journal (vol. no. & year)	Author	Type of Publication
20	Comparison of Subsurface Infiltration and Storage tank Systems to Attenuate Stormwater peak Flow and Volume	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Liang, L.T., Ab. Ghani, A., Zakaria, N.A., Abdullah, R., Mohd Sidek, L. & Kean, S.T.B	Proceeding
21	Integrating ArcView GIS 3.2 with HEC-6 Hydraulic and Sediment Transport Model for Flood Risk Analysis	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Sinnakaundan, S.K., Ab Ghani, A., Ahmad, S.S & Zakaria , N.A.	Proceeding
22	Effect of Canalization on Alluvial River	R & D Colloquium on River Engineering and Urban Drainage, August 14-15, 2001, Penang	Darus, A., Ab. Ghani, A. & Mohd Sidek, L.	Proceeding
23	Integrating Constructed Wetland into Bio-Ecological Drainage System (BIOECODS) for Water Quality Improvements	National Seminar on World Day for Water'2001, MANCID, Batu Pahat, 23-24 Mac 2001	Mohd Sidek, L., Zakaria, N.A., Ab. Ghani, A., Abustan, I., Abdullah, R., & Ashaari, F.A.H.	Proceeding
24	Scour and Deposition in Rivers : Malaysian Perspective	National Conference on Hydraulics, Hydrology and Sustainable Water Resources Management, 24-25 September 2001, Selangor	Darus, A., Ab. Ghani, A., Abdullah, S., Zakaria, N.A.Z., Abdullah, R. & Mohd Sidek, L.	Proceeding
25	Comparison Of Two Subsurface Storage Tank Systems Based To Attenuate Peak Flow – Case Study In USM Tronoh Campus.	Seminar and Exhibition on Urban Stormwater Management Manual: Principles and Applications , 21-22 August 2001, Kuala Lumpur	Ab. Ghani, A., Zakaria, N.A., Abdullah, R., Mohd Sidek, L.	Proceeding
26	The Use and Development of Bio-Ecological Drainage Systems (BIOECODS) for USM Engineering Campus.	Seminar and Exhibition on Urban Stormwater Management Manual: Principles and Applications , 21-22 August 2001, Kuala Lumpur	Mohd Sidek, L., Ab. Ghani, A., Zakaria, N.A. & Abdullah, R.	Proceeding
27	An Evaluation of On-Site Detention Storage System based on New Stormwater Management Manual for Development of Tuanku Height Development Project.	Seminar and Exhibition on Urban Stormwater Management Manual: Principles and Applications , 21-22 August 2001, Kuala Lumpur	Abdullah, R., Mohd Sidek ,L., Ab. Ghani, A. & Zakaria, N.A.	Proceeding
28	Ecological Drainage System: A New Approach Towards Flash Flood Mitigation In Urban Areas.	Seminar World Day for Water 2000, MANCID, Penang, 20 Mac, 2000	Ab. Ghani, A., Zakaria, N.A., Abdullah, R., Mohd Sidek, L., Abustan, I., & Adlan, M.N.	Proceeding
29	Application of River Modelling to Control Scour and Deposition in Malaysian Rivers undergoing Training Works,	National Civil Engineering Conference, USM, 24 – 26 January 2000	Ab. Ghani, A. , Abu Hasan, Z., Yahaya, N.E.M, Abdullah, R., and Zakaria, N.A.	Proceeding
30	Issues and Practices in Flood Risk Mapping	National Civil Engineering Conference, USM, 24 – 26 January 2000	Ab. Ghani, A., Sinnakaundan, S., S. Ahmad, S., Zakaria, N.A., Abdullah, R., dan Abustan, I.	Proceeding
31	An Infiltration System Characteristics: Case Study at USM's Perak Branch Campus	National Civil Engineering Conference, USM, 24 – 26 January 2000	Mohd Sidek, L., Zakaria, N.A., Ab. Ghani, A., Abustan, I., Abdullah, R., & Kean, S.T.B.	Proceeding
32	Establishment of Flow Rating Curves along Pari River using Loose Boundary Models,	National Conference on Rivers'99, Universiti Sains Malaysia, Penang, 14 – 17 October, 1999	Ab. Ghani, A. , Abu Hasan, Z., Abdullah, R., and Zakaria, N.A.	Proceeding
33	Issues And Practices In Designing A Holistic Flood Risk Mapping System	National Civil Engineering Conference- AWAM'99, Lumut, Perak, 24-26 January, 1999	Sinnakaundan, S., Ab.Ghani,A, S. Ahmad, M.S, Zakaria, N.A., Abdullah, R & Abustan, I	Proceeding
34	Development Of An Embedded Hydraulic Model In Geography Information System For Flood Risk Assessment	MANCID Annual Conference – 9 <sup>th</sup> MANCO. Cameron Highland, Pahang, Malaysia, 2002	Sinnakaundan, S., Ab Ghani, A, S.Ahmad, M.S & Zakaria, N,A	Proceeding



