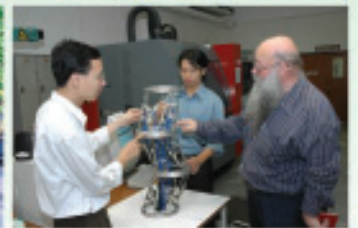


Annual Report on Research

2005



AIT
ASIAN INSTITUTE OF TECHNOLOGY

PREFACE

AIT is an autonomous international graduate school catering to the region and beyond. It was established in 1959 to serve the post graduate education requirements of the region. It has evolved into a multicultural institution with a faculty staff and students from over 30 countries from Asia and beyond. It has a strong alumni base who hold senior and key positions in the governments, non-government and intergovernmental organizations and private sector.

Research at AIT is oriented towards the sustainable development of the region, strengthening the knowledge creation and business capacity of the region, and supporting communities in their economic development and integration into the global economy. In addition to the 2000 students carrying out research projects supervised by over 120 highly qualified and experienced faculty advisors, currently there are about 220 sponsored research projects in progress staffed by 1,000 research and support personnel from 30 countries. However, the traditional sources of funding are under constraint and there is increasing competition within the region for limited research funds.

It is thus imperative that AIT consolidate its research efforts into a few strategic research focus areas and develop interdisciplinary teams of researchers who are internationally competitive and acclaimed. It is now considered important to exploit the large potential of the growing industrial base in the region. Renewed efforts are needed to proactively collaborate with this sector. Creation of common platforms for research with related industry and government and academia are being considered.

In order to achieve this successfully we are in the process of creating a few thematic groups or competency centers which will develop into world research programmes with the support of conventional developmental supporters and industry. The overall objective of establishing areas of

research knowledge groups includes ensuring that AIT is positioned favorably in the intense international competition for research funds due to good presence and reach in the region, engendering a climate of intellectual excitement at AIT through regular seminars, discussions, etc., branding AIT as a desired location for outstanding doctoral candidates, post doctoral fellows and sabbaticants, creating critical mass of researchers in these research areas, etc.

Some of the larger ongoing and expected projects include various aspects of climate change, persistent organic chemicals, 3R environmental management, etc. A contract was signed recently with SIDA for a project called Wetlands Alliance. The unique feature of this project is the "bottom up" approach of problem generation at source and solution by an interdisciplinary team of researchers from a wide variety of fields. Such outreach projects will lead to problem solving of real problems in the field. Another major project is in urban environment management. The sustainability of mega cities is a major concern all over the world. There are possibilities of researchers from across the institute to participate in such projects.

Maintaining a societal perspective on science, researchers at AIT produce knowledge for practical application with high relevance, utility and economic impacts. Research and education are managed to satisfy the needs of societal stakeholders. Crucially, the agenda of the Institute and its staff is integrated with the agenda and desires of the stakeholders. In this model, researchers are both individualists (free, critical and creative thinkers) and team players. To this end, AIT is striving for a distinct research profile in order to create some strong niche areas.

Professor Sudip K. Rakshit
Vice President Research
Asian Institute of Technology
April 22, 2006

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Chapter 1: INTRODUCTION

1.1 AIT Mission

The Asian Institute of Technology promotes technological change and sustainable development in the Asian-Pacific region through higher education, research and outreach. Established in Bangkok in 1959, AIT has become a leading regional postgraduate institution and is actively working with public and private sector partners throughout the region and with some of the top universities in the world.

Recognized for its multinational, multi-cultural ethos, the Institute operates as a self-contained international community at its campus located 40 km (25 miles) north of Bangkok, Thailand.

Besides the usual laboratories and academic buildings, the main campus includes housing, sports, and medical facilities, a conference center, and a library with over 230,000 volumes and 830 print and on-line periodicals. All serve to fulfill the AIT mission -

to develop highly qualified and committed professionals who play leading roles in the region's sustainable development and its integration into the global economy.

1.2 AIT Vision

To become a leading and unique regional multicultural institution of higher learning, offering state-of-the-art education, research and training in technology, management and societal development.

With this clear, timeless vision, the multi-skilled team of students, faculty and staff at AIT are set to continuously strengthen the institution by becoming

- An exemplary institution, with an emphasis on academic quality in terms of courses and other aspects of the operation.
 - A leader in professional development programmes.
 - A hub for the implementation of regional/transnational research projects, and a research facility for academic professionals. The hub will network with other academic and research institutions in the region and the world.
 - A model international citizen.
 - A collaborator and partner of national postgraduate institutions.
 - A financially viable, self-sustaining institution, able to draw support from donors, the private sector and individuals, with good governance and strong leadership.
 - A strong partner to its alumni, who are principal stakeholders through the AIT Alumni Association (AITAA).
-
- A trailblazer in advanced education in the region, with leadership in IT and new types of multidisciplinary programmes.

Chapter 2: SCHOOL OF ENGINEERING AND TECHNOLOGY

2.1 Mission

In line with the mission of the Institute, the mission of the School of Engineering and Technology is:

To develop highly qualified engineers and technologists who play leading roles in promoting the region's industrial competitiveness in its integration into the global economy.

2.2 Thematic Groups, Fields of Study, and Multidisciplinary Programs

Information and Communications Group

Information and communications reflect the essential importance of access, connectivity and sharing. This collaboration on the creation of relevant knowledge provides economic opportunity and empowerment for all peoples of the region.

- Computer Science (CS)
- Information Management (IM)
- Remote Sensing and Geographic Information Systems (RS-GIS)
- Telecommunications (TC)
- *Information and Communications Technologies (ICT)**

Industrial System Engineering Group

For several decades, AIT has served the development of the region by equipping young engineers with high-tech knowledge required for working in a complex industrial environment. Since its inception, the Industrial Systems Engineering (ISE) program at AIT has contributed to this mission by focusing on industrial competitiveness and innovation for sustainable growth of the

region. ISE program acts as an umbrella for four fields of study:

- Design and Manufacturing Engineering (DME)
- Industrial Engineering and Management (IEM)
- Mechatronics (MEC)
- Microelectronics (MIC)
- *Automotive Design and Manufacturing (ADM)**

Civil and Infrastructure Engineering Group

Since the start of AIT, civil engineering fields have acted as a catalyst in advancing modern methodologies, emerging technologies and innovative materials for the design and construction of safe and economical infrastructure in the region.

- Construction, Engineering and Infrastructure Management (CEIM)
- Geotechnical and Geoenvironmental Engineering (GTE)
- Structural Engineering (STE)
- Transportation Engineering (TRE)
- Water Engineering and Management (WEM)
- *Geosystem Exploration and Petroleum Geoengineering (GEPG)**

* *Interdisciplinary Areas*

2.3 Strategic Signature Areas

The changing landscape of engineering requires graduates to have not only the traditional technical knowledge of their predecessors, but also a new set of broader skills that will meet the demands of fast-moving, global and multidisciplinary environments. Engineers must now learn to understand and apply several disciplines to solve complex problems, adapt to new technology and rapidly changing situations,

combine ideas to synthesize creative solutions, and learn to work in teams using excellent communication skills.

Although all fields of study at the School of Engineering and Technology cut across traditional disciplines, in order to better serve the present needs of the region, the school has identified several "Strategic Signature Areas" to further enhance the multidisciplinary offerings. The education, research and outreach activities across the disciplinary walls of traditional fields of knowledge of our faculty will drive these offerings. These courses build on several new and existing disciplines without focusing on one of the traditional fields that are already offered at AIT. A number of strategic multidisciplinary areas have been planned to help the sustainable economic and societal developments in the region as well as for its long-term industrial competitiveness. The two existing areas already under operation are:

- Information and Communications Technologies (ICT)
- Geosystem Exploration and Petroleum Geoengineering (GEPG)

New strategic multidisciplinary areas to be launched in 2006-2007:

- Advanced and Nano Material Technologies (ANM)
- Automotive Manufacturing Engineering (AME)
- Disaster Engineering and Management (DEM)
- Offshore Technology and Management (OTM)
- Supply Chain Management and Logistics (SCL)
- Technology Venture and Entrepreneurship (TVE)
- Integrated Water Resources Development (IWRD)

2.4 Academic Outreach Centers

The School of Engineering and Technology has a wealth of innovative and untapped knowledge database from its masters and

doctoral research activities. Many academic outreach centers are set up to transform the knowledge to serve industrial and societal needs. These academic outreach centers will also serve to tab the practical aspects and the society impacts of the knowledge and technology back to the class room, as well as connect the school with the world, outside the academe. The academic outreach centers in the School of Engineering and Technology are:

Asian Center of Engineering Computations & Software (ACECOMS)

ACECOMS carries out research in engineering computations, develops and promotes computer software tools for engineering applications, and conducts training in the effective use of latest computing technology.

With 29 satellite centers in 21 cities in Asia and other regions, ACECOMS carries out research in engineering computations, develops computer software tools for engineering applications and conducts training in the effective use of latest computing technology. Visit ACECOMS: <http://www.acecoms.ait.ac.th/>

Asian Center for Soil Improvement and Geosynthetics (ACSIG)

Most capital cities in Southeast Asia are located in lowland areas with associated soft ground problems. ACSIG provides a strategic location for advanced technological education, researches and outreach activities on the application and effective utilization of ground improvement techniques. Visit ACSIG: <http://www.set.ait.ac.th/acsig/>

Asian Center for Transportation Studies (ACTS)

The need to address pressing problems in transportation-related issues in Asian cities, and anticipated trends brought about by modernization underscores the importance of the Asian Center for Transportation Studies. ACTS activities include modules on intelligent transportation systems, traffic simulation, freight transport, urban road safety and road safety audit. Visit ACTS: <http://www.set.ait.ac.th/acts/>

Geoinformatic Center

Geoinformatic Center is dedicated to development and promotion of remote sensing research and activities in Asia-Pacific. Its mandate is to share satellite data, research results and experiences with researchers in the region. Various research facilities are established especially, NOAA AVHRR receiving station and Terra/Aqua MODIS receiving station to support research on global environmental study. Visit Geoinformatic Center: <http://www.geoinfo.ait.ac.th/>

Habitech Center (HABITECH)

The Habitech System is an innovative construction process implemented widely for housing, institutional and commercial building projects in the region. Its activities include research and outreach activities such as training in production and construction, provision of services associated with projects implemented by various organizations, agencies or the private sector.

Habitech International installs building material production facilities of prefabricated modular interlocking concrete blocks worldwide for residential, institutional and commercial building construction. Visit Habitech: <http://www.habitech-international.com/indexthai.html>

International Ferrocement Information Center (IFIC)

IFIC coordinates the activities of the International Ferrocement Society (IFS) including publication of an in-house *Journal of Ferrocement*, conducting continuing education courses, and sponsored research projects. Its members include engineers, architects, students, researchers and all those interested in low-cost construction materials. Visit IFIC: <http://www.sce.ait.ac.th/ific/>

Regional Network Office for Urban Safety (RNUS)

The Regional Network Office for Urban Safety (RNUS) is a collaborative center jointly operated by the AIT and the University of Tokyo. Its priority task is the promotion of urban safety engineering utilizing advanced

engineering technologies including remote sensing and GIS. Visit RNUS: <http://www.set.ait.ac.th/rnus/>

Thailand Accident Research Center (TARC)

The Accident Research Center is an offspring of MOTC's Road Safety Master Plan acknowledging the lack of information on accidents in Thailand and the need to establish TARC. The support of TARC comes jointly from Department of Highways, Volvo Car Corporation and AIT. TARC provides academic back up and a base for road safety research. Visit TARC: <http://www.tarc.ait.ac.th>

AIT Center of Excellence in Nanotechnology (COE)

The Center of Excellence in Nanotechnology is jointly supported by Thailand's Nanotechnology Center (NANOTEC) and AIT to cultivate and foster multidisciplinary activities including research and education in the applications of nanotechnology in the developing world. Visit COE: <http://www.nano.ait.ac.th/>

2.5 School Governance

Dean of School

WORSAK KANOK-NUKULCHAI, BEng (Hon), Chulalongkorn Univ, Thailand; MEng, AIT, Thailand; PhD, Univ of California (Berkeley), USA.

Professor (*Computational Mechanics; Finite Element Methods; Tall Building Static and Seismic Analysis; Bridge Engineering; Microcomputer Software for Structural Engineering; Genetic Algorithms; Nonlinear Analysis of Structures and Continua; Plate/Shell Structures; Engineering Education; Nanomechanics*)

Associate Deans

JOYDEEP DUTTA, PhD, IACS, Calcutta Univ,
India; BSc (Hon), MSc, North Eastern Hill
Univ, India.

Associate Professor

[Functional materials, nanomaterials,
Nanoparticles, self-organisation,
Biomimetic processes, Polyelectrolyte
deposition, Gas sensors, Bio-sensors,
optoelectronic devices]

PANNAPA HERABAT, BS, MS, PhD, Carnegie
Mellon Univ, USA.

Assistant Professor

[Infrastructure Management; Asset
Management Systems; Pavement
Management System(PMS); Bridge
Management System(BMS);
Infrastructure Engineering Economics;
Computer-Aided Engineering
Management; Geographic
Information Systems (GIS); Engineering
Database Systems]

Chapter 3: SET – COMPUTER SCIENCE and INFORMATION MANAGEMENT FIELDS OF STUDY

3.1 Introduction

Computer Science

This field of study fosters high level teaching and research in computer science and aims to meet the growing regional demand for persons skilled in various aspects of computing. One focus is on educating educators who can, in turn, effectively disseminate knowledge and skills to more people.

The core curriculum in computer science covers all aspects of computing, with the faculty particularly active in artificial intelligence, software engineering, networking and information systems. The field of study also endeavors to enhance teaching and research activities in computer architectures, object orientation, neural networks, multimedia and other rapidly-evolving areas in computer science.

The courses and research topics range from those addressing the practical problems of applications development, to those dealing with the abstract and theoretical issues of computer science and advanced computing. Students are also encouraged to take courses and conduct research in areas of Computer Science which interact with Information Management, Industrial Engineering, Manufacturing Systems Engineering, Telecommunications, Mechatronics and other fields of study covered at the Institute.

Information Management

This field of study is a strategic response to society's changing needs. It will continue to evolve as organizations cope with the proliferation and complexity of new information technologies and services. It is the first of its kind in Southeast Asia.

Information is an essential resource for academic excellence, competitiveness in business and industry, scientific progress, and national development. Like any other resource, information must be managed. High-quality sources must be located, and arrangements must be made for access to timely, accurate, appropriate, and cost-effective information. Technological advances in telecommunications and the hardware and software of computing can be utilized to provide the optimum access to information.

The need for information management skills in government and private organizations is increasingly recognized. People knowledgeable in methods of facilitating information collection, dissemination, and use are in demand. Such persons should also be skilled in identifying information needs and in accessing, repackaging, and presenting information in such a way that it can be utilized in support of the objectives of the users.

The Information Management curriculum is designed to prepare students to respond to four basic challenges confronting organizations today:

- Planning the effective use of information and communication technologies within organizations;
- Developing corporate and government policies to maximize the benefits resulting from the wide-spread use of these technologies;
- Improving the strategic management of information resources in business, government, and non-profit organizations; and

- Increasing the productivity and creativity of managers and executives who work with information resources.

3.2 Research Facilities and Laboratories

Organized around ten Unix servers, some of them being multiprocessors, CSIM network comprise about 60 micro-computers, running desktop and engineering applications, scientific and research software and programming languages, with full access to the Internet. Through AI3 project, a broadband satellite link is available to Japan and other countries in the region. This link is primarily dedicated for research activities in the field of internetworking, like the new generation of Internet IPv6, distributed education, video conferencing, and unidirectional routing. Dedicated laboratories are set-up with specialized equipments. Full wireless coverage in the building allows students to conveniently work with their personal notebook computers.

3.3 Faculty and Research Staff

Full-time Faculty

DENCHO N BATANOV, BSc, MSc, PhD, Technical Univ, Sofia, Bulgaria.
Professor (*Computer Aided Design; Computer Aided Manufacturing; Computer Integrated Manufacturing; Knowledge - Based Expert Systems; Object Orientation; Software Engineering*)
[Software Engineering; Object Orientation; Knowledge - Based Expert Systems; Computer Aided Teaching and Learning; Computer Aided Design; Computer Integrated Manufacturing; Computer Aided Manufacturing]

PHAN MINH DUNG, MSc, PhD, University of Technology, Dresden, Germany.
Professor (*Artificial Intelligence; Database Systems Development; Expert Systems; Geographic Information Systems; Knowledge Engineering;*

Multimedia; Natural Language Processing)

PETER HADDAWY, BA, Pomona College, Claremont, USA; MSc, PhD, Univ of Illinois, Urbana, USA.
Professor and Vice President for Academic Affairs

KANCHANA KANCHANASUT, PhD, MSc, Computer Science, University of Melbourne, Australia; Graduate Diploma, Computer Science, BSc Mathematics, University of Queensland, Australia.
Professor, DEC Director, and InterLab Director (*Algorithms; Logic Programming; Networks*)
[Constraint - Based Programming Languages; Real-time Systems; Computer Networking Applications]

VILAS WUWONGSE, DEng Systems Science, MEng Control Engineering, BEng Control Engineering, Tokyo Institute of Engineering, Japan.
Professor and Vice President for External Relations (*Artificial Intelligence; Database Systems Development; Expert Systems; Geographic Information Systems; Knowledge Engineering; Multimedia; Natural Language Processing*)
[Expert Systems; Computational Linguistics; Applications of Micro Computers; Multimedia; Databases]

VATCHARAPORN ESICHAIKUL, BAcc, Chulalongkorn Univ, Thailand; MBA, Oklahoma State Univ; PhD, Kent State Univ, USA.
Associate Professor

SUMANTA GUHA, MS, PhD, University of Michigan, Ann Arbor, USA; PhD, Indian Statistical Institute, Calcutta, India; BSc, MSc, University of Calcutta, India.
Associate Professor (*Electronic Data Interchange; Global Information Systems; Hypertext/Hypermedia; Management of Information Technology*)
[Computational Geometry; Computer Graphics; Computational Topology; Robotics (motion planning); Algorithms in general]

Visiting Faculty

PAUL JANECEK, BSEE, US Military Academy;
MSc, Univ of London, UK; PhD, Swiss
Federal Inst of Tech, Switzerland.
Visiting Lecturer

3.4 Completed Grant and Sponsored Research

AP* Retreat Secretariat

Duration: 1 September 2003 to 31 December 2005
Investigator: Prof Kanchana Kanchanasut
Sponsor: Asia Pacific Network Information Centre,
Australia
Total Contracted Amount: Baht 785,000

Automated Brokering for B2B E-Commerce

Duration: 1 May 2002 to 31 December 2005
Investigator: Prof Peter Haddawy
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 950,000

Destination Management for E-tourism in Thailand

Project Description: E-Tourism is one of the fastest growing E-Business sectors in Thailand. In order to promote E-Tourism, there is a need to find an effective approach to manage destinations. Electronic destination, operated by destination management organizations, help to improve downstream information flows with respect to quality, content presentation, speed, and accessibility. The aim of this project is to propose an electronic destination, supported by DMOs, for Thailand.

Duration: 1 April 2003 to 30 June 2005
Investigator: Dr Vatcharaporn Esichaikul
Collaborator: Sukhothai Thammathirat Open University,
Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 431,000

IP Broadcast over Satellite Link

Project Description: The project is to study the requirements in order to provide reliable communication service using unidirectional satellite broadcast without the acknowledgement from the recipients. From these requirements, a modeling of a protocol will be designed and implemented. The model will be tested and adjusted according to its scalability factor.

Duration: 1 March 2003 to 30 June 2005
Investigator: Prof Kanchana Kanchanasut
Collaborators: Dr Sukumal Imudom and Dr Surasak Sanguanpong, Kasetsart University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 760,000

V-Class Software Development

Project Description: VClass is an E-learning platform developed by the Distributed Education Center (DEC), intERLab, at the Asian Institute of Technology (AIT). It is specifically designed for delivering on-line courses by two different methods through virtual classroom learning or virtual class on demand.

Duration: 1 January 2003 to 31 December 2005
Investigator: Prof Kanchana Kanchanasut
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 2,844,730

Web community and Knowledge-based Intelligent System for Supporting Customer Relationship Management for Thai SME

Project Description: Small and Medium Enterprises (SME) are the root of Thai economy and play substantial role for its success. Since the customers are the major sources of companies revenue the relationships with customers are critical for successful business processes. This project has the main objective to develop a prototype of Collaborative Web-based environment (Web Community) and Knowledge-Based/ Expert system with CRM (Customer Relationship Management) related contents suitable for Thai SME. It is expected that the Web community to improve the communication between practitioners on one hand and practitioners and experts on the other, for exchanging CRM-related knowledge. It is expected also that the system provide required knowledge and best practice to the managers of Thai SME.

Duration: 1 October 2004 to 31 October 2005
Investigator: Prof Dencho Batanov
Collaborator: Dr Anongnart Srivihok, Kasetsart University,
Thailand
Sponsor: Royal Thai Government / Thailand SME
Total Contracted Amount: Baht 868,000

3.5 Ongoing / In Progress Grant and Sponsored Research

A Collaborative Intelligent Tutoring System for Medical Problem-Based Learning

Project Description: Our proposed work will combine concepts from ITS with those from CSCL to develop an intelligent group-based medical PBL system. Our proposed work departs from previous efforts to incorporate user modeling into computer supported collaborative environments by focusing on modeling individual and group problem solving behavior. The techniques will be implemented using client/server combination and will incorporate a multi-modal interface that integrates text and graphics so as to provide a rich communication channel between the students and the system, as well as among students in the group.

Duration: September 2004 to August 2005 (extended to March 2006)

Investigator: Prof Peter F Haddawy
Sponsor: Royal Thai Government Joint Research Fund
2004
Total Contracted Amount: Baht 942,500

Computer-Aided Learning Program for Health Professional Students in Diabetes Patient History Taking

Project Description: The development of the multimedia computer program (CAL) for health care professional students/diabetes patient history taking skills. The process is divided into 2 parts: 1) the development of the program via Authorware Professional version 7.1 which installed the contents of the chronic disease including: underlying disease, medication history, social and family history, diet, and exercise there are some video clips inserted into the program.

Duration: September 2004 to August 2005 (extended to March 2006)
Investigator: Prof Peter F Haddawy
Sponsor: Royal Thai Government Joint Research Fund
2004
Total Contracted Amount: Baht 156,000

3.6 Publications

Refereed Journals

- Anutariya, C, Wuwongse, V and Akama, K,** XML Declarative Description with First-order Logical Constraints, *Computational Intelligence*, Vol. 21, Issue 2, pp. 130-156, 2005.
- Chippimolchai, P, Akama, K, and Wuwongse, V,** Semantic Query Optimization - Correctness and Control, *Journal of Advanced Computational Intelligence and Intelligent Informatics*, 2006 (to appear)
- Guha, S and Tran, S D,** Reconstructing Curves without Delaunay Computation, *Algorithmica*, vol. 42, pages 75-94, 2005.
- Guha, S,** Joint Separation of Geometric Clusters and the Extreme Irregularities of Regular Polyhedra, *International Journal of Computational Geometry and Applications*, vol. 15, pages 491-510, 2005.
- Haddawy, P, Cheng, C, Rujikeadkumjorn, N,** and **Dhananaiyapergse, K,** Optimizing Ad Hoc Trade in a Commercial Barter Trade Exchange, In *Electronic*

Commerce Research and Applications, 4(4), pp. 299-314, 2005.

Janecek, P and P Pu, An Evaluation of Semantic Fisheye Views for Opportunistic Search in an Annotated Image Collection, *International Journal of Digital Libraries*, Vol 5, No. 1, pp. 42-56, 2005.

Rattanawicha, P and V Esichaikul, What Makes Web Sites Trustworthy?: A Two-Phase Empirical Study, *International Journal of Electronic Business*, Vol.3 (2), pp.110-136, 2005.

Tansupasiri, T, Kanchanasut, K, Barakat, C and Jacquet, P, Using active networks technology for dynamic QoS, *Computer Networks* 3206, Elsevier Publications (accepted)

Teswanich, W, Wuwongse, V and Anutariya, C, A Knowledge Management System Framework for Governmental Regulating Processes, *Electronic Government, An International Journal (EG)*, Vol. 3, Issue 1, p. 56-73, 2006 (to appear).

Tientanopajai, K and Kanchanasut, K, QoS-SPV: A Multi-Constrained QoS-based Routing for IP Networks, *Journal of Communications and Networks*, (accepted)

Refereed Books / Chapters

- Guha, S,** Computer Graphics through OpenGL: Experiments and Theory (In writing).
- Nantajeewarawat, E, and Wuwongse, V,** 2005, Knowledge-Based Inconsistency Detection in UML Models (Book chapter, p. 528) in *Handbook of Software Engineering and Knowledge Engineering*, Vol. 3: Recent Advances edited by **S K Chang**, ISBN: 981-256-273-7

Conference Proceedings

- Awal, M A, Kanchanasut, K, and Tsuchimoto, Y**, Multicast Packet Loss Measurement and Analysis over Unidirectional Satellite Network, *Asian Internet Engineering Conference (AINTEC) 2005*, LNCS 3837, pp 254-268, Springer-Verlag, Bangkok, December 2005.
- Bechter, C, and Esichaikul, V** (2005), Personalisation in E-Learning, Proceedings of *International Conference in Management Education*, Vietnam, September 7-8, 2005.
- Chippimolchai, P, Wuwongse, V and Anutariya, A**, Towards Semantic Query Optimization for XML Databases, Proceedings of the *2st International Conference on Data Engineering (ICDE'05)*, Tokyo, Japan, pp. 1237, April 2005.
- Chun, C and Guha, S**, DIP-MIP: Distributed Individual Paging Extension for Mobile IP in IP-Based Cellular Networks, Proceedings *IEEE International Symposium on Wireless IP* (part of IEEE Wireless Networks, Communications and Mobile Computing, Vol. 2, 1005-1010 (WirelessCom 2005).
- Chun, C, Guha, S and Hossain, A K M Mahtab**, Individual Profile Graphs for Location Management in PCS Networks, Proceedings *3rd IEEE International Workshop on Mobility Management and Wireless Access (MobiWac 2005, Vol. 1, 187-1992*, in conjunction with IEEE WirelessCom 2005).
- Ekapanayapong, S and Wuwongse, V**, MusicXML Computational Framework and Its Applications, Proceedings *International Conference on Intelligent Technology (InTech 2005)*, Phuket, Thailand, 14-16 December 2005.
- Esichaikul, V and Varavithya, W**, (2005), Design of E-Government Portal for Government-to-Business Service in Thailand, Proceedings of the *International Conference on Digital Environments 2005*, Shanghai, China, July 29-31, 2005.
- Esichaikul, V, Bechter, C, and Nhan, L T** (2005), A Last-Minute E-Auction for Hotel Rooms, Proceedings of the *5th International Conference on Electronic Business 2005*, Hong Kong, China, December 5-9, 2005.
- Fox, E A, Neuhold, E J, Premssmit, P and Wuwongse, V**, Digital Libraries: Implementing Strategies and Sharing Experiences, Proceedings of the *8th International Conference on Asian Digital Libraries, ICADL 2005*, Bangkok, Thailand, December 12-15, 2005, Lecture Notes in Computer Science 3815 Springer 2005, ISBN 3-540-30850.
- Guha, S and Kha'nh, K T**, Preprocessing Convex Polygons using Range Trees for Recognition with Few Finger Probes, Proceedings *11th International Conference on Computer Analysis of Images and Patterns (CAIP 2005)*, Springer LNCS 3691, pages 338-346.
- Haddawy, P and Suebnukarn, S**, Clinical-Reasoning Skill Acquisition through Intelligent Group Tutoring, To appear in Proceedings *International Joint Conference on Artificial Intelligence (IJCAI-05)*, Edinburgh, UK, July 2005.
- Haddawy, P, Dailey, M, Kaewruen, P, and Sarakhette, N**, Anatomical Sketch Understanding: Recognizing Explicit and Implicit Structure, To appear in Proceedings *10th Conference on Artificial Intelligence in Medicine*, Aberdeen, UK, July 2005.
- Hossain, A K M Mahtab, Kanchanasut, K, A** Handover Management Scheme for Mobile IPv6 Networks, *14th International Conference on Computer Communication and Networks (ICCCN) 2005*, pp 43-48, IEEE Communication Society, San Diego, California USA, October 17-19, 2005.
- Iwaihara, M, Chatvichienchai, S, Anutariya, C and Wuwongse, V**, Relevancy Based Access Control of Versioned XML Documents, Proceedings of the *10th ACM Symposium on Access Control*

Models and Technologies, SACMAT 2005
pp. 85-94.

Janecek, P and **Natividad, C**, Using Knowledge Structures to Analyze and Communicate Dynamic Web Content, In proceedings of *Joint Conference on Computer Science and Software Engineering*, Nov. 17-18, 2005, Chonburi Thailand.

Janecek, P, **Schickel, V**, and **Pu, P**, Concept Expansion Using Semantic Fisheye Views, In proceedings of *8th International Conference on Asian Digital Libraries*, Dec 13-15, 2005, Bangkok, Thailand.

Mahtab Hossain, A K M and **Kanchanasut, K**, A Handover Management Scheme for Mobile IPv6 Networks, *14th International Conference on Computer Communication and Networks (ICCCN) 2005*, pp 43-48, IEEE Communication Society, San Diego, California USA, 17-19 October 2005.

Nasir, M and **Janecek, P**, A Framework for Integrating Faceted Classification within a Content Management System, In proceedings of *Joint Conference on Computer Science and Software Engineering*, Nov. 17-18, 2005, Chonburi Thailand.

Suebnuakarn, S and **Haddawy, P**, Modeling Individual and Collaborative Problem Solving in Medical Problem-Based Learning, To appear in Proceedings *10th Int'l Conference on User Modeling (UM'2005)*, Edinburgh, UK, July 2005.

Varavithya, W and **Esichaikul, V** (2005), The Collaborative Model to Support Discretionary Decision-Making in E-Government, Proceedings of *EGov2005*, Brunel University, UK, September 13, 2005.

Varavithya, W and **Esichaikul, V** (2005), Using Composite Act Frame Technique to Model the Rule of Origin Knowledge Representations in E-Government Services, Proceeding of *The Ninth Pacific Asia Conference on Information Systems*, Bangkok, Thailand, July 7-10, 2005.

Wuwongse, V, Towards Libraries as Paradise - A Thai Experience of Library Transformation, Proceedings *International Advanced Digital Library Conference (IADLC 2005)*, Nagoya, Japan, 25-26 August 2005.

3.7 Doctoral Students' Dissertation

Computer Science

Active Networks Technology and Dynamics QoS

by Tippyarat Tansupasiri
Supervisor: Prof Kanchana Kanchanasut

Adaptive Quality-of-Service Routing for the Internet

by Kitt Tiantanopajai
Supervisor: Prof Kanchana Kanchanasut

An Agent Model for Computer Performance Enhancement

by Poonphon Suesaowaluk
Supervisor: Prof Ramakoti Sadananda

Cellular Automata-Studies in Critical Densities

by Sriporn Supratid
Supervisor: Prof Dencho N Batanov

Converting Text Description to Object Model Using Ontologies

by Waralak Vongdowiang
Supervisor: Prof Dencho N Batanov

Information Management

Communicating Customer Trust in E-Commerce through Website Design

by Pimmanee Rattanawicha
Supervisor: Dr Vatcharaporn Esichaikul

Intelligent Tutoring for Medical Problem-Based Learning

by Siriwan Suebnukarn
Supervisor: Prof Peter F Haddawy

Recurrent Neural Networks as Forecasting Models

by Suwarin Pattamavorakun
Supervisors: Dr Manukid Parnichkun
Prof Huynh Ngoc Phien

3.8 Masters Students' Theses and Research Studies

Computer Science

Access Control in Outlook Application

by Nguyen Dinh Han
Supervisor: Prof Phan Minh Dung

Access Control with Spatial/Temporal Information

by Chalid Nalampoon
Supervisor: Prof Vilas Wuwongse

Access Control with Versioning and Timing in Digital Repositories

by Satja Hongyok
Supervisor: Prof Vilas Wuwongse

Agent-Based Simulation of Trade in Barter Trade Exchanges

by Nattiya Kanhabua
Supervisor: Prof Peter Haddawy

An Integrated Open Framework for Mining Sensor Data

by Ren Jianli
Supervisor: Dr Vatcharaporn Esichaikul

A Practical Approach towards Server-Less Group Member Authentication Protocol for Mobile Ad Hoc Network

by Md Musfiq Rahman
Supervisor: Prof Kanchana Kanchanasut

A Robust Document Layout Analysis Algorithm for Vietnamese Documents

by Nguyen Duc Thanh
Supervisor: Dr Nitin V Afzulpurkar

A Strand-Based Analysis of the Protocol TLS

by Parinya Chalermsook
Supervisor: Prof Phan Minh Dung

A Trustable Anti-Spamming Simple Mail Transfer Protocol Model

by Pham Viet Tan
Supervisor: Prof Phan Minh Dung

A Web-Based Model Using Learning Objects for Teaching and Learning Classes and Instances in C++ and JAVA

by Nguyen Dieu Huong
Supervisor: Prof Dencho N Batanov

Computer Recognition of Sketch Annotations

by Rattapoom Waranusast
Supervisor: Prof Peter Haddawy

Content Packaging and Delivery of Learning Objects for Teaching and Learning through Web

by Kamal Thakor
Supervisor: Prof Dencho N Batanov

Convex Polygon Recognition

by Kieu Trong Khanh
Supervisor: Dr Sumanta Guha

DIP-MIP: Distributed Individual Paging Extension for Mobile IP in IP-Based Cellular Networks

by Chuon Chansophea
Supervisor: Dr Sumanta Guha

E-Learning and Session Initiation Protocol (SIP)

by Andrey Kuprianov
Supervisor: Prof Kanchana Kanchanasut

Extending Fixed Internet with Wireless Ad-Hoc Networks

by Sverre Rakkenes
Supervisor: Prof Kanchana Kanchanasut

Facial Expression Recognition and Its Degree Estimation Using Fuzzy Clustering Algorithm on Gabor-PCA Features

by Md Ashraf ul Amin
Supervisors: Dr Nitin V Afzulpurkar
Dr Vatcharaporn Esichaikul

Fast Mobile IPv6 for Real-Time Streaming Media

by A K M Mahtab Hossain
Supervisor: Prof Kanchana Kanchanasut

Gateway Selection Based on Gateway Load in Ad Hoc/Infrastructure Environment

by Ahmed Waliullah Kazi
Supervisor: Prof Kanchana Kanchanasut

Implementing the SWAP-GA Model in Cluster Computers

by Md Shamim Akhter
Supervisors: Dr Kiyoshi Honda
Dr Putchong Uthayopas

Integrating an Intelligent Agent and Learning Objects to Improve Content Management in Web-Based Teaching and Learning

by Wang Qing
Supervisor: Prof Dencho N Batanov

IP Packet Loss and Recovery over Unidirectional Satellite Network

by Mohammad Abdul Awal
Supervisor: Prof Kanchana Kanchanasut

IT Security Policy Framework and Denial of Service Attack

by Vo Khac Thanh
Supervisor: Prof Phan Minh Dung

Maximizing Barter Trade over the Long Run

by Hoang Than Anh Tuan
Supervisor: Prof Peter Haddawy

Scalability Analysis of Reliable Multicast Protocol for a Unidirectional Satellite Link

by Ngo Le Minh
Supervisor: Prof Kanchana Kanchanasut

Speech Act Oriented Language for Secure Group Communication

by Le Minh Trung
Supervisor: Prof Phan Minh Dung

Teaching and Learning Exceptions Handling Mechanism in JAVA and C++ Using Learning Objects

by Myat Su Myint
Supervisor: Prof Dencho N Batanov

Teaching and Learning Inheritance in C++ and JAVA by Using Learning Objects in Web-Based Environment

by Hnin Wut Yee
Supervisor: Prof Dencho N Batanov

Teaching and Learning Java Server Pages through Learning Objects in Web-Based Environment

by Dang Vu Linh
Supervisor: Prof Dencho N Batanov

Teaching and Learning of Databases Connectivity in Programming Languages Using Learning Object Technology

by Myat Su Yin
Supervisor: Prof Dencho N Batanov

Teaching and Learning Polymorphism in JAVA and C++ Using Learning Objects

by Syed Muntasir Husain Bokhari
Supervisor: Prof Dencho N Batanov

Teaching and Learning Templates in C++ Using Learning Objects

by Tran Quoc Hoan
Supervisor: Prof Dencho N Batanov

Web-Based Teaching and Learning UML Elements Using Learning Objects

by Dang Hai Dang
Supervisor: Prof Dencho N Batanov

Research Study: Graphics Techniques in 3D Game Design

by Nguyen Binh Duong
Supervisor: Dr Sumanta Guha

Research Study: Knowledge Management for Productivity Improvement

by Afroza Nahar
Supervisor: Dr Vatcharaporn Esichaikul

Research Study: Secure Online Transaction

by Ngo Tuan Anh
Supervisor: Prof Phan Minh Dung

Information Management

A Multi-Attribute Electronic Negotiation Support System

by Pham Duc Cuong
Supervisor: Dr Vatcharaporn Esichaikul

Anatomical Sketch Recognition

by Ploen Kaewruen
Supervisor: Prof Peter Haddawy

Anatomical Sketch Segmentation

by Natapope Sarakhetta
Supervisor: Prof Peter Haddawy

An Ontology-Based Hybrid Digital Library System

by Natapone Charsombut
Supervisor: Prof Vilas Wuwongse

Building a Payment Application and Information Website for the Electricity Industry's E-Marketplace

by Hoang Anh Tuan
Supervisor: Dr Vatcharaporn Esichaikul

Business Intelligence for Customer Relationship Management

by Liu Heying
Supervisor: Dr Vatcharaporn Esichaikul

Development of a Learning Management System Working with Learning Objects

by Suji Joe
Supervisor: Prof Dencho N Batanov

Effect of Learning Style and Communication Method on Performance in E-Learning

by Burusskorn Theanthano
Supervisor: Dr Vatcharaporn Esichaikul

Integrated Framework for Measuring IT Effectiveness

by Tran Hong Duong
Supervisor: Dr Vatcharaporn Esichaikul

Learning Object-Based Support of a Teaching and Learning Input-Output Mechanism in Object Oriented Programming

by Vipul Shah

Supervisor: Prof Dencho N Batanov

Learning Objects for Teaching and Learning Object-Oriented Perl Programming

by Phan Van Nam

Supervisor: Prof Dencho N Batanov

Modeling Company Spending Behavior with Time Series Neural Networks

by Tran Vinh

Supervisor: Prof Peter Haddawy

Network Effects of the Internet on Native Languages and Implications for the Digital Divide

by Mayuna Badeka

Supervisor: Dr Vatcharaporn Esichaikul

Ontology-Based Information System Design

by Cao Hong Thang

Supervisor: Prof Vilas Wuwongse

Teaching and Learning Structured Query Language (SQL) Programming with Learning Objects in a Web-Based Environment

by Rabin Kumar Gupta

Supervisor: Prof Dencho N Batanov

Research Study: A Comparative Study of Business Process Modeling Languages

by Nguyen Trong Thuy

Supervisor: Prof Vilas Wuwongse

Research Study: Analysis of an Information Network Model for Education Management and Development in Sri Lanka

by Hewa Marambage Piyadasa

Supervisor: Dr Vatcharaporn Esichaikul

Research Study: Digital Annotation Systems for Asynchronous Collaborative Writing Activities

by Tsering Dolker

Supervisor: Dr Vatcharaporn Esichaikul

Research Study: Identification of Critical Success Factors and Barriers of Global Software Outsourcing

by Guda Swarna Rani Reddy

Supervisor: Dr Vatcharaporn Esichaikul

Research Study: The Development of a Legal Frame for E-Commerce in Thailand

by Le Trung Dung

Supervisor: Dr Vatcharaporn Esichaikul

Chapter 4: SET – CONSTRUCTION, ENGINEERING AND INFRASTRUCTURE MANAGEMENT FIELD OF STUDY

4.1 Introduction

The Construction, Engineering and Infrastructure Management field trains professionals to play leading roles in the international construction industry and in infrastructure development and management. It offers courses in four levels - operations, project, strategic issues and corporate issues. It prepares students to become effective managers and decision-makers familiar with modern techniques of construction management, engineering management and infrastructure management.

The field's courses are delivered based on a hierarchical knowledge scale that considers principles and fundamentals, applications (tools and techniques), and emerging issues. In offering courses spanning fundamentals to advanced, the emphasis is on shifting from classical to innovative knowledge.

4.2 Faculty and Research Staff

Full-time Faculty

STEPHEN O OGUNLANA, BSc, MSc, Univ of Ife, Nigeria; PhD, Loughborough, Univ of Tech, UK.

Professor (*Construction Economics; Project Management; Productivity Improvement, Dynamic Modeling and Simulation, Human Resources Management*)

CHOTCHAI CHAROENNGAM, BEng, King Mongkut's Inst of Tech, Thonburi, Thailand; MS, Univ of Kansas; PhD, Univ of Texas, USA

Associate Professor (*Project Planning, Scheduling, and Controls; Construction Productivity Improvement; Information Technology in Construction*)

Management; Construction Disputes and Litigation)

BONAVENTURA H W HADIKUSUMO, BEng, Univ of Diponegoro, Indonesia; MEng, AIT; PhD, Univ of Hong Kong.

Assistant Professor (*Construction Information Technology; Construction Site Safety, Virtual Reality application in construction; Web-based project design and management; Design for X-ability; Construction simulation; Construction site safety; Cost control*)

PANNAPA HERABAT, BS, MS, PhD, Carnegie Mellon Univ, USA.

Assistant Professor
[Asset Management System; Pavement Management System; Bridge Management System (BMS); Infrastructure Economics; and Computer-Aided Engineering Management]

4.3 Completed Grant and Sponsored Research

A Markov Deterioration Model for Truck-Induced Cracking Bridge Decks

Project Description: The research develops a hybrid deck deterioration model that incorporates the quantitative analysis of crack mechanism due to truck traffic loads into the concept of Markov deterioration model for network-level management of bridges in Thailand. The computer program that can simulate the track mechanism in reinforced concrete bridge desk under truck traffic is developed. This includes finite element modeling of the reinforced concrete under cracked and uncracked states and a simulation process based on the bridge deck geometry, material properties, and truck traffic characteristics in Thailand. The simulation output is analyzed to obtain transition probability matrices in accordance with the concept of Markov deterioration model.

Duration: 1 September 2004 to 31 October 2005
Investigator: Dr Pannapa Herabat

Collaborator: Dr Sorawit Narupiti, Chulalongkorn University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 890,000

Construction Work Performance under Bovis Lend Lease Safety and Health Management System

Project Description: This study investigates the construction work performance under Safety and Health Management System of Bovis Lend Lease (BLL). The performance to be investigated includes labor productivity and stakeholders' satisfaction. The performance of BLL projects is benchmarked with projects managed by other companies in order to study the strength and weakness of BLL safety and health management systems.

Duration: September 2004 to May 2005
Investigator: Dr B H W Hadikusumo
Sponsor: Bovis Lend Lease (Thailand) Ltd
Total Contracted Amount: Baht 87,000

4.4 Ongoing / In Progress Grant and Sponsored Research

Consistency of Safety and Health Management System Implementation

Duration: May 2005 to December 2006
Investigator: Dr B H W Hadikusumo
Sponsor: Bovis Lend Lease
Total Contracted Amount: Baht 88,500.00

Construction Work Performance Under Bovis Lend Lease Safety and Health Management System

Project Description: This study investigates the construction work performance under Safety and Health Management System of Bovis Lend Lease (BLL). The performance to be investigated includes labor productivity and stakeholders' satisfaction. The performance of BLL projects is benchmarked with projects managed by other companies in order to study the strength and weakness of BLL safety and health management systems.

Duration: May 2005 to December 2006
Investigator: Dr B H W Hadikusumo
Sponsor: Bovis Lend Lease (Thailand) Ltd
Total Contracted Amount: Baht 88,500

EU-Asia Network of Competence Enhancement on Public-Private Partnerships (PPPs) in Infrastructure Development.

Project Description: An International Network on Public Private Partnerships. Researching into PPPs and developing teaching curriculum for PPPs. The Network members are Bauhaus Universitat Weimar, University of Manchester Institute of Science and Technology, Indian Institute of Technology, Madras, Asian Institute of Technology, and Tsinghua

University. The three-year EU funded research started in April 2004.

Duration: April 2004 to March 2007
Investigator: Prof Stephen O Ogunlana
Sponsor: The European Union
Total Contracted Amount: Euro 400,000

Inspection Manuals and Procedures for Expressway Transit Authority of Thailand

Project Description: Development of Inspection Manuals for Expressway & Rapid Transit Authority of Thailand. Detailed inspection procedures and manuals are developed in this project to assist the Expressway Rapid & Transit Authority to visually inspect the structural components of their existing expressways. Systematic inspection results are valuable data for maintenance management. In addition, this project will link the developed inspection procedures and manuals with the maintenance management system used by ETA.

Duration: December 2005 to June 2006
Investigator: Dr Pannapa Herabat
Sponsor: Expressway Transit Authority of Thailand
Total Contracted Amount: Baht 600,000.00

Seminar: CIB Symposium on Globalization and Construction 2004

Project Description: International Symposium organized on behalf of CIB Working Commission on W107 on Globalization and Construction: Meeting the challenges, reaping the benefits.

Duration: March 2004 to December 2005
Investigators: Prof Stephen O Ogunlana
Dr Chotchai Charoenngam
Dr Pannapa Herabat
Dr B H W Hadikusumo
Sponsor: Participants
Total Contracted Amount: Baht 1,025,000.00

Strategic Budgeting System II

Project Description: The performance-based budgeting system has been developed and applied in parts of the Royal Thai Government reform. This project is to assist in system development in collaboration with Chulalongkorn University at the Bureau of Budget, RTG.

Duration: October 2004 to March 2006
Investigator: Dr Chotchai Charoenngam
Sponsor: Chulalongkorn University
Total Contracted Amount: Baht 1,000,000.00

The Strategic Portfolio Program Management

Project Description: To assist the Ministry of Foreign Affairs, RTG, in designing and developing strategic program and management system that can be used to coordinate portfolio of initiatives arising from different government agencies under the National Foreign Affairs Strategy set forth by the 4-year National Strategy Framework.