# URBAN STORMWATER MANAGEMENT MANUAL (MSMA) SEMINAR

Date	State	Venue
September 24 – 25, 2000	Kedah and Perlis	Holiday Villa Hotel, Alor Setar
October 15 – 17, 2000	Sabah	Pan Sutera Hotel, Kota Kinabalu
October 30 - November 1, 2000	Kelantan	Renaissance Hotel, Kota Bahru
November 10, 2000	Penang	Cititel, Penang

MSMA Seminar at Kelantan



MSMA Seminar at Penang



MSMA Seminar at Sabah

## DIALOGUE

### National Dialogue for the Implementation of Urban Stormwater Management Manual (MSMA)

Equatorial Hotel, Penang, 13 August 2001

The dialogue was conducted with the following objectives:

- ☒ To identify the implementation issues of MSMA
- ☒ To get feedback from the participants about such issues
- ☒ To hold a forum to discuss strategies for the implementation of MSMA
- ☒ To formulate a long-term methodology for the implementation of MSMA

The dialogue was jointly organised by the Department of Irrigation and Drainage (DID), Department of Local Government (DLG), and Real Estate and Housing Developer Association (REHDA). There were 200 participants including the Directors of DID from Headquarters and states, Public Work Department (JKR), State Council, representatives from the housing developers, NGO's, private consultants and academicians. Dr. Nor Azazi Zakaria as a REDAC Director was invited to give a briefing on the implementation of Bio-Ecological Drainage System (BIOECODS), a pilot project on MSMA at USM Engineering Campus, Transkrian.

The discussion concentrates on issues as follows:

- ☒ Lack of examples of MSMA application nationwide
- ☒ Lack of public participation in the planning process and the implementation of MSMA
- ☒ Contradiction in cost given by USM (Engineering Campus) and housing developers (Sierra Emas).
- ☒ Incentives through DID should be given to expedite the implementation of MSMA
- ☒ Bureaucracy problems in the approval of the drainage plan
- ☒ No project yet approved according to MSMA guideline
- ☒ MSMA roles in flood mitigation projects
- ☒ New developments should follow MSMA guideline
- ☒ Determination of responsible party for the maintenance of MSMA's structures such as detention pond.

All issues raised were given explanation by the DID's Director General, DLG's Director General, and REHDA's President.



# Kijang Gift

*Love our Nature*

*We only borrow from our child.*



**R&D Colloquium on River Engineering and Urban Drainage**

Vistana Hotel, Penang  
14-15 August 2001

The first R&D Colloquium on River Engineering and Urban Drainage was organised by REDAC and Malaysian National Committee on Irrigation and Drainage (MANCID) with the following objective:

To determine the direction of research on River Engineering and Urban Drainage in Malaysia for the next 10 year.

A workshop was held on the second day of the colloquium to set the research direction in River Engineering and Urban Drainage. Twenty presentations were made to raise ideas regarding the future research topics.

60 participants attended the colloquium. The participants and paper presenters were researchers and engineers from government and private agencies involved directly in River Engineering and Urban Drainage.

The colloquium covers the following topics:

- ☒ Stormwater Management
- ☒ Urban Hydrology
- ☒ Sustainable Urban Drainage System
- ☒ Water Quality Improvement
- ☒ Wetland
- ☒ Sediment Transport in Rivers/Drains
- ☒ River Modeling
- ☒ Environmental Management Plan

The resolutions adopted in this colloquium are as follows:

- ☒ Formation of National River Authority (NRA)
- ☒ Formation of Water Resource Ministry
- ☒ Educational Campaign: targeting on the young generation towards the environment
- ☒ Achieving DOE's Water Quality Standard
- ☒ Improving Hydrology Data Collection
- ☒ Consolidation on River Basin Information System (RBIS)
- ☒ Review the laws and policies (contradiction between state and federal)
- ☒ Publics Sensitivity
- ☒ Application of Green Technology
- ☒ Evaluation on Environmental Sensitivity
- ☒ Emphasis on Flood Risk Analysis and Mapping
- ☒ Water Quality Control using Detention Pond
- ☒ Use of Bio-Ecological Products for River Bank Protection
- ☒ Study on Vegetation Effect on Hydraulic and Water Quality For River System
- ☒ Provision of Economic Incentive And Equipment for MSMA Implementation
- ☒ Provision of Research Funding From Industry
- ☒ Utilisation of 3R Concept : Redo-Reuse-Recycle
- ☒ Promoting River Eco-Tourism
- ☒ Promoting Cooperation among Researchers and Industry

**EXHIBITION**

REDAC also participates in exhibitions to promote its Bio-Ecological Drainage System (BIOECODS). Two important exhibitions participated by REDAC are as listed herein.

**List of Exhibition Participated by REDAC**

No.	Date	Programme	Venue
1	May 15, 2001	"Engineering Excellence Award" to Department of Irrigation and Drainage Malaysia by Institution of Engineers, Australia	Kuala Lumpur Golf and Country Club (KLGCC), Kuala Lumpur
2	Oct. 25 -28, 2001	Research & Development Expo, Public Institution of Higher Learning officiated by Y.A.B Prime Minister of Malaysia	Putra World Trade Centre, Kuala Lumpur



## BRIEFING INVITATION

Since its inception on 1<sup>st</sup> May 2001, REDAC has actively participated in giving several briefings nationwide regarding its BIOECODS and the Urban Stormwater Management Manual (MSMA). A number of important briefings are listed herein.

### List of Briefings/Talks

No.	Date	Programme	Venue
1.	July 5, 2001	MHI – TV3 : Bio-Ecological Drainage System (BIOECODS)	Sri Pentas ,TV3
2.	August 1-10, 2001	Study Tour To Australia : Organized by Department of Irrigation and Drainage, Malaysia	Sydney & Canberra Australia
3.	August 13, 2001	Urban Stormwater Management Manual (MSMA) National Dialogue	Equatorial Hotel, Penang
4.	August 13, 2001	Briefing on BIOECODS to MSMA National Dialogue participants	USM Engineering Campus
5.	August 14&15, 2001	R&D Colloquium on River Engineering and Urban Drainage	Vistana Hotel, Penang
6.	August 14 &15, 2001	Briefing on BIOECODS to Engineers from Department of Irrigation and Drainage, Kedah	USM Engineering Campus
7.	August 17, 2001	Urban Stormwater Management Seminar: Organized by Department of Irrigation and Drainage, Perak	Casuarina Hotel, Ipoh
8.	August 22& 23, 2001	Urban Stormwater Management Seminar: Organized by Association of Consulting Engineers, Malaysia (ACEM)	Nikko Hotel, Kuala Lumpur
9.	November 12 & 13, 2001	9 <sup>th</sup> MANCID Annual Conference (MANCO)	Equatorial Hotel, Cameron Highlands

## POSTGRADUATE RESEARCH

With the aim to become a Centre of Excellence in Research and Development in River Engineering and Urban Drainage for Malaysia and South East Asia, REDAC has a high number of postgraduates from Malaysia and overseas. Presently twenty students have registered (Ph.D = 6, MSc = 14) and six of them have completed at master level. The students come from various levels including engineers from DID, lecturers, consultant engineers and research officers. REDAC is planning to have several post-doctoral researchers from western region in the near future through a joint research on its Bio-Ecological Drainage System.



## a) PhD

<i>Name</i>	<i>Graduation Year</i>	<i>Supervisor</i>	<i>Title</i>
Mohd Azhari Ghazalli	On going	Dr.Aminudin Ab.Ghani Dr.Abu Bakar Mohd Diah	Integrated River Management for Malacca State
Stephen Tan Boon Kean	On going	Dr.Aminudin Ab.Ghani Dr.Nor Azazi Zakaria	Development of Rainfall-Runoff Model Incorporating Infiltration Effect.
Budi Santosa	On going	Dr.Aminudin Ab. Ghani Dr.Ismail Abustan	Integrated Assessment for Flood Management and Water Resource Sustainability in Tidal Lowland Urban Watershed
Junaidah Ariffin	On going	Dr.Aminudin Ab.Ghani Dr.Nor Azazi Zakaria Mr. Ahmad Shukri Yahaya	Development of a Total Load Equation for Rivers in Malaysia
Shanker Kumar a/ Sinnakaudan	On going	Dr.Aminudin Ab. Ghani Dr. Mohd Sanusi S.Ahmad	Hydraulic Modeling and Flood Risk Analysis in GIS Incorporating Sediment Transport for Rivers in Malaysia
Mohd Farid Ahmad	On going	Dr. Nor Azazi Zakaria Prof. Madya Ir Dr. Mohamad Razip Selamat	The Comparison and Evaluation of Soil Improvement Method in Malaysia – Cased Study