Duration: October 2005 to March 2007
Investigators: Dr Chotchai Charoenngam
Dr B H W Hadikusumo
Sponsor: Ministry of Foreign Affairs
Total Contracted Amount: Baht 4,978,000.00

4.5 Publications

Refereed Journals

- Chantawit, D, Hadikusumo, B H W and Charoenngam, C** (2005), 4DCAD-Safety: Visualizing Project Scheduling and Safety Planning, *Construction Innovation*, Vol. 5, pp. 99-114.
- Damrong, C, Hadikusumo, B H W, Charoenngam, C, and Rowlinson, S** (2005), 4DCAD-Safety: Visualizing Project Scheduling and Safety Planning, *Construction Innovation Journal*, Vol. 5, pp. 99-114.
- Hadikusumo, B H W, Petchpong, S, Charoenngam, C**, Construction Material Procurement Using Internet-Based Agent System, *Automation in Construction*, Vol. 14, Elsevier, 2005.
- Herabat, P and Tangphaisankun, A**, Multi-Objective Optimization Model using Constraint-Based Genetic Algorithms for Thailand Pavement Management, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 1137-1152, September 2005.
- Manowong, E and Ogunlana, S O**, Public Hearing on Rural Infrastructure Development Projects in Thailand: The Case of the Ta Chin River Barrages, *CIRDAP Journal, Asia-Pacific Journal of Rural Development*, Vol. XV, No.1., pp. 41-54, July 2005.
- Nguyen, D L and Ogunlana, S O**, Modeling the Dynamics of an Infrastructure Project, *Computer Aided Civil and Infrastructure Engineering*, 20, pp-265-279, 2005.
- Posayanant, S and Charoenngam, C**, Balanced Scorecard-Based Performance Measurement for Rural Infrastructure Development of Thai Sub-District Local Government, *Asia-Pacific Journal of Rural Development*, Vol. 15 (1), pp. 21-37, 2005.

- Yaoyuenyong, C, Hadikusumo, B H W, Ogunlana, S O, and Siengthai, S**, Virtual Construction Negotiation Game - An Interactive Learning Tool for Project Management Negotiation Skill Training, *International Journal of Business and Management Education*, Vol. 13(2), 2005, pp. 21-36.
<http://www.usq.edu.au/business/journals/ijbme/default.htm>, 2005.

Refereed Books/Chapters

- McNeil, S and Herabat, P**, Chapter 17: Highway Asset Management System, *The Handbook of Highway Engineering*, CRC Press, 09/2005, ISBN: 0-8493-1986-2.

Conference Proceedings

- Ogunlana, S O**, The implications of success factors on large projects for the management of international joint ventures. Proceedings *International Conference on multi-national joint ventures for construction works*, Penang Malaysia, March 4-6, 2005, pp. 1-7.
- Pettongkam, P and Herabat, P**, Mechanistic Pavement Deterioration Modeling including Thermal Effects, Proceeding of the *5th International Conference on Road & Airfield Pavement Technology*, Korea, May 2005.
- Sunindjo, R and Hadikusumo, B H W**, 2005, Benefits of Emotional Intelligence to Project Management: A Study of Leadership and Conflict Resolution Styles of Project Mangers in Thailand, *QUT Research Week Conference*, 4-5 July 2005.

Other Publications

- Charoenngam, C and Treerat, N**, Output Structure for Strategic Performance Based Budgeting (SPBB), A Research Report for Bureau of Budget, Office of the Prime Minister, Royal Thai Government (RTG), 2005. (in Thai)

Ogunlana, S O, Public Private Partnerships- Gold Mining in partially cleared minefields, *International Symposium on Public Private Partnerships*, Hong Kong.

Shamas-ur-Rehman-Toor and Ogunlana, S O, What is critical for success - Investigating the critical success factors and key performance indicators for Mega construction projects, *Society for Project Management Conference*, Singapore, August, 2005.

4.6 Doctoral Students' Dissertation

Improvement of the Rural Infrastructure Development Process in Thai Sub-district Local Government
by Narong Leungbootnak
Supervisor: Dr Chotchai Charoenngam

Testing of Herzberg's Motivation Theory in the Construction Industry
by Rathavoot Ruthankoon
Supervisor: Prof Stephen O Ogunlana

4.7 Masters Students' Theses and Research Studies

A GIS-Based Decision Module for Pavement Management in Thailand
by Ittiwat Keratiwatanakul
Supervisor: Dr Pannapa Herabat

An Application of Asset Valuation for Railroad Tracks
by Chinnawit Yamkruan
Supervisor: Dr Pannapa Herabat

An Application of Planning and Control Techniques in Thai Construction Projects
by Kriengkai Payapwattanawong
Supervisor: Dr Chotchai Charoenngam

Assessing Safety Management Practices in the Bhutanese Construction Industry
by Kin Dorji
Supervisor: Dr Bonaventura H W Hadikusumo

A Web-Based Application to Support Quality Management Documentation for a Construction Company
by Noppadol Kaewborisut

Supervisor: Dr Bonaventura H W Hadikusumo

Building an Innovation Management System in a Construction Multi-Business Corporation
by Nguyen Van Hoai
Supervisor: Dr Chotchai Charoenngam

Case Studies of Solid Waste Collection in Karachi, Pakistan
by Muhammad Rizwan
Supervisor: Prof Stephen O Ogunlana

Cash Flow Planning Application for Construction Projects
by Nakorn Nakwarin
Supervisor: Dr Bonaventura H W Hadikusumo

Construction Process Improvement for a Mass Housing Project: A Case of Pre-cast Housing Construction
by Pratigya Pradhan
Supervisors: Prof Stephen O Ogunlana
Dr Chotchai Charoenngam

Construction Work Performance under Bovis Lend Lease Safety Program
by Thanapat Leingtong
Supervisor: Dr Bonaventura H W Hadikusumo

Collaborative Solving Problems between Consultants and Contractors
by Wijitra Mahavarakorn
Supervisor: Dr Chotchai Charoenngam

Culture and Workplace Behaviors: A Case Study of Joint Venture Construction Projects in Thailand
by Yoyu Toto Roma
Supervisor: Prof Stephen Ogunlana

Development of a Prediction Model and Prioritization of the Expressway Maintenance Management System
by Mohammad Shahidul Islam
Supervisor: Dr Pannapa Herabat

Knowledge Management in the Estimating Process in a Construction Organization
by Mohammad Kamal Hossain
Supervisor: Dr Bonaventura H W Hadikusumo

Management of Mega Projects: Case Study of the Second Bangkok International Airport
by Shamas-ur-Rehman Toor
Supervisor: Prof Stephen O Ogunlana

Motivation of Construction Engineers in Yunnan, China
by Dai Jiliang
Supervisor: Prof Stephen O Ogunlana

Multicriteria Decision Making for Highway Management System

by Mohammad Mamunur Rashid
Supervisor: Dr Pannapa Herabat

Owner's Risk Management for Civil Construction Projects in Vietnam

by Nguyen Thanh Huy
Supervisor: Prof Stephen O Ogunlana

Public Project Financial Planning: The Asset-Based Approach for Vietnam Transport Infrastructure

by Nguyen Thi Cam Tu
Supervisor: Dr Chotchai Charoenngam

Reliability-Based Optimal Inspection Interval

by Dolyawich Nongpong
Supervisor: Dr Pannapa Herabat

Risk Management in the Pakistan Construction Industry: A Contractors' Perspective

by Asif Hameed Malik
Supervisor: Prof Stephen O Ogunlana

Rural Road Development and Poverty Alleviation in the Lao PDR

by Emi Doyle
Supervisors: Prof Stephen O Ogunlana
Dr Shinya Hanaoka

Social Impact Assessment Development for Roads Projects in Thailand

by Siriporn Sumonwattanadej
Supervisor: Dr Pannapa Herabat

Strategic Management Process of Vietnamese Construction Organizations in Ho Chi Minh City

by Nguyen Huu Nghia
Supervisor: Dr Chotchai Charoenngam

The Integrated Performance Indicator for Airport Pavement Evaluation

by Yongyot Rotchaya
Supervisor: Dr Pannapa Herabat

Chapter 5: SET – DESIGN & MANUFACTURING ENGINEERING AND INDUSTRIAL ENGINEERING & MANAGEMENT FIELDS OF STUDY

5.1 Introduction

Design and Manufacturing Engineering

Design and Manufacturing Engineering field of study prepares students to manage advanced manufacturing technologies, focusing on the selection, use, control, design and integration of computer controlled manufacturing systems. The Design and Manufacturing Engineering curriculum reflects the objective of imparting fundamental knowledge to develop the ability to address the complex interaction between manufacturing, computers and industry.

Industrial Engineering and Management

Industrial Engineering and Management field of study prepares students for manufacturing management and decision support positions in industry and public sector, by equipping them with a broad range of decision making skills for a variety of applications. The IE&M curriculum reflects the objective of imparting fundamental knowledge to develop the ability to address complex industrial issues, emphasizing on how to design, run, control, and optimize the production systems.

5.2 Research Facilities and Laboratories

IEM and DME fields share all the laboratory facilities with Mechatronics and Microelectronics fields of study. There are several well equipped laboratories with the primary function of supporting the students and faculty for teaching and research and to conduct outreach programs.

Computer Integrated Manufacturing (CIM) Laboratory

The Computer Integrated Manufacturing (CIM) Laboratory was officially inaugurated on September 23, 1991. It provides the hardware and software support for Industrial Systems Engineering. Many research activities have been undertaken in close collaboration with industry and government sectors in the area of Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Numerical Control (CNC), Rapid Prototyping (RP) and Medical Technology. The CIM Laboratory also provides specialized training and consultancy services in CAD, CAM, CNC Machining, Reverse Engineering, Rapid Prototyping, Packaging Technology, Flexible Manufacturing Systems [FMS], and Development of Postprocessor for 5-axis CNC.

The CIM Laboratory is equipped with production and training CNC machines including EMCO TURN242 industrial production CNC lathe, EMCO VMC200 CNC vertical machining center for universal production, MAHO MH600E2 5-axis universal milling and boring machine, EMCO compact 5 CNC, EMCO F1 CNC, LVD CNC press brake, LVD water-jet cutting CNC, ZOLLER tool presetting system, and Mondiale Gallic G-420 Industrial CNC lathe, EMCO CNC training system, CAD/CAM software including UNIGRAPHICS NX4, Master CAM 9.1, Mechanical Desktop 6, AutoCAD Inventor Series, SolidWorks 2005, CAM 2000, Mimics 6.3 & Magic 5.4.

Metrology Laboratory

Metrology Laboratory provides the hardware and software support for Industrial Systems Engineering. Metrology Laboratory is equipped with Measuring Instruments (Zeiss

CMM, Mitutoyo Profile Projector, Taylor Hobson Surface Roughness Tester, Lab View Hardware & Software).

Mechatronics and Automation Laboratory

This lab is equipped with many PLC systems (S5, S7-200/ 300/400, INDRAMAT, BOSCH), distributed control systems (PCS7), operator panels (OP5, OP17/DP, OP35), PC-based human machine interface package (WINCC), and networked fieldbuses (PROFIBUS, INTER-BUS, SERCOS). The lab has mobile robots (NOMAD, PIONEER 2), Robot arms (CRS), Industrial Robot (KUKA-KR15), a self-made Open Architecture CNC machine, CNC control systems (MTC200, SINUMERIK 81 00/8400), image processing systems (DVT, MATROX), and FPGAs (XILINX-1i VIRTEX PRO, ALTERA). Software packages such as SYNOPSIS IC Design, ANYSIM, ANSYS, ADAMS, and many types of special sensors and actuators are also available for the research use.

Many research activities have been undertaken in close collaboration with industry and government sectors in the area of industrial automation, robotics, control, system design and integration. Some examples of the research are: medical tele-analyzer, automated visual inspection systems, MEMS design, autonomous flying robot, automating centrifuge machines, autonomous under-water robot, automating crystallization process, etc.

Simulation Laboratory

This lab is equipped with networks of Pentium PC for general applications and internet access, high end CAD/CAM & Simulation software such as ARENA and AutoMOD. In addition, a high performance computer facility with parallel cluster is also available for research use.

Microelectronics Laboratory

The microelectronics facilities consist of two main laboratories:

- (1) IC Design Lab
- (2) Nanotechnology

The IC Design lab computers have standard software useful for studying and research. ANSYS, Orcad, ModelSim SE, Xilinx ISE, Synopsys, Leonardo Spectrum LS, Tanner (S-Edit for Schematic Capture, T-Spice and W-Edit for Simulation and L-Edit for Physical Layout) are some of the software which are available. All the computers are networked through a high end (Intel XEON) server which is secure from external attacks. The laboratory facilities are used for Analog and digital circuit design, Microchip design and fabrication, MEMS, Micro-actuators and micro-sensors design, Computational electronics, etc. The fabrication is done in cooperation with NECTEC, NSTDA, Thailand.

The Nanotechnology Laboratory consists of a chemistry lab, instrumentation room and an electronics laboratory. The chemistry laboratory is equipped with standard chemical tables and hood for carrying out wet-chemical processing. The instrumentation room consists of equipments like optical spectrophotometer, microscope etc. The electronics laboratory is equipped with digital oscilloscopes, signal generators, power supplies, standard voltage and current meters as well as stocked with discrete devices for testing and research. This laboratory is used for teaching and research especially in the processing related subjects.

5.3 Faculty and Research Staff

Full-time Faculty

MARIO T TABUCANON, BSEE, BSME, Cebu Inst of Tech, Philippines; MEng, DEng, AIT, Thailand.

Professor (*Multiple Criteria Decision Making; Operations and Production Management; Operations Research; Project Management; Systems Modeling*)

ERIK L J BOHEZ, BEng, High Tech Inst St Antonius, Ghent; MEng, State Univ of Ghent, Belgium.

Associate Professor (*Computer Aided Design; Computer Aided Manufacturing; Computer Graphics; Computer Numerical Control; Five Axis*)

Machining; Fractal and Holistic Manufacturing; Robust Control; Simulation of Metal Removal; Virtual Axis Machine)
[CNC/CAD/CAM; Five Axis Machining; Holonic and Fractal Manufacturing; Mold and Die Design]

VORATAS KACHITVICHYANUKUL, BS, Natl Taiwan Univ; MEng, AIT, Thailand; PhD, Purdue Univ, Indiana, USA
Associate Professor (*Simulation; ERP; Scheduling, Metaheuristics; Parallel Computing*)
[Planning and Scheduling Systems; Enterprise Resource Planning Systems; Supply Chain Modeling and Analysis; Discrete Event Simulation Software Development; Manufacturing System Simulation; Manufacturing Decision Support Systems; Just-in-Time Manufacturing System]

ANULARK TECHANITISAWAD, BEng, Kasetsart Univ, Thailand; MBA, Eastern Michigan Univ; PhD, Texas A&M Univ, USA
Associate Professor (*Branch-and-cut for assembly system design with zonings; Integer and Combinatorial Optimization; Integrated location and vehicle routing; Mathematical Programming*)

PISUT KOOMSAP, BEng, Thammasat Univ, Thailand; MSc, Univ of Louisville; PhD, Pennsylvania State Univ, USA
Assistant Professor (*Sensing and Control for Manufacturing Processes and Systems; Laser Applications in Manufacturing; Rapid Prototyping; Condition-Based Maintenance; Continuous Improvement*)
[Rapid Prototyping; Sensing and Control for Manufacturing Processes and Systems; Laser Applications in Manufacturing; Condition-Based Maintenance; Continuous Improvement]

HUYNH TRUNG LUONG, BEng, Ho Chi Minh City Univ of Tech, Vietnam; MEng; DEng, AIT, Thailand.
Assistant Professor
[Emergency inventory policies and inventory policies for perishable products; Supply chain design;

Measures of bullwhip effect in supply chains; Availability-based and reliability-based maintenance; Fuzzy quality control charts; Statistical design of experiments; Network flows related problems]

Visiting Faculty

INGO BÜREN, Dipl-Ing, Universität des Saarlandes; PhD, Univ of Saarbrücken, Germany
Visiting Professor
[Packaging design and marketing].

MOHAMMED QUADDUS, BS, Bangladesh Univ of Engg & Tech; MEng, AIT; MS, and PhD, Univ of Pittsburgh, USA
Visiting Professor
[Information & Decision Systems, Strategic Decision Support, Group Support Systems, Scenario Planning, Strategic IS Management, Knowledge Management, Business Process Reengineering, Logistics and Supply Chain Information Management, System Dynamics in Strategic Management, Multiple Criteria Decision Making, Theories & Applications of IT Diffusion]

UMESH CHANDRA RAY, BSc, RIT Jamshedpur; MTech, IIT Kanpur; PhD, IIT Kharagpur, India
Visiting Professor
[Computer Applications to Industrial Engineering Problems]

5.4 Completed Grant and Sponsored Research

A New Software for 5-Axis Machining Optimization, Simulation, and Verification (Joint Project with SIIT and CIM Lab AIT)

Project Description. Optimization of cutting operations is an active area of research in the CNC-based manufacturing. The limited capabilities of the CAD/CAM systems require a new software based on rigorous mathematical analysis verified by practical machining. The project aims to further the current research by producing a graphic simulator of a multi-axis milling machine linked with new and conventional optimization procedures. The main results of include six new numerical

algorithms for tool path optimization of the five-axis milling machines endowed with interactive user friendly graphic interface. The results also include routines for visualization of the tool path (part surface and machine coordinates), errors (over cuts and undercuts), machining strips, part surface positioning, the tool orientations etc. The software also includes an IGES viewer and translator. The software has been verified by a variety of surfaces including one of the most challenging parts, a blade of an industrial impeller. The results also include an open source library, a website of the 5 axis machining community of Thailand: www.5axis.thai.com, seven research papers in top international journals. All the algorithms have been published in top international journals (*Computer Aided Design, International Journal of Production Research, Machines Tools and Manufacture and Applied Numerical Mathematics*) and many international conference papers.

Duration: January 2002 to November 2005
Investigator: Assoc Prof Erik L J Bohez
Sponsor: NECTEC
Total Contracted Amount: Baht 1,326,400

5.5 Ongoing / In Progress Grant and Sponsored Research

Biodegradable Polylactide and Natural Rubber for Multicolor Articles Rapid Prototyping

Project Description: Rapid Prototyping (RP) is a method to manufacture products without mold and die. Three-dimension CAD solid models are translated into stacks of 2D cross-sections, used to generate commands to fabricate physical prototypes layer by layer. Several of RP systems are commercially available in the market today, and many techniques are in research. The trend of new RP techniques is towards low cost systems that are compatible with various types of materials, and capable of making multicolor articles. This research proposes to develop a process to produce multicolor articles from two economically significant raw materials of Thailand; the environmental-friendly polylactide and natural rubber to strengthen the capability of Selective Vacuum Manufacturing (SVM), a new RP technique being developed at AIT. In this proposed process, four process-colored pigments are mixed with base materials according to the input color from the design, and transferred to feeder of SVM system, where the material is filled layer-by-layer to manufacture multicolor parts. The outcome of this research will provide a capability of producing multicolor articles from environment-friendly materials with inexpensive RP technique, affordable to middle and small companies.

Duration: December 2005 to December 2006
Investigator: Dr Pisut Koomsap
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 785,000

Evaluation of the Modernization of Technical Education in Production Technology

Project Description: The purpose of the project is to evaluate the results of the Project "Modernization of Technical Education in Industrial Production Technology" Phase I, implemented between 1994 and 1998 by EMCO under contract with Rajamangala Institute of Technology (RIT). The study was limited to 10 sites, which were the object of the Phase I of the Project. The result of the evaluation is that the project was highly successful. A plan for further development is provided and suggestions to link to the Thai industry are given. Investments in new site campuses and CNC Technology Center are given. Curriculum and required training for RIT faculty and staff are suggested.

Duration: July 2001 to December 2007
Investigator: Assoc Prof Erik L J Bohez
Sponsor: EMCO/RIT
Total Contracted Amount: Baht 450,000

5.6 Publications

Refereed Journals

Hieu, L C, Sloten, J V D, Bohez, E L J, Khanh, L, Binh, P H, Oris, P, Toshev, Y, and Zlatov, N, Medical Rapid Prototyping Applications and Methods, *Journal of Assembly Automation*, Vol. 25, No. 4, 2005.

Koomsap, P, Shaikh, I, and Prabhu, V V, Integrated Process Control and Condition-Based Maintenance Scheduler for Distributed Manufacturing Control Systems, *International Journal of Production Research*, Vol. 43, No. 8, pp.1625-1641, 2005.

Leksakul, K and Techanitisawad, A, An Application of the Neural Network Energy Function to Machine Sequencing, *Computational Management Science*, Vol. 4, No. 4, pp. 309-338, 2005.

Luong, H T, and Nagarur, N N, Optimal Maintenance Policy and Fund Allocation in Water Distribution Networks, *Water Resources Planning and Management*, Vol. 131, No. 4, pp. 299-306, 2005.

Mongkalig, C, Tabucanon, M T, and Hop, N V, Heuristics for Job Shop Scheduling Problems with Progressive Weighted Tardiness Penalties and Inter-machine Overlapping Sequence-dependent Setup Times, *International Journal of Industrial Engineering and Management Systems*, Vol. 4, No.1, pp. 9-30, 2005.

My, C A, Bohez, E L J, Phien, H N, Tabucanon, M T, Makhanov, S S, and Munlin, M, On 5-Axis Freeform Surface Machining Optimization: Vector Field Clustering Approach, *International Journal of CAD/CAM*, Vol. 5, No. 1, 2005.

Watanapa, B and Techanitisawad, A, A Genetic Algorithm for the Multi-Class Contingent Bidding Model, *OR Spectrum*, Vol. 27, No. 4, pp. 525-549, 2005.

Watanapa, B and Techanitisawad, A, Simultaneous Price and Due Date Settings for Multiple Customer Classes, *European Journal of Operational Research*, Vol. 166, No. 2, pp. 351-368, 2005.

Refereed Books/Chapters

Kachitvichyanukul, V, Purintrapiban, U, and Utayopas, P, (eds), Simulation and Modeling: Integrating Sciences and Technology for Effective Resource Management, January 2005. (ISBN 974-8208-57-5)

Ullah, A M M S, Rahman, Md R, Kachitvichyanuluk, V, and Harib, K H, Fractal Dimension: A New Machining Decision-Making Parameter, in **J A Meech, Y Kawazoe, V Kumar and J F Maguire** (eds.), *Intelligence in a Small Materials World: The Fourth International Conference on Intelligent Processing and Manufacturing of Materials*, DEStech Publications, Inc., Lancaster, PA, pp. 470-486, 2005.

Conference Proceedings

Hieu, L C, Khanh, L, Sloten, J V D, Bohez, E L J, Hung, L T, Quang, N T, Toshev, Y, Zlatov, N, and Binh, P H, Current Developments In Biomedical Modelling, Proceedings of the *First International Conference on the Development of Biomedical Engineering in Vietnam*, Ho Chi Minh City, Vietnam, 27-29 July 2005.

Kasemset, C and Kachitvichyanukul, V, Simulation-based Tool for Implementing Theory of Constraints, Proceedings of the *APIEMS 2005 Conference*, Manila, Philippines, December 2005.

Luong, H T and Phien, N H, Measure of Bullwhip Effect in Supply Chain: the Case of AR(2) Demand Process, Proceeding of the *18th International Conference on Production Research, ICPR18*, Salerno, Italy, August 2005.

Luong, H T, The Effect of Lead Time on Bullwhip Effect in Supply Chain, Proceedings of the *2005 International Conference on Simulation and Modeling*, Bangkok, Thailand, January 2005.

Makhanov, S S, Munlin, M, and Bohez, E L J, Methods to Optimize the Tool Path of the Five Axis Milling Machine Developed by the SIIT-AIT Research Group '5 Axis Thai', Proceedings of *ACIAR2005*, Bangkok, 2005.

Nguyen, V L, Kachitvichyanukul, V, and Luong, H T, A Multistage Parallel Genetic Algorithm for Multi-Objective Job Shop Scheduling, Proceedings of the *APIEMS 2005 Conference*, Manila, Philippines, December 2005.

Pisuchpen, R and Bohez, E L J, Modeling and Optimization of Integrated Flexible Manufacturing, Assembly and Disassembly by Petri Net, Proceedings of *ICPR18*, Salerno, Italy, 2005.

Pongchairerks, P and **Kachitvichyanukul, V**, A Non-Homogenous Particle Swarm Optimization with Multiple Social Structures, Proceedings of the *International Conference on Simulation and Modeling 2005*, Bangkok, Thailand, January 2005.

Sinh, H V, **Thai, T X**, **Dong, N T**, **Bohez, E L J**, **Lin, T**, and **Tang, T D**, Tool Breakage Detection in CNC Machine Tools Based on Vibration Monitoring, Proceedings of *ICPR18*, Salerno, Italy, 2005.

Sunanon, P, **Koomsap, P**, and **Nachaisit, S**, Image Processing for Rapid Prototyping Technology, Proceedings of the *2005 International Conference on Simulation and Modeling*, pp. 249-253, 2005.

Trinh, T H and **Kachitvichyanukul, V**, A Simulation Approach for Performance Evaluation of Pull, Push Systems, Proceedings of the *International Conference on Simulation and Modeling 2005*, Bangkok, Thailand, January 2005.

Udomsakdigool, A and **Kachitvichyanukul, V**, Heterogeneous Multiple Colonies Ant Algorithm for Job-Shop Scheduling Problem, Proceedings of the *APIEMS 2005 Conference*, Manila, Philippines, December 2005.

Udomsakdigool, A and **Kachitvichyanukul, V**, Heterogeneous Ant Algorithm for Job Shop Scheduling, Proceedings of the *International Conference on Simulation and Modeling 2005*, Bangkok, Thailand, January 2005.

Waiyaganand, K and **Bohez, E L J**, Intelligent Feature Based Process Planning for Five-Axis Lathe, *International Computer-Aided-Design and Computer Graphics*, HKUST, Hong Kong, 7-10 December 2005.

Wannarumon, S and **Bohez, E L J**, Aesthetic Fitness of Art Forms based on IFS Fractals, Proceedings of *CAD05*, Bangkok, 2005.

Wannarumon, S, **Bohez, E L J**, and **Annanon, K**, Evolving Jewelry Design Based on IFS Fractals and Condensation Sets, Proceedings of *ICPR18*, Salerno, Italy, 2005.

5.7 Doctoral Students' Dissertation

Design and Manufacturing Engineering

Optimization of 5-Axis Freeform Surfaces Machining: Vector Field Clustering Approach
by Chu Anh My
Supervisor: Associate Professor Erik L J Bohez

Industrial Engineering and Management

Applications of the Neural Network Energy Functions in Solving Integer Programming Models
by Komgrit Leksakul
Supervisor: Dr Anulark Techanitisawad

Heuristics for Job Shop Scheduling Problems with Progressive Weighted Tardiness Penalties and Inter-machine Overlapping Sequence-dependent Setup Times
by Chatpon Mongkalig
Supervisor: Prof Mario T Tabucanon

5.8 Masters Students' Theses and Research Studies

Design and Manufacturing Engineering

An Expert System for Boiler Fans Maintenance Support Using Vibration Analysis Technique
by Nguyen Hong Long
Supervisor: Dr Pisut Koomsap

Application of Mini-SCADA in Hanoi Electrical Network
by Phung Quang Khai
Supervisor: Associate Professor Erik L J Bohez

A Preliminary Investigation on Abrasive Water Jet Milling (AWM) Process
by Amit Kumar
Supervisor: Dr Pisut Koomsap

Automatic Design of a Multi-Liquid not Mixed Cocktail Glass

by Aueychai Jitaua

Supervisor: Associate Professor Erik L J Bohez

Development and Implementation of a Braking Algorithm for a Car Crash Avoidance System

by Jakra Tandhavatana

Supervisor: Dr Pisut Koomsap

Industrial Engineering and Management

A Comparative Study of Third-Party-Logistics-Service Providers and Traditional Warehouse

by Mattaneeya Sengpanit

Supervisor: Dr Voratas Kachitvichyanukul

A GA-Benders Algorithm for Lot Sizing and Scheduling in a Multistage Production System with Sequence Dependent Setup

by Terasak Jitngarmkusol

Supervisor: Dr Anulark Techanitisawad

A Genetic Algorithm for Resource-Constrained Project Scheduling with Flexible Work Profiles

by Nguyen Tien Dung

Supervisor: Dr Anulark Techanitisawad

A Genetic Algorithm for Resource-Constrained Project Selection and Scheduling

by Trinh Quoc Vu

Supervisor: Dr Anulark Techanitisawad

An Ant Colony Algorithm for Solving Multi-Depot Vehicle Routing Problems with Time Windows

by Tossaporn Nakay

Supervisors: Dr Anulark Techanitisawad
Dr Voratas Kachitvichyanukul

An Enhanced Genetic Algorithm for Multi-Objective Job Shop Scheduling

by Nguyen Van Lam

Supervisor: Dr Voratas Kachitvichyanukul

An Inspection Maintenance Model for Power Transformers: A Case Study of Bangpa-In Substation, Electricity Generating Authority of Thailand

by Chanchai Singkeewan

Supervisor: Dr Huynh Trung Luong

A Periodic Review Inventory Model with Joint Orders for a Retail Gas Station

by Le Nhu Hung

Supervisor: Dr Anulark Techanitisawad

A Periodic Review Inventory Model with Uncertain Demand in a Two-Echelon Distribution System

by Pham Thi Thu Hoai

Supervisor: Dr Anulark Techanitisawad

Application of Genetic Algorithm in Continuous Flow Shop Scheduling

by Bui Thanh Trung

Supervisor: Dr Huynh Trung Luong

Application of Tabu Search in a Resource-constrained Project Scheduling Problem: A Case Study in Vietnam

by Le Quy Quan

Supervisor: Dr Huynh Trung Luong

A Production Optimizaton Model for Oil Refinery

by Tran Quang Thao

Supervisor: Dr Voratas Kachitvichyanukul

A Simulation Model for Wire Harness Assembly of Automobiles

by Jocel R Cenabre

Supervisor: Dr Voratas Kachitvichyanukul

A Simulation Tool for Performance Evaluation of Hybrid CONWIP/KANBAN Control Policy

by Chu Thanh Chung

Supervisor: Dr Voratas Kachitvichyanukul

Continuous Flow Shop Scheduling: A Case Study of Additives and Petroleum Products Company in Hanoi, Vietnam

by Bui Huy Thanh

Supervisor: Dr Huynh Trung Luong

Decision Support System for Integrated Planning and Scheduling

by Kanokpoom Kungwalsong

Supervisor: Dr Voratas Kachitvichyanukul

Development of an Optimal Maintenance Policy for Roads: A Case Study in Vietnam

by Ta Manh Thang

Supervisor: Dr Huynh Trung Luong

Efficient Warehousing: A Case Study of a Toy Manufacturing Company

by Gajendra Dwivedi

Supervisor: Dr Huynh Trung Luong

Fuzzy Quality Control Chart

by Suksan Ruankaew

Supervisors: Dr Huynh Trung Luong
Dr Voratas Kachitvichyanukul

**Job Scheduling with Sequence-Dependent
Setup Time: A Case Study of Terdsak
Engineering 1991 Limited Partnership**
by Chatchai Chaloephanit
Supervisor: Dr Huynh Trung Luong

**Measures of Bullwhip the Effect in the Supply
Chain with Autoregressive Demand
Processes**
by Nguyen Huu Phien
Supervisor: Dr Huynh Trung Luong

**Performance Evaluation of Operation Policies
with Variable Product Mix**
by Nguyen Thi Xuan Hoa
Supervisor: Dr Voratas Kachitvichyanukul

**Production Planning: A Case Study in
Thanglong-Viglacera Ceramic Tiles
Company**
by Le Sy Trung
Supervisor: Dr Huynh Trung Luong

**Simulation-Based Tool for Theory of
Constraints (TOC) Implementation**
by Chompoonoot Kasemset
Supervisor: Dr Voratas Kachitvichyanikul

Chapter 6: SET – GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING FIELD OF STUDY

6.1 Introduction

Beside the traditional areas of foundation engineering, earth structures, underground excavations, land subsidence, and landslide mitigations, geotechnical engineers and researchers are increasingly involved in new and dynamic areas of ground improvement, geosynthetic engineering, land reclamation, lightweight materials, forensic engineering and the effective recycling of waste materials.

Furthermore, geotechnical engineers are increasingly challenged to solve environmental problems related to the reduction of construction wastes, provision of efficient waste disposal facilities, clean-up of contaminated sites as well as geological related hazards such as landslides and soil erosion. The GTE field of study also includes onshore and offshore exploration. In accommodating these requirements, the courses in the field have been enhanced to equip geotechnical engineers not only with traditional knowledge of soil mechanics and geology but also with skills in hydrogeology, geochemistry, biological processes, petroleum engineering, resource exploration, and geophysics. Students in the field are exposed to geomaterials, continuum mechanics and particulate/discontinuous media.

6.2 Research Facilities and Laboratories

The Geotechnical and Geoenvironmental Laboratory can be boasted as one of the most equipped geotechnical laboratories in the region with more than 30 years of experience in both soil and rock testing. The laboratory, which offer technical services on testing and research on the engineering behavior and properties of soil and rock;

geologic mapping; environmental geophysical surveys; and testing of geosynthetic materials conducted by ACSIG, consists of five (5) sections - Soil Mechanics, Rock Mechanics, Engineering Geology, Geophysics, and Geoenvironmental Engineering.

Soil Mechanics Laboratory

The Soil Mechanics Laboratory has facilities for testing and research on the engineering behavior and fundamental properties of soil. It is equipped to test compaction, seepage, compressibility, deformation and shear strength, soil dynamics, and ground improvement. Among other equipment, it has an automatic Central Data Acquisition System (CDAS) and two temperature-controlled rooms that house triaxial and consolidation equipment. Its field operation unit has a full range of tools for sampling soils and rocks and field test equipments for vane tests, Dutch cone tests, piezocone tests, pressuremeter tests, screw plate tests, electric logging, and vibration measurements.

Rock Mechanics Laboratory

The Rock Mechanics Laboratory has facilities to determine a variety of the physical and mechanical properties of rocks and rock aggregates required for research and practice. Moreover, the laboratory is capable of determining hardness, swelling and slake durability index properties of weak rocks. The laboratory has provided testing services to a large number of infrastructure projects in the region.

Engineering Geology Laboratory

The Engineering Geology Laboratory has facilities for research on the engineering behavior and fundamental properties of rocks and minerals. It provides classification and characterization tests for rock and

minerals including petrographic and X-ray diffraction studies. It has stereoscopes, radial line planimetric plotter, stereo-sketch and sketch masters for analysis and interpretation of airphotos as applied to mineral explorations, transportation route studies, forestry, and civil engineering.

Geophysics Laboratory

The Geophysics Laboratory is being developed for training and researches in Geosystem Exploration and Petroleum Geoenvironmental Engineering. It has a number of seismic, electric, magnetic and radiometric instruments, including some of the most advanced equipment such as DAS-1 (OYO), a multi-purpose hi-performance seismic data acquisition system, or SYSCAL R1 Plus (IRIS Instruments), an all-in-one multi-electrode resistivity and induced polarization (IP) imaging system. The Laboratory is capable of conducting and assisting in geophysical field surveys for engineering, environmental, mineral resources, oil and gas exploration as well as in performing analysis, interpretation and visualization of geophysical data acquired.

Geoenvironmental Laboratory

The Geoenvironmental Laboratory provides a variety of equipment for geoenvironmental engineering research. It has equipment for geotechnical and chemical analysis that supports research in fundamental processes related to soil, water and chemical interactions that are applied to site and risk assessment, waste containment systems, and remedial technology. The chemical analysis equipment, spectrophotometer, from which the ion concentration can be determined with good accuracy and precision, enables research on soil-contaminant interaction. Flexible wall permeameter, rigid wall permeameter and consolidation cell with permeameter are used to analyze water and chemical migration through waste containment systems. While the electrokinetic cell with advanced monitoring and controlled system is utilized for research in site reclamation and site remediation.

6.3 Faculty and Research Staff

Full-time Faculty

DENNES T BERGADO, BSCE, Mindanao State Univ, Philippines; MEng, AIT, Thailand; PhD, Utah State Univ, USA
Professor (*Soil/Ground Improvement Techniques, Geosynthetic Engineering, Landfill Liners, In-Situ Testing, and Geotechnical Engineering for Mitigation of Natural Hazards*)
[Ground improvement techniques and geosynthetics, In-situ testing, Geotechnical disaster mitigation, and Probabilistic/numerical methods in geotechnical engineering]

ULRICH GLAWE, Dipl-Geol, Univ of Erlangen-Nuremberg, Germany; MSc, Imperial College, UK; PhD, Univ of Erlangen-Nuremberg, Germany.
Associate Professor (*Geoenvironmental Engineering; Engineering Geology*)
[Geological hazards; Ground improvement using electrochemical stabilization; Contaminant transport in fine-grained soils; Landfill design for developing countries and in wet lands; Tsunami deposits]

NOPPADOL PHIEN-WEJ, BEng, Chulalongkorn Univ, Thailand; MS, PhD, Illinois at Urbana-Champaign, USA.
Associate Professor (*Tunnelling and other underground excavations in rocks and soils; Slope stability and retaining structures; Landslides; Earth structures and dams; Pile foundations; Buried pipes and culverts*)
[Soft ground tunnelling; Underground excavations in rock; Deep excavations; Land subsidence from deep well pumping; Rock properties]

KYUNG-HO PARK, BEng, MEng, Korea Univ; DEng, SUNY at Buffalo, USA.
Assistant Professor (*Geotechnical Engineering; Geomechanics; Computational Mechanics; Boundary Element Methods*)

Research Staff

PHAM HUY GIAO, DEng, MEng, Asian Institute of Technology, Thailand; Dipl Ing (MSc), Bucharest University, Romania
Senior Research Engineer (*Exploration and Engineering Geophysics; Geotechnical Engineering; Computer-Aided Analysis in Geoengineering*)

6.4 Completed Grant and Sponsored Research

Asia Link

Contribution: 5.75 man-months
Contributor: Dr Ulrich Glawe
Sponsor: European Commission
Total Contracted Amount: Bht 12,277,315.00

Asia Pro Eco

Duration: March 2004 to February 2005
Investigator: Dr Ulrich Glawe
Sponsor: European Commission
Total Contracted Amount: Baht 1,297,296.00

Construction of Ground Improvement for East Runway/Taxiways & Cargo Aprons, Suvarnabhumi Airport

Duration: 17 January 2003 to 31 July 2005
Investigator: Dr Ulrich Glawe
Collaborator: Dr Noppadol Phien-wej
Sponsor: GMT Corporation Ltd., Thailand
Total Contracted Amount: Baht 3,209,759

Development of System and Software for Tunnel-induced Building Damage Risk Assessment in Bangkok

Duration: 1 May 2003 to 30 June 2005
Investigator: Dr Kyung Ho Park
Collaborators: Dr William Barry, AIT
 Dr Pannapa Herabat, AIT
 Walailak University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 575,000

Geoenvironmental Engineering Curriculum Development for South and Southeast Asian Region

Project Description: Academic knowledge and practice in the field of Geoenvironmental Engineering is well advanced in Europe. Asian academics and engineers however, still lack knowledge in this newly developing discipline, despite the great demand in the region. The project is aimed at setting up a curriculum development program in the south and southeast Asia to provide adequate education to civil engineers and engineering geologists in the above-mentioned field by taking into consideration the regional socio-economic

background. This aim will be achieved through faculty exchange, workshops, new courses and lectures, shared project research including students involvement, and by extending the project activities with short-courses, with emphasis on less developed countries such as Vietnam, Laos PDR and Cambodia. Since the 36 months program will be primarily implemented at the School of Civil Engineering, AIT, it will target students from all over Asia during and after the project. In addition, teaching and academic activities will be expanded to the less developed countries in the region during the project, and after the end of the EC sponsored program.

Duration: 24 September 2002 to 23 September 2005
Investigator: Dr Ulrich Glawe
Sponsor: European Commission
Total Contracted Amount: Baht 12,607,033

Geotechnical Advisory Services in the Construction Supervision of Klong Tha Dan Dam, Nakorn Nayok, Thailand

Contribution: 0.5 man-month
Participant: Dr Noppadol Phien-wej
Sponsor: Royal Irrigation Department of Thailand
Total Contracted Amount: 640,000.00

Geotechnical Supervision for Foundation Works of Tha Dan Dam, Nakorn Nayok

Project Description: Tha Dan Dam is the first major reinforced cement concrete dam to be constructed in Nakorn Nayok, Thailand. The project is initiated by His Majesty the King and is now under construction. AIT's involvement will be in an advisory capacity in foundation excavation and treatment works and rock quarrying for dam material.

Duration: February 2000 to December 2005
Investigator: Dr Noppadol Phienwej
Sponsor: ASDECON Corporation, Thailand
Total Contracted Amount: Baht 610,000

Integrated Management & Safe Disposal of Municipal Solid Waste in Least Developed Asian Countries

Duration: 1 April 2004 to 30 October 2005
Investigator: Dr Ulrich Glawe
Collaborator: Prof Dennes Bergado, AIT
 Prof C Visvanathan, AIT
 Khulna University of Engineering & Technology, Bangladesh
Sponsor: European Commission
Total Contracted Amount: Baht 1,297,296

Klong Prapa Canal Covering Project- Part IV (Utilities, Geotechnics and Geometric Design)

Duration: 26 October 1999 to 30 June 2005
Investigator: Dr Noppadol Phienwej
Collaborators: Prof Worsak Kanok-Nukulchai, AIT
 WISANUCOM Engineering Consultants Company Limited, Thailand
Sponsor: Department of Highways, Ministry of Communication, Thailand
Total Contracted Amount: Baht 2,245,200

Klong Prapa Canal Covering Project

Project Description: The 40-meter wide Klong Prapa Canal is an open channel that has been delivering raw drinking water to Bangkok over the past 100 years. In response to His Majesty the King's concerns over the growing effects of domestic waste, pollution and road traffic on the quality of raw water, a Royal Project has been initiated to enclose the open-channel and protect it from intrusion. The by-product is an elevated Klong Prapa Corridor that will provide a multi-mode transportation system, which is environment-friendly and pollution-free. The enclosure system must meet strict requirements specified by the Metropolitan Waterworks Authority, and the project must ensure its constructability.

Duration: 26 October 1999 to 30 June 2005

Investigators: Prof Worsak Kanok-Nukulchai
Prof Tawatchai Tingsanchali
Prof Yordphol Tanaboriboon
Dr Noppadol Phienwej
Mr Anwar Naveed

Sponsor: Department of Highways, Thailand

Total Contracted Amount: Baht 11,329,387.85

Review and Investigation of Flood Drainage Project around the Suwannaphum Airport

Contribution: 1.5 man-months

Participant: Dr Noppadol Phien-wej

Sponsor: Royal Irrigation Department of Thailand

Total Contracted Amount: 3,124,625.00

The Asian Horizon 21- A Trilateral Collaboration between AIT-KKU and CU on Development of Geosystem Exploration Program for Thailand

Duration: 20 March 2002 to 31 March 2005

Investigator: Dr Pham Huy Giao

Collaborator: Department of Mineral Resources, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 1,000,000

Thermal Stabilization of Soft Bangkok Clay

Duration: 1 April 2003 to 30 June 2005

Investigator: Prof Dennes Bergado

Collaborator: Dr Suttisak Soralum, Kasetsart University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 918,500

6.5 Ongoing / In Progress Grant and Sponsored Research

Bridge-Development of Human Resources in Development of Academic Programmes in Sustainable Geosystem Exploration and Engineering (BRIDGE)

Project Description: Considering the growing demand for an international training and education in geo-system engineering and exploration in the Mekong region countries, this 3-year project aims to help develop human

resources at Vietnam National University (VNU) and National University of Laos (NUOL). Project partners are VNU, NUOL, AIT, ITC (The Netherlands) and Stockholm University (SU). Overall objective of the action is to develop human resources in the Mekong Region in the integrated field of Geosystem Engineering and Exploration. The main scopes and activities include: (i) Training and upgrading of teaching staff at VNU and NUOL in Geosystem engineering and exploration; (ii) Training and upgrading of administrative and managerial staff in international graduate educational management; (iii) Exchange of new teaching materials and new teaching tools; and (iv) Provide support to development of course modules that will be integrated in the international programs in geo-system engineering and exploration, under development at NUOL and VN.

Duration: 1 November 2005 to 30 November 2008

Investigators: Dr Pham Huy Giao
Dr Noppadol Phien-wej

Sponsor: ITC (The Netherlands)
European Commission

Total Contracted Amount: Baht 4,674,126.00

Characterization of Soft Soil in Mekong Delta, a Collaboration Project

Duration: 2004 to 2006

Research Team Member: Dr Pham Huy Giao

Investigator: Geotechnical Group
Tokyo Institute of Technology (TIT).

Sponsor: Japanese Government

Development of System for Tunneling-induced Damage Risk Assessment using Analytical Methods

Project Description: The project aims at developing the design manual for evaluating the tunneling-induced building damage risk assessment using analytical methods.

Duration: 1 September 2004 to 30 December 2006

Investigator: Dr Kyung-Ho Park

Sponsor: NOWENG Co, Ltd

Total Contracted Amount: Baht 376,972.00

Post-Tsunami Reconstruction for Sustainable Coastal Development

Contribution: 1 man-month

Investigator: USAID/SERD/Dr Amrit Bart

Participant: Prof D T Bergado

Total Contracted Amount: US \$5.0 M

Rubber Tire Chips Mixed with Sand Reinforced with Geogrid

Project Description: The aim of this research is to study the behavior of high strength geogrid with lightweight rubber tire chip-sand fill. The parameters obtained in this project will be utilized for development of design procedure and design criteria for MSE construction with lightweight fill and high strength geogrid reinforcements as well as compare the design procedure and criteria obtained from this project with other design methods such as coherent gravity and tie-

back methods. This study will be completed after one year.
Duration: January 2005 to March 2006
Investigators: Prof Dennes T Bergado
 Dr Noppadol Phienwej
Sponsor: Royal Thai Government (RTG)
Total Contracted Amount: Baht 600,000.00

Thermal Stabilization of Soft Bangkok (Phase 2)

Project Description: The significant characteristics of Bangkok clay, thick deposited soft clay, are low permeability, low strength, high compressibility, and high water content. These properties create problem in foundation and infrastructure engineering such as low bearing capacity, unstable slope, large settlement by consolidation when loaded and taking a long time to achieve the primary consolidation settlement. In order to reduce the future settlement contributed by the primary consolidation of thick layers of low permeability foundation soil, improvement in the soil drainage system is deemed necessary. This research work studied the new innovation technique to hasten the consolidation rate of soft Bangkok clay by using the combination of prefabricated vertical drain (PVD) and thermal method. Both laboratory and field works have been done. The results show that raising the clay temperature up to 90°C increases its permeability about 3 to 4 times. Therefore, this technique accelerates the rate of consolidation because the permeability and the pore pressures increase with temperature. Moreover, elevated temperature tend to increase the shear strength of clays at drained condition.