## b) Master

<i>Name</i>	<i>Graduation Year</i>	<i>Supervisor</i>	<i>Title</i>
Ahmeda M. Saleem	1998	Dr.Aminudin Ab.Ghani Dr.Rozi Abdullah	Incipient Motion of Sediment Particles Over Loose Deposited Beds in A Rectangular Channel
Zorkeflee Abu Hasan	1998	Dr.Aminudin Ab.Ghani Dr.Rozi Abdullah	Evaluation of Scour and Deposition in Malaysian Rivers Undergoing Training Works: Case Studies of Pari and Kerayong Rivers
Nasehir Khan E.M Yahaya	1999	Dr.Aminudin Ab. Ghani Dr.Rozi Abdullah	Development of Total Bed Material Transport Rating Curves for Rivers in Malaysia: Case Studies of Pari River and Kerayong River and Kulim River
Noor Azman Ibrahim	2002	Dr.Aminudin Ab. Ghani Dr. Nor Azazi Zakaria Mr. Ahmad Shukri Yahaya	Evaluation & Development of Sediment Load Equations for Rivers in Malaysia
Abd. Kadir Nik Abdullah	2002	Dr.Nor Azazi Zakaria Dr. Dini Ramya Hassan Basri	Site Suitability for Solid Waste Disposal by Natural Attenuation Near Coastal Area
Pn. Yong Rashidah binti Mat Tuselim @ Selamat	2002	Dr. Dini Ramya Hassan Basri Dr.Nor Azazi Zakaria	A Study on the Effectiveness of Using a Bio-Physical Pilot Plan Rotating Biological Contractor-Sedimentation as a Secondary Treatment of Leachate
Mahadzir Kassim	Thesis Write-Up	Dr.Aminudin Ab.Ghani Dr. Ismail Abustan	Sediment Deposition in a Rigid Monsoon Drain along Raja River Catchment, Alor Setar
Sharifah Abdullah	Thesis Write-Up	Dr.Aminudin Ab.Ghani Dr. Nor Azazi Zakaria	Simulation of Muda River Channel Changes due to Sand Mining Operations
Yip Hing Wai	Thesis Write-Up	Dr. Rozi Abdullah Dr.Aminudin Ab. Ghani	Hydrological Study for Ungauged Catchment in Peninsular Malaysia.
Ahmad Darus	Thesis Write-Up	Dr.Aminudin Ab. Ghani Dr. Nor Azazi Zakaria	Stable Channel Design Using FLUVIAL-12: Case Study of Raia River
Ahmad Bakri Abdul Ghaffar	On going	Dr.Aminudin Ab.Ghani Dr.Rozi Abdullah	Assessment of Floss Resistance Equation Application to Malaysian Rivers
Baharuddin Ahmad Nasir	On going	Dr.Aminudin Ab. Ghani Dr.Ismail Abustan	Flood Improvement Options using Detention/Retention Ponds for Existing Schemes in Malaysian Urban Area
Anita Ainan	On going	Dr.Aminudin Ab. Ghani Dr. Nor Azazi Zakaria	Peak Flow Attenuation Using Bio-Ecological Drainage System
Tan Peng Leak	On going	Dr.Aminudin Ab. Ghani Dr. Nor Azazi Zakaria	Effectiveness of Detention Ponds in Attenuating Peak Flow





**9<sup>th</sup> MANCO  
MANCID ANNUAL CONFERENCE**

**“SUSTAINABLE USE OF LAND AND WATER”  
12 & 13 NOVEMBER 2001  
EQUATORIAL HILL RESORT CAMERON HIGHLANDS, PAHANG**

### **Introduction**

The conference focused on problems of sustainable development in Malaysia with emphasis on the use of land and water. Such Development should guarantee acceptable quality of the environment, competent protection and rational exploitation of natural resources in particular soil and water, and efficient conservation or, if necessary, restoration of the landscape as an environment for people to live in.

Among problems identified due to development and agriculture include the loss of forests and wetlands, soil and land degradation, pollution of surface and groundwater, green house gas accumulation and ozone depletion.

To achieve sustainable development with regards to the use of land and water, activities need to be taken into account include control of soil-water, regime, flood control, erosion control, revitalization of streams and all land improvement and land reclamation measures including irrigation. The conference was jointly organised by Department of Irrigation and Drainage Malaysia, Malaysian National Committee on Irrigation & Drainage (MANCID) and REDAC. The conference was attended by 125 participants from various government and private agencies.

### **Objectives and Subtopics**

The aim of the conference was to analyse the cause of the unfavorable situation and trends and to propose measures to avert situation and, if possible to revert such trends for sustainable development in Malaysia. The present policies on land and water resources management in Malaysia were presented together with papers covering the following subtopics.

- Land Erosion
- Forestry and Water
- Food Production
- Conservation of Flora & Fauna, Natural Wetlands and Ecosystem
- Biological Indicator for River Conservation
- Flood Mapping using Remote Sensing & GIS
- Improved Irrigation Efficiencies & Conservation
- Water Quality Deterioration and Improvement
- Sustainable Urban Drainage System

15 papers were presented on above subtopics by relevant authorities from government and private agencies including non-governmental organizations.



## Speaker

## Title



Y.Bhg. Dato' Ir. Hj Keizrul bin Abdullah Director General, JPS Malaysia	Keynote Address I
Y. Bhg Dato' Hj Abdul Rahman Imam Arshad Director General, Economic Planning Unit, Pahang	Keynote Address II
En. Mohd Azhari bin Ghazalli JPS Malaysia	National Policy on Irrigation Management
Ir. Low Koon Sing JPS Malaysia	Online National Water Resources (Drought Monitoring System)
En. Roslan Mohamad JAS Malaysia	Water Quality Improvement
Dr Nor Azazi Zakaria REDAC, USM	Sustainable Urban Drainage Systems : BIOECODS Experience at USM Engineering Campus
En Ahmad Zainal b. Mat Isa Jabatan Perhutanan	Forestry and Water
Prof. Chan Ngai Weng Penang Water Watch	Water Resources in Malaysia : NGO's Perspectives
Jaya Mary Asirvatham Persatuan Pencinta Alam Malaysia	Conservation of Flora and Fauna
En. Sannath Kumaran WWF Malaysia	The Montane Ecosystems Characteristics, Conservation And The Need For Protection
Puan Wan Maznah Wan Omar School of Biological Sciences, USM	Perspective in the Use of Algae as Biological Indicator for Monitoring and Protecting Rivers
En. Jasni bin Yaakub LESTARI UKM	Sediment Deposition in Putrajaya Wetland
Mr Loh Kok Foo MACRES	The Use of Remote Sensing and GIS Technologies for Sustainable Land & Water Management
Dr. Shamsuddin Ibrahim FRIM	Sustainable Use of Forest Resources in the New Economy
Dr. Mohamad Nor Jaafar Chan Chee Seng MARDI	Food Production Through Sustainable Use of Land and Water
Prof Dr. Mohd Amin bin Mohd Som UPM	Improved Irrigation Efficiencies and Conservation



# REDAC ALBUM



*MSMA Dinner,  
Renaissance Hotel  
Kota Bharu*

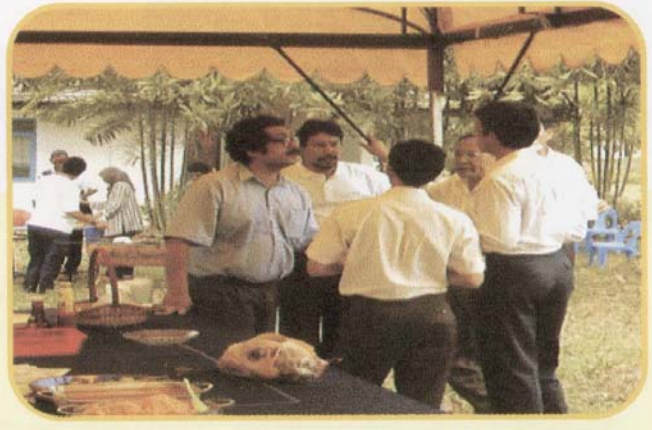


*Technical Visit by Director General, Department of Irrigation  
& Drainage To BIOECODS Pilot Project, USM Engineering  
Campus*