Duration: January 2005 to March 2006
Investigators: Prof Dennes T Bergado
 Dr Noppadol Phien-wej
Sponsor: Royal Thai Government (RTG)
Total Contracted Amount: Baht 900,000

6.6 Publications

Refereed Journals

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Abuelnaga, H M, Bergado, D T, Soralump, S, and Rujivipar, P, Thermal Consolidation of Soft Bangkok Clay, *Lowland Technology International*, Vol. 7, No., 1, pp. 13-22, 2005.

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Balasubramaniam, A S, Oh, E Y N, Bolton, M W, Bergado, D T, and Phien-wej, N, Deep-Well Pumping in the Bangkok Plain and its Influence on Ground Improvement Development with Surcharge and Vertical Drains, *Ground Improvement*, Vol. 9, No. 4, pp. 149-162, 2005.

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Bergado, D T, Youwai, S, and Rittirong, A, Strength and Deformation Characteristics of Flat and Cubical rubber Tyre Chip-Sand mixtures, *Geotechnique*, Vol. 55, No. 8, pp. 603-606, 2005.

Jaisi, D P, Glawe, U, and Bergado, D T, Hydraulic Behaviour of Geosynthetic and Granular Landfill Drainage Materials in the Sa Kaeo Landfill, Thailand, *Geotextiles and Geomembranes*, Vol. 23, No. 3, pp. 185-2041, 2005.

Kumar, A and Glawe U (2005), Laboratory Determination of Contaminant Transport Parameters in Fine Grained Soils-Current Practices-A Review-*Quarterly Mehran University Research Journal of Engineering and Technology* (ISSN 0254-7821), Vol. 24, No. 3, pp. 251-268.

Park, K H, Analytical Solution for Tunnelling-induced Ground Movement in Clays, *Tunnelling and Underground Space Technology* 20 (2005), pp. 249-261, 2005.

Phien-wej, N and **Anwar, S**, Rock Mass Characterization for the Underground Cavern Design of Khiritharn Pumped Storage Scheme, *Geotechnical and Geological Engineering*, pp. 175-197, 2005.

Phien-wej, N and **Suwansawat S**, Geotechnical Experiences in the Design and Construction of the First Bangkok MRT Subway Line, *Felsbau-Journal for Engineering Geology, Geomechanics and Tunnelling*, No. 2/2005 April, pp. 18-24.

Phien-wej, N and **Yasamut S**, Cavern Construction in Weak Rocks at Lam Ta Khong Pump Storage, *Felsbau-Journal for Engineering Geology, Geomechanics and Tunnelling*, No. 2/2005 April, pp. 10-17, 2005.

Phien-wej, N, **Giao, P H**, and **Thepparak, S**, Prediction of Differential Settlement of Buildings Induced by Land Subsidence from Deep Well Pumping, *Geotechnical Engineering Journal*, April, pp. 69-75, 2005.

Srivachiraporn A and **Phien-wej N**, Characteristics and Impacts of Ground Movements in EPB Shield Tunnelling, *Felsbau-Journal for Engineering Geology, Geomechanics and Tunnelling*, No. 2/2005 April, pp. 25-31.

Shapit L, **Ojha C S P** and **Glawe, U**, Sorption Characteristics of the Soft Bangkok Clay, *Lowland Technology International*, Vo. 7-2, pp. 69-73, 2005.

Tuan, N Q, **Phien-wej, N**, and **Phic, N Q**, State of Tunnelling in Vietnam, *Felsbau-Journal for Engineering Geology, Geomechanics and Tunnelling*, No. 2/2005 April, pp. 38-43.

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Phienwej, N and **Nutalaya, N**, Subsidence and Flooding in Bangkok. Chapter 22 in *The Physical Geography of Southeast Asia*, Editor-**Avijit Gupta**, Oxford University Press Inc., New York, pp. 358-378, 2005

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- Philippines, pp. 65-75. (Invited Lecture), 2005.
- Bergado, D T and Abuel-Naga, H M**, Tsunami Devastations and Reconstruction with Geosynthetics, Proceedings *International Conference on Geotechnical Engineering for Disaster Mitigation and Rehabilitation*, Singapore, 2005.
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- Bergado, D T, Lorenzo, G A, and Taechakumthorn, C**, Compression Behavior of High Water Content Cement-Admixed Clay, *Proceedings International Conference on Deep Mixing- Best Practice and Recent Advances*, Stockholm, Sweden., 2005.
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- Giao, P H**, Electric Imaging of Some Asian Coastal Soft Clay Deposits, Proceedings *ATC12 Workshop on Land Reclamation and Coastal Structures in Asia*, Hanoi, Vietnam, in printing, 24 November 2005.
- Giao, P H, Phien-wej, N, Athichanagorn, S,** and **Satarugsa, P**, The Asian Horizon 21 (AH 21) Project – A Trilateral Collaboration in Development of a New Application-Oriented Education and Research Program on Geoexploration Technology, Proceedings *1st AIT-RTG Joint-Research Public Seminar*, Asian Institute of Technology, pp. 125-128, 8 August 2005.
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- Kumar, A, Sthapit, L** and **Glawe, U**, Heavy Metal Diffusion Through the Soft Bangkok Clay, Proceedings *15th Conference on Engineering Geology*, Erlangen, Germany, pp. 447-452, 6-9 April 2005.
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6.7 Doctoral Students' Dissertation

Fundamentals of Cement-Admixed Clay in Deep Mixing and its Behavior as Foundation Support of Reinforced Embankment on Subsiding Soft Ground
by Glen A Lorenzo
Supervisor: Prof Dennes T Bergado

Investigating the Efficiency of Electrokinetic Remediation and Electrokinetic Stabilization in the Soft Bangkok Clay
by Pornpong Asavadorndeja
Supervisor: Dr Ulrich Glawe

6.8 Masters Students' Theses and Research Studies

A Geotechnical-Geophysical Study on a Dyke System in the North of Vietnam

by Pham Quy Ngoc

Supervisors: Dr Noppadol Phien-wej
Dr Pham Huy Giao

Analysis of Time-Dependent Response of Tunnels Considering Creep Effect

by Pramod Kumar Thakur

Supervisor: Dr Noppadol Phien-wej

Analytical Prediction of Ground Movements due to MRTA Tunneling

by Md Arifuzzaman

Supervisor: Dr Kyung-Ho Park

Application of Artificial Neural Networks (ANN) in Prediction of Ground Movement in EPB Shield Tunneling of Bangkok MRT

by Peeranuch Suvattiphon

Supervisors: Dr Noppadol Phien-wej
Dr Suchatvee Suwansawat

A Study of Well Test Analysis for the Fractured Basement of an Oil Field

by Nguyen Hai Minh

Supervisors: Dr Noppadol Phien-wej
Dr Pham Huy Giao

Complex Variable Solutions for Tunneling-induced Ground Movements in Clays

by Bituporn Tontavanich

Supervisor: Dr Kyung-Ho Park

Development of Software for Tunneling-Induced Building Damage Risk Assessment Using Analytical and Empirical Methods

by Mg Mg Myint Soe

Supervisor: Dr Kyung-Ho Park

Electrochemical Stabilization of Soft Bangkok Clay

by Florence Melvin Tomas Mendoza

Supervisors: Dr Ulrich Glawe
Dr Kyung-Ho Park

Enhanced Oil Recovery in Basement Rock of the White Tiger Field in Offshore Southern Vietnam

by Pham Duc Thang

Supervisors: Dr Noppadol Phien-wej
Dr Pham Huy Giao

Hanoi Land Subsidence with Reference to Development of a Proper Monitoring Network

by Duong Thi Toan

Supervisor: Dr Noppadol Phien-wej

Heavy Metal Diffusion Through Soft Bangkok Clay

by Aneel Kumar

Supervisor: Dr Ulrich Glawe

Hydrodynamic Pressure on Concrete Dams During Earthquakes

by Amanullah Marri

Supervisors: Dr Kyung-Ho Park
Dr Ulrich Glawe

Interaction between Geogrid Reinforcement and Tire Chip-Sand Mixture

by Suriyon Prempramote

Supervisor: Prof Dennes T Bergado

Investigation on Landslide in the Portal Excavation of a Diversion Tunnel in Weathered Sedimentary Rocks in Eastern Thailand

by Swe Thet Maung

Supervisor: Dr Noppadol Phien-wej

Landslide Hazard Zonation and Preliminary Results of Debris Flow Simulation for the Hohwaeldibach-Torrent, Fluehli, Central Switzerland

by Krishna Bahadur Chaudhary

Supervisor: Dr Ulrich Glawe

Landslide Hazard Zonation for the Spierbergmoesli Area Using GIS in Central Switzerland

by Muhammad Moeen

Supervisor: Dr Ulrich Glawe

Landslide Triggering Factors and Mass Movements Hazard Zonation & Mapping Using Remote Sensing and Geographic Information System Methods in Central Province, Sri Lanka

by Hewa Wasamge Jayantha Dharmaratne

Supervisor: Dr Ulrich Glawe

Numerical Modeling of a Full Scale Reinforced Embankment on Deep Mixing Cement Piles

by Nguyen Hop Minh

Supervisor: Prof Dennes T Bergado

Thermal Conductivity of Saturated Clay by Needle Probe Method

by San San

Supervisor: Prof Dennes T Bergado

Thermal Consolidation of Soft Bangkok Clay with PVD

by Susit Chaiprakaikeow

Supervisor: Prof Dennes T Bergado

**Three Dimensional Analysis of Ground
Movement in the EPB Shield in Bangkok**

by Chang Pyo Hong

Supervisor: Dr Noppadol Phien-wej

**Undrained Shear Strength of Soft Bangkok
Clay at Elevated Temperatures**

by Bee Fong Lim

Supervisor: Prof Dennes T Bergado

Chapter 7: SET – MECHATRONICS AND MICROELECTRONICS FIELDS OF STUDY

7.1 Introduction

Mechatronics

At present, most academic institutions and industries in the Asian region are only system integrators. Components are procured from more developed countries (e.g. computer numerically controlled machines, robots, and automated guided vehicles) and are integrated as a system (e.g. flexible manufacturing system). To support the growth of the region's economy, expertise not only as system integrators but also as builders of components of advanced technologies must be developed. The growing number of electronic devices and the strong interactions between mechanical and electronic parts no longer permit separate investigations of these components.

Mechatronics provides new insights through an integrated consideration of mechanics, electronics and information technology. The curriculum is designed to provide multidisciplinary knowledge and to develop the ability to design mechatronics systems.

Microelectronics

The region's growing industrial sector and the increasing demand for high technologies have brought the need for expertise in microelectronics to a critical level. The students are prepared to cope with the needs of the electronics industry in the region. The curriculum is equally balanced between the analog and digital design of circuits as well as the processing related topics including failure analysis, suitable for this electronics industrial sector in the region. The curriculum has been designed and constantly adapted in partnership with microelectronics industries and collaborating universities overseas. Miniaturisation of IC and the possibilities of completely new

technologies like nanotechnology have also been introduced.

7.2 Research Facilities and Laboratories

Mechatronics and Microelectronics fields of study share all the laboratory facilities with IEM and DME fields of study. There are several well equipped laboratories with the primary function of supporting the students and faculty for teaching and research and to conduct outreach programs.

Computer Integrated Manufacturing (CIM) Laboratory

The Computer Integrated Manufacturing (CIM) Laboratory was officially inaugurated on September 23, 1991. It provides the hardware and software support for Industrial Systems Engineering. Many research activities have been undertaken in close collaboration with industry and government sectors in the area of Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Numerical Control (CNC), Rapid Prototyping (RP) and Medical Technology. The CIM Laboratory also provides specialized training and consultancy services in CAD, CAM, CNC Machining, Reverse Engineering, Rapid Prototyping, Packaging Technology, Flexible Manufacturing Systems [FMS], and Development of Postprocessor for 5-axis CNC.

The CIM Laboratory is equipped with production and training CNC machines including EMCO TURN242 industrial production CNC lathe, EMCO VMC200 CNC vertical machining center for universal production, MAHO MH600E2 5-axis universal milling and boring machine, EMCO compact 5 CNC, EMCO F1 CNC, LVD CNC press brake, LVD water-jet cutting CNC, ZOLLER tool presetting system, and Mondiale Gallic G-420

Industrial CNC lathe, EMCO CNC training system, CAD/CAM software including UNIGRAPHICS NX4, Master CAM 9.1, Mechanical Desktop 6, AutoCAD Inventor Series, SolidWorks 2005, CAM 2000, Mimics 6.3 & Magic 5.4.

Metrology Laboratory

Metrology Laboratory provides the hardware and software support for Industrial Systems Engineering. Metrology Laboratory is equipped with Measuring Instruments (Zeiss CMM, Mitutoyo Profile Projector, Taylor Hobson Surface Roughness Tester, Lab View Hardware & Software).

Mechatronics and Automation Laboratory

This lab is equipped with many PLC systems (S5, S7-200/ 300/400, INDRAMAT, BOSCH), distributed control systems (PCS7), operator panels (OP5, OP17/DP, OP35), PC-based human machine interface package (WINCC), and networked fieldbuses (PROFIBUS, INTER-BUS, SERCOS). The lab has mobile robots (NOMAD, PIONEER 2), Robot arms (CRS), Industrial Robot (KUKA-KR15), a self-made Open Architecture CNC machine, CNC control systems (MTC200, SINUMERIK 81 00/8400), image processing systems (DVT, MATROX), and FPGAs (XILINX-1i VIRTEX PRO, ALTERA). Software packages such as SYNOPSIS IC Design, ANYSIM, ANSYS, ADAMS, and many types of special sensors and actuators are also available for the research use.

Many research activities have been undertaken in close collaboration with industry and government sectors in the area of industrial automation, robotics, control, system design and integration. Some examples of the research are: medical tele-analyzer, automated visual inspection systems, MEMS design, autonomous flying robot, automating centrifuge machines, autonomous under-water robot, automating crystallization process, etc.

Simulation Laboratory

This lab is equipped with networks of Pentium PC for general applications and internet access, high end CAD/CAM & Simulation

software such as ARENA and AutoMOD. In addition, a high performance computer facility with parallel cluster is also available for research use.

Microelectronics Laboratory

The microelectronics facilities consist of two main laboratories:

- (1) IC Design Lab
- (2) Nanotechnology

The IC Design lab computers have standard software useful for studying and research. ANSYS, Orcad, ModelSim SE, Xilinx ISE, Synopsys, Leonardo Spectrum LS, Tanner (S-Edit for Schematic Capture, T-Spice and W-Edit for Simulation and L-Edit for Physical Layout) are some of the software which are available. All the computers are networked through a high end (Intel XEON) server which is secure from external attacks. The laboratory facilities are used for Analog and digital circuit design, Microchip design and fabrication, MEMS, Micro-actuators and micro-sensors design, Computational electronics, etc. The fabrication is done in cooperation with NECTEC, NSTDA, Thailand

The Nanotechnology Laboratory consists of a chemistry lab, instrumentation room and an electronics laboratory. The chemistry laboratory is equipped with standard chemical tables and hood for carrying out wet-chemical processing. The instrumentation room consists of equipments like optical spectrophotometer, microscope etc. The electronics laboratory is equipped with digital oscilloscopes, signal generators, power supplies, standard voltage and current meters as well as stocked with discrete devices for testing and research. This laboratory used for teaching and research especially in the processing related subjects.

7.3 Faculty and Research Staff

Full-time Faculty

NITIN V AFZULPURKAR, BEng, Univ of Poona, India; PhD, Univ of Canterbury, New Zealand
Associate Professor [*Computer vision (pattern recognition and image processing); MEMS design, fabrication for electronic and bio medical applications; Soft computing algorithms for robotics and automation applications; Mechatronics applications for industrial use*]

JOYDEEP DUTTA, BSc (Hons), St Edmund's College; MSc (Physics), North Eastern Hill Univ; PhD, IACS, Calcutta Univ, India.
Associate Professor
 [Functional materials, nanomaterials, Nanoparticles, self-organisation, Biomimetic processes, Polyelectrolyte deposition, Gas sensors, Bio-sensors, optoelectronic devices]

MANUKID PARNICHKUN, BEng, Chulalongkorn Univ, Thailand; MEng, PhD, Univ of Tokyo, Japan
Associate Professor
 [Robotics, control, and measurement (involves with design and development of hardware and software of mechatronics devices); New robot mechanism, novel control algorithm, and innovative measurement concept are investigated]

Visiting Faculty

DEBESH KUMAR DAS, BEng; MEng; PhD, Jadavpur, India.
Visiting Professor
 [VLSI design and testing; Logic synthesis]

HEE-GAK LEE, BS, Korea Military Academy and Seoul Natl Univ; MS, Drexel Univ; PhD, Univ of Iowa, USA
Visiting Professor
 [Structural analysis and design/ optimization; design and

manufacturing; concurrent engineering; automotive engineering; weapon systems; CAD/CAE].

NUKALA SURIYANARAYANA MURTHY, BE, Andhra University Waltair; MS, IIT Chennai; PhD, NIT Warangal, India
Visiting Professor
 [Low Power VLSI Architectures for DSP Applications; ASIP Implementations and Device Modeling; Application of Cumulants and HOSA]

LERTSAK LEKAWAT, BE King Mongkut's Institute of Technology Ladkrabang, Thailand
 MSc George Washington University USA; PhD Carnegie Mellon University, USA
Visiting Lecturer
 [Data Storage System, Analog design, digital design, mixed signal design]

7.4 Completed Grant and Sponsored Research

Development of an Automatic-Controlled-Flying Robot Project

Project Description: Control of 6-DOF fully autonomous helicopter type flying robot is very difficult. Many researchers verified their control algorithms only on simulation. There are very few success experiments on fully control of the flying robot. In order to make the robot fly autonomously, the attitude and position controls are needed. In this project, the neuro-fuzzy controllers (NFC) are developed to control the roll, pitch and yaw of the flying robot, while the hybrid adaptive neuro-fuzzy model reference control (Hybrid-ANFMRC) is developed to control its position. The attitude controllers are trained offline to zero out the roll, pitch and yaw errors. The position control uses the hybrid technique called, "hybrid adaptive neuro-fuzzy model reference control". The position control learns online to track the velocity reference model, while trying to obtain the smooth response and zero steady state error.

Duration: January 2001 to December 2005
Investigator: Dr Manukid Parnichkun
Sponsor: Thailand Research Fund
Total Contracted Amount: Baht 1,080,000

Development of an Intelligent Underwater Mobile Robot Project

Project Description: This project is to develop an intelligent underwater mobile robot, which can be remotely controlled. The development includes its intelligence, onboard control system, and wireless communication. Human operator is able to remotely control the robot

and sense environment through wireless communication with assistance from the onboard intelligence. Waterproof actuator, mechanism and electronics for the robot will be designed using up-to-date Mechatronics technology. The intelligent underwater mobile robot will be experimentally tested for its performance. The knowledge and experience gained from the project will be reported

Duration: **April 2003 to December 2005**
Investigator: **Dr Manukid Parnichkun**
Sponsor: **Royal Thai Government**
Total Contracted Amount: **Baht 1,000,000**

Development of MEMS actuator (2004-2005)

Project Description: To develop an optimal design for an electrostatic comb drive for disc drive dual stage servo system and to study active control of fly height of a MEMS based micro actuator by applying numerical simulation techniques.

Duration: **July 2004 to December 2005**
Investigator: **Dr Nitin Afzulpurkar**
Sponsor: **Seagate Technology**
Total Contracted Amount: **Baht 142,000**

International Symposium on Nanotechnology in Environmental Protection and Pollution

Project Description: The symposium addressed environmental protection and pollution issues and topics, which were frequently mentioned in conferences and workshops worldwide as topics that need to be addressed sooner than later. An open dialogue between the scientists and engineers developing these technologies and the environmental activists and public policy-makers can lead to a sense of trust and will give directions to the future needs and activities.

Duration: **December 2004 to December 2005**
Investigator: **Dr Joydeep Dutta**
Sponsors: **NANOTECH/MTEC, NSTDA
AORD (USA)**
Total Contracted Amount: **Baht 450,000 + US\$ 5,000**

Machine Vision Training Module

Project Description: Capacity building for the HDD Cluster for the industry personnel in "Machine Vision" techniques

Duration: **September 2005 to December 2005**
Investigator: **Dr Nitin Afzulpurkar**
Sponsors: **Consortium of Industry and NECTEC**
Total Contracted Amount: **Baht 252,000**

ZnS Nanophosphors for Field Effect Devices and DNA Labeling Applications

Project Description: This project addresses the development of doped zinc-sulphide quantum dots to be used as phosphors for flat panel displays and for DNA labeling purposes. The bottom-up approach of synthesis is being followed in this project where the nanoscaled materials are synthesized from their atoms. ZnS:Mn particles has been built up for its emission enhancement and electroluminescent devices are being fabricated. The phosphors so developed will be attached to crosslinkers and the biomolecules of

different DNAs to use the quantum dots for DNA labelling.

Duration: **2003 to 2005**
Investigator: **Dr Joydeep Dutta**
Sponsor: **MTEC/NSTDA**
Total Contracted Amount: **Baht 1,800,000**

7.5 Ongoing / In Progress Grant and Sponsored Research

A Study of Development of an Intelligent Vehicle Project

Project Description: The project is to develop an intelligent vehicle for use to improve highway safety and fuel consumption. The intelligent vehicle can also be employed by handicapped and elderly persons who are normally unable to effectively and safely travel around by themselves, which can translate into some significant savings for the nation. The project main objective is to develop an intelligent vehicle which is able to move from one place to another autonomously, without help from human. Operator only needs to provide information about his/her destination to the vehicle. The vehicle receives intelligence from various sensors installed on board. These sensors are used to determine the position of the vehicle, the directions of other vehicles in the vicinity, static and dynamic obstacles, traffic lines, symbols, signs, inter-vehicle distances, etc. It also receives intelligence from the Global Positioning Satellites (GPS) to help in navigation, control, and avoidance of accidents.

Duration: **March 2005 to December 2006**
Investigator: **Dr Manukid Parnichkun**
Sponsor: **National Electronics and Computer Technology Center**
Total Contracted Amount: **Baht 1,000,000**

Conjugated Semiconductor Nanoparticles as Fluorophores for Rapid Detection of Bacteria's

Project Description: This project will study the assembly of fluorescent inorganic nanoparticles (nanophosphor), ZnS:Mn²⁺ and biomimetic polymers and its subsequent attachment to bacteria's and will try to address the two major challenges for the rapid detection of a single bacterium are the achievement of (i) short to real-time detection and (ii) ultrasensitivity in bioanalysis. Here, we propose a bioconjugated nanophosphor (ZnS:Mn²⁺)-based bioassay for in situ pathogen quantification. The bioconjugated nanoparticle would provide the fluorescent signal for bioanalysis that can be easily incorporated with biorecognition molecules, such as an antibody.