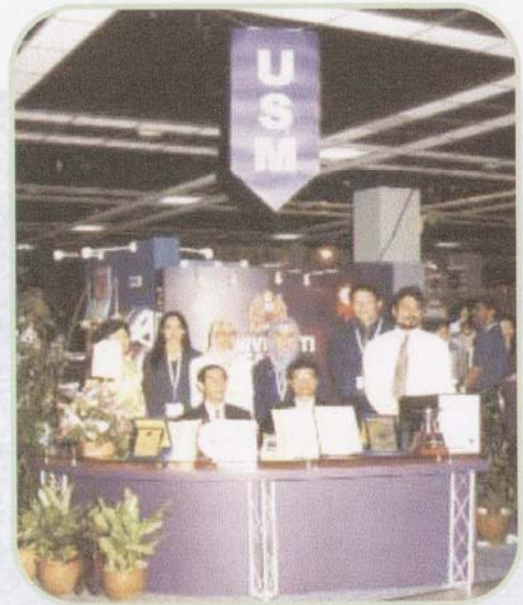
*9<sup>th</sup> MANCID Annual Conference  
Equatorial Hotel, Cameron Highlands*







*BBQ Lunch at USM Perak Branch Campus, Tronoh*



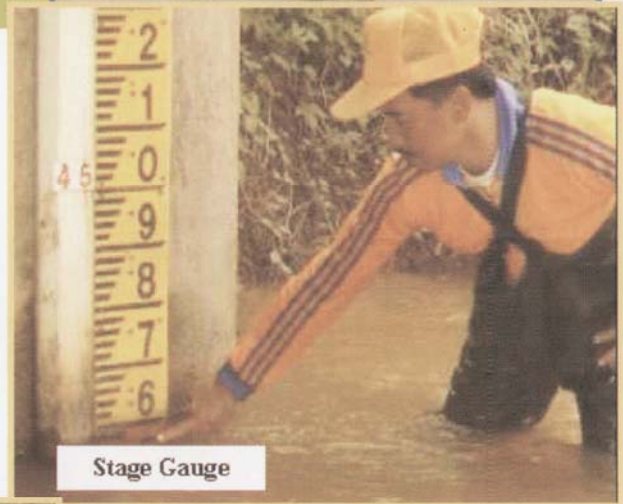
*Expo Research & Development 2001  
Public Institution of Higher Learning  
Putra World Trade Centre*







*Undergraduate Students During Sediment Transport Measurement at Pari River, Ipoh*



**Stage Gauge**



**Sediment Load Sampling & Flow Measurement**

*Post graduate Students During Sediment Transport Measurement at Raia River, Tanjung Village, Ipoh*

**“Rivers, as a part of nature, can be mastered NOT by FORCE but by UNDERSTANDING”**

**(Howard H.Chang, 1988)**



# REDAC FAMILY

Dr Nor Azazi Zakaria  
Director  
Ext : 5460  
H/P : 012-5001405  
Email : redac01@eng.usm.my



Dr Aminuddin Ab. Ghani  
Deputy Director  
Ext : 5461  
H/P : 012-4534355  
E-mai:redac02@eng.usm.my



Dr Rozi Abdullah  
Associate  
Lecturer, School of  
Civil Engineering, USM  
Ext : 6245 H/P : 012-4888712

Pn. Lariyah Mohd Sidek  
Associate  
Lecturer, School of  
Civil Engineering, USM



Cik Azura Jaapar  
Personal Assistant  
Ext : 5463 H/P:012-4666302  
Email : redac@eng.usm.my



Mr Shanker Kumar a/l  
Sinnakaudan  
Research Officer  
Ext : 5465 H/P:012-5100721  
Email : redac04@eng.usm.my



Mr. Lau Tze Liang  
Research Officer  
Ext : 5466 H/P:012-4540304  
Email:redac05@eng.usm.my

Mr Stephan Tan Boon Kean  
Research Officer  
Ext : 5467 H/P: 012-5016600  
Email:redac06@eng.usm.my



En. Mohd Fazli Yusoff  
Research Officer  
Ext : 5468 H/P:012-5150774  
Email:redac07@eng.usm.my



En. Mohd Fauzi Ahmad Shah  
Technician  
H/P: 012-5127353



En. Paker Mohamad  
Assistant Research  
Officer  
H/P : 012-5567110

Cik Saidah Abdul Rahman  
Assistant Lecturer  
Attachment Scheme  
H/P : 013-4066056



Cik Siti Sara Ibrahim  
Assistant Lecturer  
Attachment Scheme