Duration: **December 2005 to December 2006**
Investigator: **Dr Joydeep Dutta**
Sponsor: **NANOTECH/NSTDA**
Total Contracted Amount: **Baht 1,498,992**

Development of a Medical Tele-Analyzer by Force-Displacement-Hybrid Tactile Sensor and Actuator for Abdominal Mass Analysis (Phase 2) Project

Project Description: Presently, expert medical doctors in abdominal mass analysis are insufficient in Thailand. Patients staying far away from the hospitals, where the expert doctors are working, have to bear to get cured at near hospitals without any choices. Some patients might choose to move to the expert hospitals but they have to spend a lot of money and time. It is too late for many times. Furthermore, in the case of heavy infection patients, doctors cannot approach the patients directly. This problem needs urgent solution.

From the above reasons, our research group has an idea to develop a medical tele-analysis system. The developed system consists of 2 subsystems; doctor-side subsystem and patient-side subsystem. In the doctor side subsystem, an array of displacement sensor is equipped to detect movement of doctor's hand and fingers. The detected information is transmitted to the patient side to be used in medical disease analysis. On the other hand, the patient-side subsystem consists of an array of displacement actuators which is used to follow displacement of doctor's hand and fingers. An array of force sensors is used to detect forces between patient and the equipment.

Since the above mentioned analysis and control need real time operation, the desired communication channel has to be direct-line type. Telephone line, satellite, or other coming media is the choice of selection.

Automatic database system, which helps doctor to analyze disease, will be implemented on the developed tele-analyzer. This database system collects data in the previous analysis to help the system to learn and record the data automatically. Supervised teaching by expert medical doctor is necessary to help medical students or less experience doctors in analyzing disease and also in self learning.

Not only using in medical tele-analysis, the proposed system can also be used in any tele-force-displacement controls of processes.

Duration: August 2004 to December 2008
Investigator: Dr Manukid Parnichkun
Sponsor: National Electronics and Computer Technology Center

Total Contracted Amount: Baht 1,674,200

Development of an Automated Visual Inspection System (2005-2006)

Project Description: To develop a prototype of Automated visual inspection system which can identify significant defects in computer hard disk drive during the assembly process. The developed system will consists of hardware (camera and jig) and customized image processing software.

Duration: November 2004 to December 2006
Investigator: Dr Nitin Afzulpurkar
Sponsors: Consortium of Seagate, Hitachi, Western Digital and NECTEC
Total Contracted Amount: Baht 1,500,000

Development of an Automatic Tide Sensing Unit for Tsunami Early Warning System

Project Description: The main objective of this project is to study and develop an automatic tide sensing unit for Tsunami early warning system. The sensing unit will have a capability to detect automatically tide information; including tide height, wave amplitude, wave length, and wave speed. All the information will be transmitted to a ground station to analyze possibility of Tsunami, its magnitude and arrival time at each coastal location for proper action and warning to the concerned parties.

Duration: December 2005 to December 2006
Investigator: Dr Manukid Parnichkun
Sponsor: Royal Thai Government Joint Research Fund
Total Contracted Amount: Baht 1,000,000

Development of Generic smart MEMS based control Systems

Project Description: In this research, electrostatic actuator combined with accelerometer sensor using polymums and cmos processing technology is designed and fabricated. A micropump and micro valve system are then designed and fabricated. The possible application areas are smart devices for HDD, medical and automotive applications.

Duration: February 2004 to December 2006
Investigator: Dr Nitin Afzulpurkar
Sponsor: National Science and Development Agency, Thailand

Total Contracted Amount: Baht 3,880,800

Development of a Systematic-Error-Compensate CNC Controller Project

Project Description: Nowadays, accuracy of products is one of the most critical considerations for manufacturers. Since many work-pieces are produced by Computer Numerical Control Machine (CNC Machine), thus, work-pieces accuracy depends directly on accuracy of the CNC Machine.

Actually, CNC machine is able to produce work-piece accurately up to the level of 1 mm. However, in reality, it is very difficult to control the machine at this level since the CNC machine always includes the following inaccuracies in the system; (1) inaccuracy in CNC machine assembly, especially with movable components, (2) thermal distortion of CNC machine and work-pieces during manufacturing, (3) inaccuracy induced by cutting forces, (4) cutting tool wear, (5) fixture errors, etc. Inaccuracies from (1), (2), and (3) are the main factors of manufacturing errors in CNC machines.

Mostly, manufacturing error is time-variant (not constant with time), it depends on many factors including machine condition, environment temperature, work-

pieces material and weight, and so on at the instant of operation.

In this research, the researchers will develop a systematic-error-compensate CNC controller. The developed controller collects necessary information; e.g., position and displacement, temperature, forces, etc., from CNC machine and uses this information in the error compensate algorithm to compensate error in real time. Output from the error compensation is applied to correct command to the CNC machine.

Duration: 2001 to December 2007
Investigator: Dr Manukid Parnichkun
Sponsor: Mitutoyo Association for Science and Technology
Total Contracted Amount: 2,500,000 Yen

Nanocomposite Polymer-metal Plasmon Sensors

Project Description: This project aims on the development of nanotechnology activities amongst the partners making use of the cross-disciplinary competence of the principal investigators of this project. The nanoparticle synthesis will be carried out in AIT in close co-operation with the Polymers group that will advice on the functionalisation of these particles. Simultaneously the group in Uppsala will develop the polymers to be used in this project. Nanocomposites will then be fabricated for specific sensor applications.

Duration: May 2005 to April 2008
Investigator: Dr Joydeep Dutta
Sponsor: SIDA Research Grant, Sweden
Total Contracted Amount: 367,000 Swedish Kroner

Nanotechnology based Pressure Sensors for Tsunami Detection

Project Description: The main objective of this project is to study and develop a 'stand alone pressure sensing device' for Tsunami early warning system. The device will be fabricated using a demonstrated multilayered thin film deposition technique that has been developed at AIT, comprising of alternate layer stacks of gold nanoparticles and doped or undoped ZnS nanoparticles by a novel layer-by-layer modified polyelectrolyte deposition process.

Duration: December 2005 to December 2006
Investigator: Dr Joydeep Dutta
Sponsor: AIT-RTG Joint Research Project
Total Contracted Amount: Baht 875,000

7.6 Publications

Refereed Journals

Ashraful Amin, M, Afzulpurkar, N, Dailey, M, Esichaikul, V, and Batanov, D, Fuzzy-C-Mean Determines the Principle Component Pairs to Estimate the

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Choomuang, R and Afzulpurkar, N, Hybrid Kalman Filter/Fuzzy Logic based Position, Control of Autonomous Mobile Robot, *International Journal of Advanced Robotic Systems*, Volume 2, number 3, 2005. ISSN1729-8806, pp. 197-208.

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Siritaratiwat, A, Tongsoomporn, D, Chooruang, K, and Afzulpurkar, N, A Study of Noise Effects Due to the Diode Protection for Shield Resistance Measurement of GMR Recording Heads, *IEEE Transactions on Magnetics*, Vol. 41, No. 10, pp 2941-2943, October 2005.

Suebsomran, A and Parnichkun, M, Disturbance Observer-Based Hybrid Control of Displacement and Force in a Medical Tele-Analyzer, *International Journal of Control, Automation, and Systems, ICASE and KIEE*, Vol. 3, No. 1, pp. 1-9, 2005.

Sugunan, A, Thanachayanont, C, Dutta, J, and Hilborn, J G, Heavy-Metal Ion Sensors using Chitosan-capped Gold Nanoparticles, *Journal of Science and Technology of Advanced Materials*, Vol. 6, pp. 335-340, 2005.

Warad, H, Sugunan, A, Thanachayanont C, and Dutta, J, ZnS:Mn²⁺-Phosphors Capped with Chitosan, *Microscopy and Microanalysis*, Vol. 11, Supplement S02, pp. 1912, August 2005.

Warad, H C, Ghosh, S C, Hemtanon, B, Thanachayanont, C, and Dutta, J, Luminescent Nanoparticles of Mn Doped ZnS Passivated with Sodium Hexametaphosphate, *Journal of Science and Technology of Advanced Materials*, Vol. 6, pp. 296-301, 2005.

Refereed Books/Chapters

Afzulpurkar, N V, (Editor), Proceedings of the *fourth Asian Conference on Robotics and Automation (ACIAR, 2005)*, Bangkok, Thailand, May 2005, ISBN 974-8208-58-3

Conference Proceedings

Ashraful Amin, M, Afzulpurkar, N V, Dailey, M, Esichaikul, V, and Batanov, D, A Fuzzy Clustering Approach to Estimate the Degree of Facial Expression Using Gabor-PCA Features, Proceedings of *Regional Inter-University Postgraduate Electrical and Electronics Engineering Conference*, Hong Kong, 2005, July.

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Sugunan, A, **Warad, H**, **Thanachayanont, C**, **Dutta, J**, and **Hofmann, H**, Zinc Oxide Nanowires on Non-epitaxial Substrates from Colloidal Processing for Gas Sensing Applications, Proceedings of the *NATO Advanced Study Institute on*

Nanostructured and Advanced Materials for Applications in Sensors, Optoelectronic and Photovoltaic Technology Sozopol, Bulgaria, 6-17 September 2004; Series: NATO Science Series II: Mathematics, Physics and Chemistry, Vol. 204, Vaseashta, A.; Dimova-Malinovska, D.; Marshall, J.M. (Eds.) 2005, XI, 425 p. (Springer, ISBN: 1-4020-3560-8).

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7.7 Doctoral Students' Dissertation

Mechatronics

Hybrid Kalman Filter/Fuzzy Logic-Based Position Control of Autonomous Mobile Robot
by Rerngwut Choomuang
Supervisor: Dr Nitin V Afzulpurkar

7.8 Masters Students' Theses and Research Studies

Mechatronics

3D Measurement with the Catadioptric Stereoscopic Camera System for Assembly Applications
by Kadam Digvijay Manikrao
Supervisor: Dr Nitin V Afzulpurkar

Automatic Obstacle Avoidance and Map Generation for a Mobile Robot
by Anup Arun Desai
Supervisor: Dr Manukid Parnichkun

Automatic Road Sign Recognition for Intelligent Vehicle
by Nguyen Viet Tiep
Supervisor: Dr Manukid Parnichkun

Automation of a Tunnel KILN
by Pham Hong Son
Supervisor: Dr Nitin V Afzulpurkar

Control of a Rotary Inverted Pendulum System

by Bui Trung Thanh
Supervisor: Dr Manukid Parnichkun

Design and Automation of Assembly Work-Cell, Employing Uncalibrated Eye in Hand Visual Servoing

by Vikram Shrikant Vyawahare
Supervisor: Dr Nitin V Afzulpurkar

Design of a MEMS-Based Microactuator for Active Slider Attitude Theoretical Control by Numerical Simulation

by Siddhartha Jain
Supervisor: Dr Nitin V Afzulpurkar

Design of Automated Spray Painting Process and Integrated Development of Vision System for Detection and Classification of Surface Defects

by Narasimha Rao V L Velichety
Supervisor: Dr Nitin V Afzulpurkar

Development and Control of a Fish Robot

by Duong Thanh Trung
Supervisor: Dr Manukid Parnichkun

Development and Control of Upper Extremity Prosthetic Limb by EMG Signal

by Cuhananthan Wijayanayagam Indrajit
Supervisor: Dr Manukid Parnichkun

Development of a Leg-Exoskeleton

by Nhu Quy Tho
Supervisor: Dr Manukid Parnichkun

Development of a Machine Vision Algorithm for Defect Detection and Sorting of Tomatoes

by Md Rokunuzzaman
Supervisor: Dr Nitin V Afzulpurkar

Development of an Automation System for Vacuum Metalization Process

by Subramanian Arunkumar
Supervisor: Dr Nitin V Afzulpurkar

Development of a Plotter

by Sampathkumar Jagannathan
Supervisor: Dr Manukid Parnichkun

Development of a Robot Moving in Pipes

by Nguyen Cong Chien
Supervisor: Dr Manukid Parnichkun

Development of a Visualizatin and Control System for the Evaporation Stage at a Cane Sugar Plant

by Pham Hung Nam
Supervisor: Dr Nitin V Afzulpurkar

Development of Bio-Mimetic Underwater Robot

by Vikram Prabhakar Gokhale
Supervisor: Dr Manukid Parnichkun

Development of Tsunami Detectible Sensors

by Nara Samattapapong
Supervisor: Dr Manukid Parnichkun

Doll Hair Rooting Automation

by Eko Aris Budi Cahyono
Supervisor: Dr Nitin V Afzulpurkar

GPS Based Navigation of an Intelligent Vehicle

by Vikram Arun Godbole
Supervisors: Dr Manukid Parnichkun
Dr Nitin V Afzulpurkar

OPC Server, Data Acquisition and Archiving for Process Control System

by Aung Zaw Min
Supervisor: Dr Nitin V Afzulpurkar

Positioning Determining System of an Underwater Robot

by Supagorn Trapcharoen
Supervisor: Dr Manukid Parnichkun

Real-Time Dynamic Target Tracking and Servoing Using Image Motion

by Israr Ahmad Khan Saeed
Supervisor: Dr Nitin V Afzulpurkar

Servo Control of Pneumatic System by Sliding Mode Controller

by Pippie Arbiyanti
Supervisor: Dr Manukid Parnichkun

Vision-Based Road Detection and Tracking System for an Intelligent Vehicle

by Nguyen Duy Duong
Supervisor: Dr Manukid Parnichkun

Microelectronics

A Low Power Filter Bank for Sub-Band Audio Processing in a Digital Hearing AID

by Narin Ravadchai
Supervisor: Dr Lertsak Lekawat

A Peristaltic Thermopneumatic Micropump

by Wasinee Mamanee
Supervisor: Dr Nitin Afzulpurkar

BiCMOS Design of PEC (Power Faction Correction) for High Power Combi Controller in B6 Process

by Meng Ruijun
Supervisor: Dr Lertsak Lekawat

Clock and Data Recovery for Sonet OC-12 System

by Tom Takan

Supervisor: Dr Lertsak Lekawat

Design and Fabrication of 2-Axis, High G MEMS Micro Accelerometer

by Akekachai Deesiri

Supervisor: Dr Nitin V Afzulpurkar

Design of the IEEE 802.15.4 MAC FPGA and ASIC Layout for Low-Rate Low-Power Wireless Networks

by Tharasit Praputtoy

Supervisor: Dr Lertsak Lekawat

Development of Iron-based Amorphous Soft Magnetic Alloys from Commercial Cast-Iron

by Rantej Bali

*Supervisors: Dr Eric Fleury
Dr Joydeep Dutta*

Formation and Potential Uses of Glutamate-Stabilized Gold Nanoparticles

by Abhilash Sugunan

Supervisor: Dr Joydeep Dutta

Head Noise Characterization of GMR and TMR Sensor for Magnetic Recording

by Amit Kumar Suhane

Supervisor: Dr Lertsak Lekawat

Optimal Design and Fabrication of MEMS Microactuator for a Hard Disk Drive Dual-Stage Servo System

by Puttachat Khuntontong

Supervisor: Dr Nitin V Afzulpurkar

Study of Zinc Sulphide Quantum Dots

by Hermant C Warad

Supervisor: Dr Joydeep Dutta

Towards Luminescent Device Using ZnS Quantum Dots

by Bunyarit Hemtanon

Supervisor: Dr Joydeep Dutta

Chapter 8: SET – REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS

FIELD OF STUDY

8.1 Introduction

Geoinformatics comprising **Remote Sensing (RS)**, **Geographic Information System (GIS)** and **Global Positioning System (GPS)** provides extremely useful tools for environmental and natural resources management. They are widely recognized as supporting tools for the planning, monitoring, and management of the appropriate utilization of resources at the country, regional and global levels.

While they represent multidisciplinary backgrounds, students in RS&GIS share a common interest, that is, to use remote sensing, GIS, GPS and other space technologies as tools in pursuing their academic work as well as in developing new technologies that are applicable to the region.

Because of the complexity of the technologies together with the heavy dependence on advanced computer skills, application specialists need to have a sound knowledge of the theoretical aspects and practical approaches to integrate many resources of information that address different applications. Furthermore, scientists, planners or engineers interested in these technologies should be familiar with past, present and future satellite systems, their appropriate usage, data acquisition and handling and integration with other data sources.

The curriculum well covers the theoretical aspects and application of space technology, especially in Remote Sensing and GIS. It provides students ample time to gain application know-how through laboratory sessions. Students are free to use satellite data received by the NOAA, AVHRR and MODIS Satellite Receiving Stations for their theses or research studies.

The demand for RS&GIS graduates is very high as there is lack of professionals in these disciplines, particularly those with a vast knowledge of the practical utilization of these technologies. Employment opportunities are available in a wide range of areas, including agriculture, forestry, coastal development and management, urban planning and development, medical technology, mapping and planning, disaster mitigation and environmental management.

Major areas covered in the coursework are fundamentals of remote sensing and GIS, earth-energy interaction, atmospheric correction, application potential in various disciplines, GIS data sources, map projection, geo-statistics, spatial modeling, automated mapping, digital terrain model, GPS data acquisition, and integration of GIS, remote sensing and GPS.

8.2 Research Facilities and Laboratories

The RS&GIS field of study provides excellent facilities for teaching, research and projects which consists of the Digital Image Processing laboratory, Institute-wide GIS laboratory, Asia e-learning project experiment room, meeting rooms, and the Geoinformatics Center laboratory. The RS&GIS field of study has a policy of maintaining the best working environment for students, staff and faculty. Apart from the Institute-provided access to the Internet and electronic mail, each student of the RS&GIS field of study is allocated computer space for individual use of about 1-2 Gb (extendible). The space for personal web pages to be hosted on RS&GIS network, can also be provided upon request. The RS&GIS LAN Network can also be monitored in real time.

Besides, it has a very good archive of over 600 scenes of satellite imagery of SPOT, Landsat-TM, NOAA, ADEOS, ERS-SAR, and JERS-SAR to serve the students in their research and thesis studies. Other data, such as topographic, landuse, soil, geology maps of Thailand and some aerial photographs, are also available.

The RS&GIS library also provides students with more specialized books, journals, and computer manuals.

Some equipment in its laboratory available for academic activities include: Trimble geoexplorer; Garmin GPS Series III and V; laptop computer; digital camera; wireless hub/switch; wireless USB; network switch; network hub; black/white and color laser printers; A4 and A0 scanners; table and personal stereoscopes; and an LCD projector.

8.3 Faculty and Research Staff

The Institute is deeply grateful that **Her Royal Highness Princess Maha Chakri Sirindhorn** has seen fit to share her expertise and experience with faculty, staff and students, as an Honorary Faculty Member. In this singular position, Her Royal Highness is associated with the Remote Sensing and Geographic Information Systems Field of Study.

Full-time Faculty

XIAOYONG CHEN, BS, MS, PhD, Wuhan Technical Univ of Survey and Mapping, People's Republic of China.
Associate Professor (*Automated Mapping, GIS, Photogrammetry, Remote Sensing, Mathematical Morphology and Database Management System*)
[Remote sensing and geographic information system; particular emphasis on GIS theory, digital image analysis and real-time mapping; key research areas on theoretic framework of geo-spatial information science, digital photogrammetry, laser range data processing, multi-dimensional / multi-scale / multi-accuracy / multi-

media geo-spatial data modeling; GIS application in urban planning, intelligent transportation system, environment monitoring, disaster mitigation, archaeology and tourism]

KIYOSHI HONDA, BAgr, DEng, Tokyo Univ, Japan

Associate Professor (*Image Processing, Erosion control, Terrain modeling, Remote Sensing, GIS, Data Assimilation*)

[Modeling and Simulation on Near Real Time Ubiquitous Geo-Informatics; Web-GIS, including development of remote sensing and GIS server on Web Map Service (WMS) using Open Source Software such as Minnesota Map Server; Tsunami WMS development; Real time Mapping; volcano slope development; Crop/Plant Modeling by data assimilation; Debris Flow Simulation; Parallel computing]

NITIN KUMAR TRIPATHI, BTech, National Inst of Technology, India; MTech, IIT; PhD, IIT, Kanpur, India.

Associate Professor (*GIS, Remote Sensing, Environment, Internet GIS*)

[Application of Geoinformatics in environment, marine, health and agriculture fields; Development of wireless GIS using the concept of Internet GIS and wireless devices such as wireless LAN, personal digital assistant (PDA) with mobile phone (GPRS) used for real-time spatial data logger and air-pollution monitoring]

Visiting Faculty

MICHIRO KUSANAGI, BS, MS, Univ of Tokyo, Japan; MS, PhD, Univ of California, USA.

Visiting Professor (*Aerospace System Engineering, Space System Engineering*)

JUNICHI SUSAKI, BEng, MEng, DEng, Univ of Tokyo, Japan

Visiting Assistant Professor (*Environmental Information Extraction and Validation, Remote Sensing and GIS development*)

[Satellite data processing from data receiving to application; field

measurements of physical parameters on surface such as Bidirectional Reflectance Distribution Function (BRDF) and albedo, and used the data for model development and validation; Environmental change monitoring using on satellite and meteorological data based on data fusion techniques. One of such applications is early drought warning system targeting field measurement, model development and application]

Research Staff

MANZUL KUMAR HAZARIKA, PhD, University of Tokyo, Japan; MEng, Asian Institute of Technology, Bangkok, Thailand; MTech, Indian Institute of Technology, Kharagpur; BTech, J N Krishi Vishwa Vidyalyaya (J. N. Agriculture University), India

Senior Research and Training Specialist
(*RS and GIS Applications to Global Environment, Terrestrial Carbon Cycle and NPP*)

[Handling independent projects, conducting research and analysis, identifying issues, formulating options, and making conclusions and recommendations; Theories, concepts and applied approaches related to carbon cycle and ecosystem models, which require an integration of multiple, complementary and independent data and methods in a spatial domain for accurate estimation of carbon sequestered in forests at a reasonable cost]

SURAT LERTLUM, BS, Norwich University; MS, The George Washington University, USA; DTechSc Computer Science, Asian Institute of Technology, Thailand
Research Scientist (*GIS, RS, Digital Image Processing, Surveying, Mapping*)

[Low-resolution (NOAA AVHRR) forest classification, High-resolution (Landsat TM), and Multi-resolution forest classification includes thermal band; Object-Oriented data model for multi-resolution / multi-temporal remote sensing and GIS data sets; related-research with NOAA AVHRR and MODIS data; related-research on Real

Time Kinematics Differential GPS and the development of mobile system utilizing open source software; related-research on the archaeological remote sensing and GIS including the remote sensing and GIS for archaeology in Southeast Asia; related-research on the archaeological Virtual Reality, including 3D modeling from digital photographs and from laser scanning]

LAL SAMARAKOON, PhD, Ehime University, Japan.

Visiting Senior Scientist; Director, Geoinformatics Center

[Technology transfer and knowledge sharing; Appropriate usage of remote sensing; GIS and GPS in real-world applications; landslide hazard mapping; poverty mapping; social impact and environment changes; location-allocation studies; internet GIS; Web application and Digital Asia network for regional data sharing. Provide remote sensing, GIS and GPS consulting services to help solve real-world applications, develop institutional capacities and appropriate means for technology transfer.]

MARC SOURIS, PhD, Université de La Rochelle, France

Visiting Research Scientist (*Remote Sensing and GIS development*)

8.4 Completed Grant and Sponsored Research

3D Digital City Modeling: Some Case Studies for Protection of World Cultural Heritages in Thailand

Duration: April 2002 to July 2005

Investigator: RTG

Collaborator: Dr Xiaoyong Chen

Sponsor: RTG

Total Contracted Amount: Baht 1,000,000

Application of GIS in Poverty Mapping

Project Description: The training course provided the participants the technical know-how for preparing poverty maps applying 'small area estimation' method using census and household survey data. The training helped the participants in locating the pockets of

severe deprivation for implementing poverty reduction programs on priority basis.

Duration: **February 3 to 23, 2005**
Investigator: **Dr Manzul Hazarika**
Sponsor: **Central Bureau of Statistics, Nepal**
Total Contracted Amount: **Baht 478,625**

Basic Training in Remote Sensing and GIS

Project Description: This was a basic training in Remote Sensing and GIS and the training was organized for a group of participants from Afghanistan.

Duration: **May 3-31, 2005**
Investigator: **Dr Manzul Hazarika**
Sponsor: **UNEP- RRC.AP (Training for Afghanistan)**
Total Contracted Amount: **Baht 195,000**

Digital Asia Network (DAN)

Project Description: This project was aimed at exchanging spatial digital data distributed among various agencies through network. The contract included providing 2 training courses on open GIS during the project period.

Duration: **April 2004 to July 2005**
Investigator: **Dr Lal Samarakoon**
Sponsor: **JAXA/RESTEC**
Total Contracted Amount: **Baht 1,874,796**

E3P

Project Description: The project aims to assess the environmental impact of the intensification of pig production in the Red River delta, North Vietnam. This intensification is impossible to avoid because of the permanent increase of population. The pollution phenomenon in the area will be modeled and try to simulate through a GIS the different possible scenarios, in order to help decision makers in the future master plan for the development of the regions. The project is EU funded, CIRAD is the project manager, and AIT is in charge with VIGeo in Vietnam of the GIS work.

Duration: **March 2005 to February 2006**
Investigator: **Dr Frederic Borne**
Sponsor: **CIRAD-France**
Total Contracted Amount: **Baht 329,000**

JAXA Mini-Project (WSSD)

Project Description: This is a capacity building project based on real-world applications of remote sensing and GIS. Six countries, namely Nepal, Bangladesh, Philippines, Vietnam, Cambodia and Laos participated in project. Capacity building was carried out based on areas identified by each participating countries. Some of the topics were flood mapping, paddy cultivated area estimation, coastal zone monitoring and management, and urban area expansion. Trainees were invited to Geoinformatics Center 2 times, spending 4 weeks in each occasion. Joint field visits were conducted to collect relevant information in their home countries. JAXA appreciated the project outcomes and agreed to increase the number of projects.

Duration: **April 2004 to July 2005**

Investigator: **Dr Lal Samarakoon**
Co-Investigator: **Dr Manzul Hazarika**
Sponsor: **Japan Aerospace Exploration Agency, Project FY 2004-2005**
Total Contracted Amount: **Baht 8,143,200**

Near Real Time Agricultural Activity Monitoring Using Multi-Temporal MODIS Earth Observation Satellite Data

Duration: **1 May 2003 to 30 June 2005**
Investigator: **Dr Kiyoshi Honda**
Collaborators: **Kasetsart University, Thailand
 Chlachomkiao Royal Military Academy, Thailand**
Sponsor: **Royal Thai Government**
Total Contracted Amount: **Baht 950,000**

Real Time Spatial Logging Device for Open GIS

Duration: **1 May 2003 to 30 June 2005**
Investigator: **Dr Nitin Kumar Tripathi**
Collaborators: **Dr Phisan Santitammont, Chulalongkorn University, Thailand
 Dr Pakorn Apaphant, Geoinformatics & Space Technology Development Agency, Thailand**
Sponsor: **Royal Thai Government**
Total Contracted Amount: **Baht 937,000**

Regional Space Activity Promotion Study

Duration: **22 June 1999 to 31 March 2005**
Investigator: **Dr Michiro Kusanagi**
Sponsor: **National Space Development Agency of Japan**
Total Contracted Amount: **Baht 2,967,329**

Space Application Study

Duration: **1 April 1999 to 31 March 2005**
Investigator: **Dr Michiro Kusanagi**
Sponsor: **Japan Science and Technology Corporation**
Total Contracted Amount: **Baht 1,233,796**

Sustainable Peri Urban Agriculture

Duration: **1 June 2003 to 31 December 2005**
Investigator: **Dr Frederic Borne**
Collaborator: **Dr Nitin Tripathi**
Sponsor: **Centre de Cooperation Internationale en Recherche Agronomique pour le Development, France**
Total Contracted Amount: **Baht 369,000**

Training on applications of GIS for Biodiversity Mapping

Project Description: Fundamental concepts of Remote Sensing and GIS were presented in the first week of the training and a case study for biodiversity was given in the second week.

Duration: **June 20 to July 1, 2005**
Investigator: **Dr Manzul Hazarika**
Sponsor: **BISEP-ST, Nepal**
Total Contracted Amount: **Baht 429,000**

Training on Open-source Map Server

Project Description: Training was aimed at providing the fundamental structure as well as implementation an opensource mapserver

and the Minnesota Mapserver was used for the training.
Duration: August 22 to 26, 2005
Investigator: Dr Manzul Hazarika
Sponsor: UDA, Sri Lanka
Total Contracted Amount: Baht 344,400

8.5 Ongoing / In Progress Grant and Sponsored Research

Applying Parallel Computing on Cluster and Grid Systems for Agricultural Monitoring Based on Crop Model and Remote Sensing (RTG-CLUSTER)

Project Description: To implement SWAO-GA on cluster and grid computing system to make it possible to perform agriculture monitoring which is based on data assimilation on crop model and remote sensing.
Duration: October 2004 to June 2006
Investigator: Dr Honda Kiyoshi
Sponsor: RTG-Budget-Joint Research Project FY 2004
Total Contracted Amount: Baht 975,000

Asia e-learning Project Experiment by Multi-point Distant Learning Network System

Project Description: AIT have been conducting distant education pilot experiment via Super bird C since 2003 with Tsukuba University and Multimedia University. AIT's part is to provide RS & GIS contents as well as supporting fundamental experiment as Thai side counterpart. This will continue on as one of the WINDS (Giga bit rate satellite) utilization program.
 This project is to try to investigate about the status of health condition of school children utilizing GIS technology for their distributions
Duration: Since 2003
Investigator: Prof Michiro Kusanagi
Sponsor: Japanese Space Exploration Agency JAXA

Asian Highway

Technical Abstract: To design and develop an information system for the Asian Highway based on GIS utilizing remote sensing images. Master database which will provide public through Web Map Service will be developed. Also a stand alone system to provide good human interface without internet connection will be developed. The data includes Asian Highway data such as route, spec of road, Socio-economic data and remote sensing images and elevation data
Duration: August 2003 to April 2006
Investigator: Dr Honda Kiyoshi
Sponsor: UN-ESCAP
Total Contracted Amount: Baht 652,500

Development of marine and coastal resources database of Thailand

Project Description: To develop the fundamental GIS database for key components of marine

and coastal resources in Thailand, namely coral reefs, mangrove forests, seagrass beds, aqanimals for conservation (e.g. turtles, dugong) and threats e.g. coastal erosion. The database will be stored on the server computer for National Coastal and Marine Information Centre under DMCR to be shared by many potential users such as governmental, non-government and researchers to help in the conservation and coastal zone management.

Duration: One Year
Investigator: Dr K Ikejima
Co-Investigator: Dr Nitin Kumar Tripathi
Sponsor: UNEP
Total Contracted Amount: Baht 2,460,000

Digital Asia

Project Description: Keio University has established Digital Asia Research Center (DARC) and looking forward to establish a network in the region to collaborate with Node Agencies for data sharing. This network attempts to link all participating agencies and provide a place where they can obtain useful information for developing their own applications. During the five-year project period, attempt will be made to establish 30 Nodes in the region with high-end computer hardware and software necessary for data/information sharing over the Internet. Geoinformatics Center participates as a collaborator for developing browser software, promoting data sharing, teach/train Node Agencies and supporting the system.
Duration: April 2005 to March 2010
Investigator: Dr Lal Samarakoon
Sponsor: Keio University, Project FY 2005-2009
Total Contracted Amount: Baht 700,000 (Annually)

Flood Water Retention for Dry Season

Project Description: Northeast Thailand has always been subjected to floods and droughts problem and the problems are getting more severe with increasing water demands, land use change, deforestation, etc. The Chi river basin is one main river basin of this region that suffers flood during rainy season and drought during dry season. This research proposal aims to develop a methodology to alleviate the floods and droughts problems of the Chi river basin. A water budget model for the basin will be developed to find the water availability and demand. The scarcity of the water during the drought is the main issue that will be addressed by finding the locations for the rainwater harvesting structures using the digital terrain model and the remote sensing data. Planning the water retention structures will be modeled by integrating hydrologic model, hydraulic model, remote sensing and GIS and hierarchy optimization techniques.
Duration: October 2005 to October 2006
Investigator: Dr Nitin Kumar Tripathi
Sponsor: RTG-Budget-Joint Research Project FY 2005
Total Contracted Amount: Baht 970,000

Geographic Information System and Nutritional Status of Lamphoon Province People Thailand

Project Description: To set up a GIS database to analyse nutritional status of Thai people: 1) to investigate the distribution and frequency of protein energy malnutrition (PEM) of preschool and school children using GIS technology, 2) to study the associations between nutritional/ environmental determinants and PEM in preschool and school children.

Duration: September 2004 to February 2006
Investigator: Prof Michiro Kusanagi
Co-Investigator: Dr Srisaang Kaojarearn
Sponsor: RTG-Budget-Joint Research Project FY2004
Total Contracted Amount: Baht 600,000.00

GIM

Project Description: To develop algorithms for delineating actual irrigated and non-irrigated area using multi-temporal low-resolution RS data and limited number of high resolution RS data at global scale.

Duration: December 2002 to December 2005
Investigator: Dr Honda Kiyoshi
Sponsor: International Water Management Institute
Total Contracted Amount: Baht 1,200,000

Human Network Project

Project Description: Geoinformatics Center has trained more than 1000 personnel, most of them belonged to various agencies of the Asian region since its inception in 1995. It was found that many of the trainees have moved from their original agencies to other agencies, while some of them have excelled to become leaders or experts. This project is aimed at re-establishing the link with the past trainees in order to promote JAXA and AIT activities in applications of space technologies in the region through them. Further, it is expected that it will help JAXA and AIT in finding new areas for applications and opportunities. During this project, 6 countries will be visited for holding 1-day seminar inviting past trainees. Their information will be compiled and posted in a website.

Duration: January 2005 to June 2006
Investigator: Dr Lal Samarakoon
Sponsor: JAXA - Bangkok, Project FY 2005-2006
Total Contracted Amount: Baht 774,810

Image Processing, Data Analysis, and Preparation of a GIS Data Base of Remote Sensing Images From Around The Mesopotamia Marsh (Mesopotamia)

Project Description: To carry out image processing, data analysis and preparation of a GIS database of remote sensing image around the Mesopotamia marsh.

Duration: January 2004 to April 2006
Investigator: Dr Honda Kiyoshi
Sponsor: Digital Service International Co, Ltd (DSI)
Total Contracted Amount: Baht 700,000

JAXA Mini Project (WSSD-2)

Project Description: This project was awarded as a part of JAXA's contribution to the Asia-Pacific region for capacity building. This project comprise of three parts; Caravan Training Programs, Mini-Projects, and Workshops. Caravan Programs are being conducted since 1997 with the help of JAXA sponsorship. Each year two countries are being selected. In 2005-06, trainings were conducted in Lao PDR and Sri Lanka and 9 Mini-Projects were supported in 6 countries. Two workshops were conducted in 2005-06 for information sharing, one as a parallel session during the Asian Conference of Remote Sensing (ACRS) and the other one at ASEAN Subcommittee on Space Technology and Applications (SCOSA), both were held in Hanoi.

Duration: April 2005 to March 2006
Investigator: Dr Lal Samarakoon
Co-Investigator: Dr Manzul Hazarika
Sponsor: Japan Aerospace Exploration Agency, Project FY 2005-2006
Total Contracted Amount: Baht 14,730,000

JST Project

Project Description: This research grant was provided by the Japan Science and Technology Agency (JST). The Yasuoka Laboratory, Institute of Industrial Sciences, University of Tokyo facilitated the project for satellite data receiving and archiving. Geoinformatics Center was requested to receive, archive and distribute NOAA and MODIS data among the research centers in Japan and collect field data for validations. This research project is expected to continue for few more years.

Duration: January 2005 to March 2006
Investigator: Dr Lal Samarakoon
Co-Investigator: Dr Junichi Susaki
Sponsor: Japan Science Technology, Project FY 2005-2006
Total Contracted Amount: Baht 1,478,000

KDML 105-GIS

Project Description: To investigate the effect of environment and management factors which could contribute to the grain quality of Khao Hom Mali and identification of potential growing areas.

Duration: November 2005 to October 2006
Investigator: Dr Xiaoyong Chen
Co-investigator: Dr Srisaang Kaojarearn
Sponsor: RTG-Budget-Joint Research Project FY 2005
Total Contracted Amount: Baht 1,000,000

Road Management

Project Description: To develop a methodology on the use of remote sensing data and digital elevation model (DEM) for evaluating risk of mass movement such as collapse, landslides, debris flow for the purpose of road management in especially planning and detail designing phase. The study area is selected in Catanduanes island in the Philippines.

Duration: February 2002 to February 2006

Investigator: Dr Honda Kiyoshi
Sponsor: Japan Bank of International Cooperation
Total Contracted Amount: Baht 1,111,968

Spatial Analysis of Malaria Risk to the Determination of Epidemiological Surveillance in an Endemic Region of Thailand and the effectiveness of a New Control strategy (RTG-MALARIA)

Project Description: To carry out geo-spatial risk assessment on malaria to come up with better control strategies by combining expertise of Mahidol University (Malaria disease) and AIT (geo-informatics)

Duration: October 2004 to June 2006
Investigator: Dr Honda Kiyoshi
Sponsor: RTG -Budget-Joint Research Project FY 2004
Total Contracted Amount: Baht 1,000,000

The GIS Component in Tsunami Early Warning System of AIT (RTG-TSUNAMI-GIS)

Project Description: To implement GIS components to Tsunami Early Warning System of AIT : 1) to develop a real time GIS for Tsunami Information Management using FOSS, 2) to collect Real Time Tsunami Sensor Data and update GIS database, 3) to collect earthquake on line from Web and E-mail and update GIS database, 4) to publish Tsunami Sensor Information and Earthquake Information to concerted people over the Internet, 5) to carryout 3D Tsunami Simulation.

Duration: December 2005 to December 2006
Investigator: Dr Honda Kiyoshi
Sponsor: RTG-Budget-Joint Research Project FY 2005
Total Contracted Amount: Baht 875,000

8.6 Publications

Refereed Journals

Boulos, Maged N Kamel and Honda, K, Web GIS in practice IV: publishing your health maps and connecting to remote WMS sources using the Open Source UMN MapServer and DM Solutions MapLab, *International Journal of Health Geographics*, 5:6, 2006(doi:10.1186/1476-072X-5-6)

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Hossain, M Z, Tripathi, N K, and Phillips, M J, Environmental Carrying Capacity for Sustainable Shrimp Farming – an assessment of Kandaleru Creek in Andra Pradesh, India, *Aquaculture Compendium – CAB International*, Wallingford, OXON, OX10 8DE, UK, 2005.

Ines, A V M and Honda, K, On quantifying agricultural and water management practices from low spatial resolution RS data using genetic algorithms: A numerical study for mixed pixel environment, *Advances in Water Resources*, pp.856-870, Vol. 28, Issue 8, 2005.

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Kamthonkiat, D, Honda, K, Turrall, H, Tripathi, N K, and Wuwongse, V, Discrimination of Irrigated and Rainfed Rice in a Tropical Agricultural System using SPOT-VEGETATION NDVI and Rainfall Data, *International Journal of Remote Sensing*, pp.2527-2547, Vol. 26, No. 12, 20 June 2005.

Kanchana, N and Tripathi, N K, An information value based analysis of physical and climatic factors affecting dengue fever and dengue haemorrhagic fever incidence, *International Journal of Health Geographics*, 4(13), 1-13, 2005.

Kusanagi, M, Thapa, R B and Kitazumi, A, Suitability Analysis for Potential Future Transportation Infrastructure in South East Asia, *GIS Development Magazine*, 2005

Lichti, D D, Gordon, S J, and Tipdecho, T, Error Models and Propagation in Directly Georeferenced Terrestrial Laser Scanner Networks, *Journal of Surveying Engineering*, ASCE, Vol.131, No.4, pp.135-142.

Onprapha, P, Tripathi, N K, and Dutta, J, Air pollution monitoring and GIS modeling: a new use of nanotechnology based solid state gas sensors, *Journal of Science and Technology of Advanced Materials*, Elsevier, Vol. 6, 251-255, 2005.

Rongnoparut, P, Ugsang, D M, Baimai, V, Honda K, and Sithiprasasna, R, Use of a Remote Sensing-Based Geographic Information System in the Characterizing Spatial Patterns for Anopheles Minimus A and C Breeding Habitats in Western Thailand, *Southeast Asian Journal of Tropical Medicine and Public Health*, ISSN: 0125-1562, Vol. 36, No.5, September, pp. 1145-1152, 2005.

Saykawlard, S, Honda, K, Das Gupta, A, Eiumnoh, A, and Chen, X, Prediction of subsurface water level change from satellite data, *Hydrological Processes*, pp. 947-954, Vol. 19, Issue 4, 2005.

Sithiprasasna, R, Ugsang, D M, Honda, K, Jones, J W, and Singhasivanon, P, IKONOS-derived Malaria Transmission Risk in Northwestern Thailand, *Southeast Asian Journal of Tropical Medicine and Public Health*, ISSN: 0125-1562, pp. 14-22, Vol. 36, No. 1, January 2005.

Tinnachote, C and Chen, X, An Approach for Object-Based Positional Error Model, *Journal of Spatial Science*, pp. 1-12, Vol. 50, June 2005.

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Tripathi, N K and Vasan, C, Open GIS based wireless data logger for flood mitigation, Role of water sciences in trans-boundary river basin management, Ed. By Dr S Herath, Dr Dusmantha Dutta, Dr A Dasgupta. Published by: United Nations University, Asian Institute of Technology, 75-80, 2005.

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8.7 Doctoral Students' Dissertation

Analysis of SPOT Vegetation NDVI for Mapping Irrigated and Non-Irrigated Rice Cultivation

by Daroonwan Kamthonkiat
Supervisor: Dr Kiyoshi Honda

A Semantic Zoom Approach in GIS to Rule-Based Landscape Visualization

by Chamnan Kumsap
Supervisor: Dr Frederic Borne

8.8 Masters Students' Theses and Research Studies

A Mobile GIS Based Shopping Assistant System

by Kapil Katiyar
Supervisor: Dr Nitin Kumar Tripathi

A Mobile GIS Based Tourist Information System

by Mandar Narayan Sarlashkar
Supervisor: Dr Nitin Kumar Tripathi

A Real Time Disaster Mapping Camera

by Ravi Chauhan
Supervisor: Dr Kiyoshi Honda

Automatic Detection of Traffic Flow Parameters for ITS

by Ruifeng Ye
Supervisor: Dr Xiaoyong Chen

Cloud Motion Vector (CMV) and Change Determination in the Foothills of Bhutan from Remotely Sensed Images

by Ugyen Penjor

Supervisor: Prof Michiro Kusanagi

Monitoring Shoreline Dynamics in Pak Phanang, Thailand Using Remote Sensing and Geographic Information Systems

by Sayedur Rahman Chowdhury

Supervisor: Dr Nitin K Tripathi

Data Assimilation in SWAP Model Based on a NDVI-LAI Relationship

by Panithan Srinuandee

Supervisor: Dr Kiyoshi Honda

Tsunami Disaster Preparedness Model for Sustainable Planning and Development of Krabi, Thailand

by Abdul-Salam Soomro

Supervisor: Dr Nitin Kumar Tripathi

Distribution Testing of Positional Error of Geospatial Data

by Sirikul Hutasave

Supervisor: Dr Xiaoyong Chen

Error Distribution Simulation for Handling Positional Uncertainties in Geographic Information Systems

by Zhang Lei

Supervisor: Dr Xiaoyong Chen

Extraction of River Network from ASTER Data and SRTM DEM

by Aleinmar Htwe

Supervisor: Dr Kiyoshi Honda

Fusion of Stereo-Optical and Interferometric SAR DEMS

by Manoj Karkee

Supervisor: Prof Michiro Kusanagi

GIS Based Model/Algorithm Development to Identify Core Rural Road Network for Development and Maintenance Planning

by Md Shahidul Islam

Supervisor: Dr Kiyoshi Honda

GIS Based Poverty Analysis and Mapping for Rural Development Planning in Nepal: A Case Study of Kaski District

by Man Bahadur Kshetri

Supervisor: Prof Michiro Kusanagi

Integration of Remote Sensing Data with Forest Growth Model to Estimate the Growth Productivity

by Juthasinee Thanyapraneedkul

Supervisors: Dr Nitin Kumar Tripathi

Dr Frederic Borne

Monitoring Agricultural Drought Using MODIS Temperature Vegetation Dryness Index in Mae Nam Chi Basin, Thailand

by Kaesorn Jumpa

Supervisor: Dr Nitin Kumar Tripathi

Chapter 9: SET – STRUCTURAL ENGINEERING FIELD OF STUDY

9.1 Introduction

Structural engineering has always been seen as one of the few fields of study where one can combine real technical skills with artistic flair. Structural engineers are known to be people who enjoy innovation, opportunities, responsibility and excitement, whilst working within a creative profession. Structural engineers plan and design various structures such as buildings, bridges, sport stadiums, towers, and underground structures.

The built environment which is designed and constructed by structural engineers has an enormous impact on our everyday lives. In order to design and construct safe and economic structures, they need to keep abreast with the latest methods of structural analysis, modeling concepts for computation, advanced design, material technology, and improved knowledge in structural loadings.

The field educates professionals who will be at the forefront of advanced research in Structural Engineering. They are trained to respond creatively to the industrial requirements of infrastructure development.

9.2 Faculty and Research Staff

Full-time Faculty

WORSAK KANOK-NUKULCHAI, BEng (Hon), Chulalongkorn Univ, Thailand; MEng, AIT, Thailand; PhD, Univ of California (Berkeley), USA.

Professor (*Computational Mechanics; Finite Element Methods; Tall Building Static and Seismic Analysis; Bridge Engineering; Microcomputer Software for Structural Engineering; Genetic Algorithms; Nonlinear Analysis of Structures and Continua; Plate/Shell Structures; Engineering Education; Nanomechanics*)

[Finite element methodologies and numerical methods; finite element modeling of large deformation plates and shells, time integration methods, contact and impact problems; nonlinear solution techniques as well as the numerical aspects of dynamic problems; finite element software development especially under personal computer environment; meshfree methods based on Kriging Interpolation; structural health monitoring]

KIM KIDU, BEng, Hanyang Univ, Korea; MEng, AIT, Thailand; PhD, Imperial College of Science, Tech and Medicine, London.
Associate Professor

PICHAJ NIMITYONGSKUL, BEng, Chulalongkorn Univ, Thailand; MEng, DEng, AIT, Thailand.
Associate Professor
[Concrete Engineering; Building Design; Construction Materials; Prestressed Concrete Structures; Plate Structures; Advanced Reinforced Concrete; Advanced Concrete Technology; Materials and Products for Construction; Experimental Methods in Structural Engineering]

PENNUNG WARNITCHAI, BEng, Chulalongkorn Univ, Thailand; MEng, PhD, Tokyo Univ, Japan.
Associate Professor

WILLIAM BARRY, BS, PhD, Carnegie Mellon Univ; MS, Stanford Univ, USA.
Assistant Professor

Visiting Faculty

YOSHITAKA KATO,
Visiting Assistant Professor
[concrete material and maintenance management, specifically in maintenance management of

concrete structures based on risk evaluation, evaluating environmental impacts on concrete structures, estimating concrete quality of existing structure using multiple NDT (Non-Destructive Test) and modeling of diffusion of substances in concrete]

Research Staff

NAVEED ANWAR,
Associate Director, Asian Center for Engineering Computations and Software

BERNARD LEFEBVRE,
Senior Research Assistant and Director, Habitech Center

9.3 Completed Grant and Sponsored Research

EASEC-10 Conference Preparation Phase

Project Description: The East Asia-Pacific Conference on Structural Engineering and Construction (EASEC) was founded by Professor Fumio Nishino, then the Vice President for Academic Affairs of the Bangkok-based Asian Institute of Technology, to provide a forum for professional structural and construction engineers and researchers working in Asia and the Pacific region to present recent progress in research and development, and to discuss the implementation of new tools and technology in professional applications. In particular, the conference intends to promote mutual understanding and share common ideas. EASEC has been held biennially since 1986. EASEC-10 will be organized in Bangkok during August 3-5, 2006.

Duration: 1 July 2005 to 31 December 2005
Investigator: Prof Worsak Kanok-Nukulchai
Sponsor: EASEC Secretariat
Total Contracted Amount: Baht 400,000

Independent Inspecting and Testing Agency in Manufacturing of Concrete Sleepers for SRT (ITD Sleeper – 2005)

Project Description: Italian Thai Development Public Company Limited was contract from the State of Railways of Thailand (SRT) for manufacturing and supplying of concrete sleepers for SRT Track Rehabilitation Project. Based on the specifications SRT, an independent testing agency is required. At the request of Italian Thai Development Public Company Limited, the structural engineering laboratory of the then School

of Civil Engineering, Asian Institute of Technology is engaged to conduct the inspecting and testing for the structural performance of sleepers precast concrete.

Duration: 1 January 2005 to 31 December 2005
Investigator: Dr Pichai Nimityongskul
Sponsor: Italian-Thai Development Public Co Ltd, Thailand
Total Contracted Amount: Baht 800,000

Investigation of Structural Integrity of Din Daeng Housing

Duration: 1 December 2002 to 31 December 2005
Investigator: Dr Pichai Nimityongskul
Sponsor: National Housing Authority, Thailand
Total Contracted Amount: Baht 5,303,315

Klong Prapa Canal Covering Project

Duration: 26 October 1999 to 30 June 2005
Investigator: Prof Worsak Kanok-Nukulchai
Collaborator: Case Company Limited, Thailand
Sponsor: Department of Highways, Ministry of Communication, Thailand
Total Contracted Amount: Baht 6,341,440

Klong Prapa Canal Covering Project- Part II (Water & Architect)

Duration: 26 October 1999 to 30 June 2005
Investigator: Prof Tawatchai Tingsanchali
Collaborators: Prof Worsak Kanok-Nukulchai, AIT
Prof Ajit Annachatre, AIT
YP Consultants Company Limited, Thailand
Dr Apichart Wongkaew
Dr Yingplew Suphakitwong
Sponsor: Department of Highways, Ministry of Communication, Thailand
Total Contracted Amount: Baht 1,228,748

Klong Prapa Canal Covering Project- Part III (Traffic Study)

Duration: 26 October 1999 to 30 June 2005
Investigator: Prof Yordphol Tanaboriboon
Collaborators: Prof Worsak Kanok-Nukulchai, AIT
Mr Krisda Tangkawachiranon
Sponsor: Department of Highways, Ministry of Communication, Thailand
Total Contracted Amount: Baht 1,513,000

Klong Prapa Canal Covering Project- Part IV (Utilities, Geotechnics and Geometric Design)

Duration: 26 October 1999 to 30 June 2005
Investigator: Dr Noppadol Phienwej
Collaborators: Prof Worsak Kanok-Nukulchai, AIT
WISANUCOM Engineering Consultants Company Limited, Thailand
Sponsor: Department of Highways, Ministry of Communication, Thailand
Total Contracted Amount: Baht 2,245,200

Natural Rubber Composites for Railway Sleepers: A Feasibility Study

Duration: 16 May 2003 to 30 June 2005
Investigator: Prof Worsak Kanok-Nukulchai
Collaborator: Thammasat University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 996,000

Risk Analysis due to Catastrophic Urban Floods in Bangkok using GIS, Remote Sensing and Surface-River Model

Duration: 1 September 2004 to 30 November 2005
Investigator: Dr Yoshitaka Kato
Collaborator: Dr Dushmanta Dutta, AIT
Sponsor: United Nations University, Japan
Total Contracted Amount: Baht 360,000

9.4 Ongoing / In Progress Grant and Sponsored Research

Adjustment to the Building Energy Code

Project Description: Department of Energy Development and Promotion (DEDP) is implementing a project entitled "Adjustments of the Building Energy Code" with assistance from the Danish Cooperation for Environment and Development (DANCED). The main purpose of the project is to update the Building Codes related to energy. The existing codes and standards relating to energy will be adjusted or updated according to the latest available knowledge. Comprehensive and valuable knowledge on energy issues related to buildings already exists in Thailand. To emphasise the sustainability of the project it is obvious to utilize this national resource.

Duration: 1 June 2002 to 30 June 2006
Investigator: Prof Worsak Kanok-Nukulchai
Sponsor: Dansk Energi Management A/S
Total Contracted Amount: Baht 14,040,000

Chemical Modification of Natural Rubber Composites for Structural Application

Project Description: Natural rubber (NR) is naturally soft and highly deformable at room temperature. After crosslinking (or vulcanization), rubber becomes more elastic but still possesses low compressive modulus. From our previous investigation, mechanical properties of NR were significantly enhanced by increasing crosslinking density of NR vulcanizates, and by adjusting types and amounts of reinforcing fillers. It was found that by increasing crosslinking density of NR vulcanizates, the rubber product becomes very stiff and inelastic, whereas, by adjusting the type and amount of reinforcing fillers at low to moderate crosslinking density, the stiffness of the rubber is still low. Crosslinking density demands expensive chemicals and a large amount of reinforcing fillers to achieve desirable properties.

Duration: 30 September 2004 to December 2006
Investigator: Prof Worsak Kanok-Nukulchai
Sponsor: Royal Thai Government (RTG) Joint Research Fund
Total Contracted Amount: Baht 996,000

EASEC Secretariat (EASECS)

Project Description: To run the secretariat for EASEC Series of Conferences organized biennially in Asia. The Conferences serve to provide a forum for professional structural and construction engineers and researchers working in Asia and the Pacific region to present recent progress in research and development, and to discuss the implementation of new tools and technology in professional applications. In particular, the conference intends to promote mutual understanding and share common ideas. EASEC has been held biennially since 1986.

Duration: 25 June 2005 to 31 December 2006
Investigator: Prof Worsak Kanok-Nukulchai
Sponsor: Participants/Donors/Subsidy
Total Contracted Amount: Baht 8,800,000

Evaluation of Seismic Capacity of Gravity-Load-Designed, Prestressed Concrete Slab-Column Frame Buildings in Bangkok

Duration: October 2005 to March 2006
Investigator: Dr Pennung Warnitchai
Sponsor: Thailand Research Fund
Total Contracted Amount: Baht 350,000

Finite Element Modeling of Tsunami Propagation on the Coast of Thailand

Project Description: On December 26, 2004, coastal regions of the Indian Ocean were devastated by a large earthquake in the ocean near Indonesia's province of Aceh. Much of tragic loss of lives and injuries could have been prevented if there were early warning systems in those countries surrounding the Indian Ocean, including Thailand. In order to set up a reliable warning system in Thailand, it is necessary to have good wave sensors in the ocean to detect potential tsunami as well as good mathematical and numerical tools to predict behavior of tsunami. This study aims to establish a finite element model for simulating tsunami propagation on the coast of Thailand. The obtained model can be used in conjunction with wave sensors to form a tsunami warning system. The obtained software application will encourage Thailand to rely on its own strength in tsunami disaster prevention and mitigation.

Duration: 1 November 2005 to 31 October 2006
Investigator: Prof Worsak Kanok-Nukulchai
Sponsor: Royal Thai Government (RTG) Joint Research Fund
Total Contracted Amount: Baht 875,000

International Ferrocement Information Center 2005 (IFIC 2005)

Investigator: Dr Pichai Nimityongskul
Duration: 1 February 2005 to 31 December 2006
Total Contracted Amount: Baht 500,000

Investigation of Structural Integrity of Eua Arthorn Housing

Project Description: AIT conduct an inspection to investigate the structural integrity of Eua Arthorn Housing Authority.

Duration: 10 May 2004 to 31 December 2007

Investigator: Dr Pichai Nimityongskul

Sponsor: National Housing Authority

Total Contracted Project: Baht 3,750,000

Mitigation of Seismic Risk in Thailand

Duration: Since August 2002

Investigator: Dr Pennung Warnitchai

Sponsor: Thailand Research Fund

Total Contracted Amount: Baht 3,154,000

Natural Rubber Composites for Railway Sleepers: A Feasibility Study

Project Description: In this proposal, different natural rubber composites will be studied with the aim to be utilized as railway sleepers. Natural rubber is proposed as the primary raw material because Thailand is currently the largest producer of rubber in the world. If the project finds a successful composite of natural rubber that fits for railway sleepers, the country will benefit from being able to exploit the large stock of natural rubber she over- produces every year. This in turn will stabilize the market price of natural rubber. Prototypes of railway sleepers will be made from different composites of natural rubber, and will be tested based on the functional requirements of railway sleepers in cooperation with the State Railway of Thailand. As railway tracks can be installed by regular spikes as in the case of wooden sleepers, Thailand will not need to import special fasteners. In addition, once the technology is well proven, Thailand can export this technology oversea.

Duration: 16 May 2003 to December 2006

Investigators: Prof Worsak Kanok-Nukulchai

Dr Noppadol Phien-wej

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 996,000

Seismic Behavior of Steel Beam-Column Connection with Knee Brace (Knee Braced Frame)

Project Description: The research proposed herein will involve an experimental study of a new structural system to resist seismic forces called moment frames with knee brace. The research work involves a quasi-static testing and numerical simulations of the frame assemblages.

Duration: November 2005 to November 2006

Investigator: Dr Pennung Warnitchai

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 996,000

Seismic Hazard Assessment and Mitigation of Seismic Risk in Thailand (Phase 1): Sub-Project 3 and 4

Project Description: In this project, the dynamic properties of about forty (40) tall reinforced concrete

buildings in Bangkok will be identified by an ambient vibration method. Based on the results obtained, appropriate empirical formulas for estimating building fundamental periods will be derived, and a method to construct accurate building dynamic models will be developed. The seismic performance of six representative buildings will be extensively evaluated by nonlinear pushover analysis, and economic and effective corrections of retrofit schemes to improve the seismic performance will be identifies. Based on these results, practical seismic design guidelines will be made.

Duration: 1 September 2002 to 31 December 2006

Investigator: Dr Pennung Warnitchai

Collaborator: Dr Noppadol Phienwej, AIT

Sponsor: Thailand Research Fund

Total Contracted Amount: Baht 3,154,000

Testing of Structural Integrity of Concrete Structure for Hopewell Column (Hopewell 2005)

Project Description: To study the structural integrity of Hopewell's column and to observe and identify the extent of deterioration or damage of concrete structure and to determine the strength of concrete by using either non-destructive test for North Bound Train System in a Bangkok (Bang sue-Rangsit) and Bang Sue Train Station.

Duration: August 2005 to March 2007

Investigator: Dr Pichai Nimityongskul

Sponsor: NTBR

Total Contracted Amount: Baht 3,000,000

9.5 Publications

Refereed Journals

Anwar, N, Kanok-Nukulchai, W, and Batanov, D N, Component-Based, Information Oriented Structural Engineering Applications, *Journal of Computing in Civil Engineering*, Vol. 19, No. 1, pp. 45-57, ISSN 0887-3801 (2005).

Hengsadekul, T and Nimityongskul, P, Appropriate Technology for Low-Cost Housing by Using Precast Vetiver Grass-Clay Composite, *Journal of the Ferrocement*, Vol. 35, No. 3, pp. 628-640, (2005)

Hoang, N and Warnitchai, P, Design of Multiple Tuned Mass Dampers by using a Numerical Optimizer, *Earthquake Engineering and Structural Dynamics*, Vol. 34, pp. 125-144, (2005).

Kato, E, Kato, Y, and Uomoto, T, Development of Simulation Model of Chloride Ion Transportation in Cracked Concrete, *Journal of Advanced Concrete Technology*, Japan Concrete Institute, Vol.3, No.1, pp.85-94, (2005).

Kato, Y and Uomoto, T, Modeling of Effective Diffusion Coefficient of Substances in Concrete Considering with Spatial Properties of Composite Materials, *Journal of Advanced Concrete Technology*, Vol.3, No.2, pp. 241-251, (2005).

Kato, Y and Uomoto, T, Proposal for quantitative evaluation methodology of inspection value in maintenance of concrete structures based on repair-risk, *Journal of Advanced Concrete Technology*, Vol.3, No.3, pp. 363-370, (2005).

Patjawit, A and Kanok-Nukulchai, W, Health monitoring of highway bridges based on a Global Flexibility Index, *International Journal of Engineering Structures*, Vol 27, pp. 1385-1391 (2005).

Plengkhom, K and Kanok-Nukulchai, W, An Enhancement of Finite Element Method with Moving Kriging Shape Functions, *International Journal of Computational Methods*, Vol. 2, No. 4, pp. 451-477, (2005).

Poovarodom, N, Jantasod, M, and Warnitchai, P, Dynamic Properties of Reinforced Concrete Buildings in Bangkok, *Research and Development Journal of the Engineering Institute of Thailand*, Vol. 16, No. 2, pp. 21-32, (2005).

Yamazaki, F, Matsuoka, M, Warnitchai, P, Poling, S, and Ghosh, S, Tsunami Reconnaissance Survey in Thailand Using Satellite Images and GPS, *Asian Journal of Geo-informatics*, Vol. 5, No. 2, pp. 53-61, (May 2005).

Refereed Books/Chapters

Kanok-Nukulchai, W, Structural Analysis (Section 6.37.3.4) in the *Encyclopedia of Life Support Systems Section*, UNESCO, Paris (2005).

Nimityongskul, P and Hengsadeeikul, T, Vetiver Grass-Clay Composite Silo, the useful knowledge on vetiver grass, ISBN: 974-92420-9-2, Printed No 4, Chapter 7, pp. 76-79, Office of the Royal Development Projects Board Publication, Bangkok, Thailand (in Thai)

Warnitchai, P, Lessons Learned from the 26 December 2004 Tsunami Disaster in Thailand, Report on the 2004 Sumatra Earthquake and Tsunami Disaster, September 2005, edited by **Kimiro Meguro**, International Center for Urban Safety Engineering, Institute of Industrial Science, the University of Tokyo.

Conference Proceedings

Ito, M, Kato, Y, and Uomoto, T, The Importance of Curing in Preventing the Spalling-of Patching Repair Material, Proceedings of the *4th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia*, pp.241-248, 2005.

Joyklad, P, Pheeraphan, T, and Nimityongskul, P, Development of Ferrocement Panel to Resist Blast Load, Proceedings of the *Tenth International Convention on Civil Engineering (NCCE-10)*, Chonburi, Thailand, May, 2-4, 2005.

Joyklad, P, Pheeraphan, T, and Nimityongskul, P, Development of Ferrocement Panel to Resist Blast Load, Proceedings of the *First Concrete Conference (ACC1)*, Rayong, Thailand, October 25-27, 2005.

Kanok-Nukulchai, W, Enhancement of FEM with Moving Kriging Shape Function, Paper presented in honor of *R L Taylor's DRUCKER MEDAL SYMPOSIUM, ASME International Mechanical Engineering Congress and Exposition*, Nov 8, 2005.

- Kanok-Nukulchai, W**, Suvarnabhumi Airport: Target to Success, Paper presented at the *Director Meeting of the Shimizu Institute of Technology*, Shimizu Corporation, Tokyo, Japan.
- Kato, E, Yokota, H, Kato, Y, and Uomoto, T**, Influence of Crack Formation on Chloride Penetration, Proceeding of *International Workshop on Durability of Reinforced Concrete under Combined Mechanical and Climatic Loads*, pp.105-111, 2005
- Kato, Y and Takeshita, N**, Simulation Study on Relation Between Local Rainfall Conditions and Amount of Moisture Supplied to Concrete, Proceedings of the *4th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia*, pp.79-88, 2005
- Nimityongskul, P, Chitasombuti, J, and Barbhuiya, S A**, Relationship between Compressive Strength Concrete Incorporating Classified Rice Husk-Ash, Proceedings of the *ConMat'05, Third International Conference on Construction Materials: Performance, Innovations and Structural Implications*, Vancouver, Canada, August 22-24, 2005.
- Tsunekuni, M, Nishimura, T, Kato, Y, and Uomoto, T**, Structural Performance Monitoring of Reinforced Concrete Bridges, Proceedings of the *4th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia*, pp.51-60, 2005
- Warnitchai, P**, Lessons Learned from the 26 December 2004 Tsunami Disaster in Thailand, Proceedings of the *International Symposium on Disaster Reduction on Coasts*, Monash University, Melbourne, Australia, November 14-15, 2005.
- Warnitchai, P**, Lessons Learned from the 26 December 2004 Tsunami Disaster in Thailand, Proceedings of the *4th PSU-Engineering Conference (PEC-4)*, Prince of Songkla University (PSU), Hai Yai, December 8-9, 2005.
- Warnitchai, P**, Roles of the Mass Media in Natural Disaster Reduction, Proceedings of the *APEC-EqTAP Seminar on Earthquake and Tsunami Disaster Reduction*, Jakarta, Indonesia, September 27-28, 2005.
- Warnitchai, P**, The 26 December 2004 Tsunami Disaster in Thailand: Experience and Lessons Learned, Proceedings of the *Fifth Workshop on Safety and Stability of Infrastructures against Environmental Impacts*, De La Salle University, Manila, Philippines, December 5-6, 2005.
- ### Other Publications
- Kanok-Nukulchai, W and Patjawit, A**, Structural Health Monitoring Based on Global Flexibility Index: a Case of Highway Bridges, Structural Assessment Monitoring Control (SAMCO), Vol. 14, No. 3, pp. 3-7, (2005).
- Nimityongskul, P**, AIT adopted vetiver grass to make respiration grain storage silo, Published on page 7, The National Newspaper, Monday, August 15, 2005 (in Thai).
- Nimityongskul, P**, Surface Deterioration of Concrete Contaminated by Pyritic Aggregates : A Phenomenal Occurrence in Thailand, Report submitted to Japan concrete Institute on the Occasion of its 40th Anniversary, July 12, 2005.
- Nimityongskul, P**, 2 Patents pending for invention at the department of intellectual property, Ministry of commerce on vetiver grass development technology -Simple press equipment - Vetiver Grass-Clay Block Pattern and Usage
- Sharma, B S and Warnitchai, P**, Seismic Evaluation of Buildings: Simplified Modal Pushover Analysis - A Practical Approach to Improve Public Safety, *Civil Computing: Computer Applications in Civil Engineering*, The Asian Center for Engineering Computations and Software

(ACECOMS), Vol. M31-0307-0904, pp. 32-35, March – June 2005 issue.

Sharma, B S, Warnitchai, P, and Taleongpong, S, Current Status of Earthquake Resistant Design of Tall Buildings in Thailand: The First Three Tall Buildings Explicitly Designed for Earthquake Resistant, *Civil Computing: Computer Applications in Civil Engineering*, The Asian Center for Engineering Computations and Software (ACECOMS), Vol. M31-0307-0904, pp. 11-15, March – June 2005 issue.

Warnitchai, P, Earthquake Risk in Thailand, *Civil Engineering Magazine*, Engineering Institute of Thailand, No. 1, January – February issue, 2005.

9.6 Doctoral Students' Dissertation

Structural Identification: Prestressed Concrete Girder Bridge for Strength Evaluation
by Anun Patjawit
Supervisor: Prof Worsak Kanok-Nukulchai

9.7 Masters Students' Theses and Research Studies

Adaptive Force-Based Pushover Analysis of Reinforced Concrete Frames Using a Fiber Section Model
by Benny Suryanto
Supervisors: Dr Kim Kidu
Dr Pennung Warnitchai

A Mechanistic Approach for Modeling Deterioration of Flexible Pavement
by Jawed Qureshi
Supervisor: Dr William Barry

An Assumed Strain 4-Node Reinforced Concrete Shell Element Considering Geometric and Material Nonlinearity
by Songsak Suthasupradit
Supervisor: Dr Kim Kidu

An Improved Local Kriging Method in 2D Elastostatics
by Thaung Htut Aung
Supervisor: Dr William Barry

Application of Moving Kriging Shape Functions on Plate Problems
by Shazim Ali Memon
Supervisor: Prof Worsak Kanok-Nukulchai

Design Improvement of R/C Interior Beam-Column Joints in Low to Moderate Seismic Risk Regions
by Pramin Norachan
Supervisor: Dr Pennung Warnitchai

Development of Ferrocement Armored Panels
by Panuwat Joyklad
Supervisor: Dr Pichai Nimityongskul

Development of High-Strength and Durable Concrete Mix Proportions by Using Replacement of Fly Ash and Silica Fume
by Phyu Phyu Myint
Supervisor: Dr Pichai Nimityongskul

Effects of Foundation Flexibility on Elastic and Inelastic Seismic Responses of Multi-Story Buildings
by Jose Leo C Mission
Supervisor: Dr Pennung Warnitchai

Enhancing Fresh Tremie Concrete Properties for Bored/Deep Pile Applications
by Muhammad Talha Junaid
Supervisor: Dr Pichai Nimityongskul

Experimental Investigation on Fresh Concrete Properties of High Strength and Durable Concrete with Prediction Models Using Artificial Neural Networks
by Bishnu Prasad Subedi
Supervisor: Dr Pichai Nimityongskul

Feasibility Study on Structural Health Monitoring of Multi-Span Prestressed Concrete Bridges by Using Thermal-Induced Responses
by Kriangkrai Treewattanakul
Supervisor: Dr Pennung Warnitchai

Finite Element Analysis of the Response of Steel Frame Structures Subjected to High Temperature
by Thein Nu
Supervisor: Dr William Barry

Interference Effects from Adjacent Structures on Wind-Induced Forces in Large Billboards
by Kobchai Poemsantitham
Supervisor: Dr Pennung Warnitchai

Nonlinear Finite Element Analysis of Reinforced Concrete Deep Beams
by Sara Ghadimi Khasraghy
Supervisor: Dr William Barry

**Production of Aerated and Autoclaved
Lightweight Mortar Containing Pulverized Fly
Ash and Bottom Ash**

by Thanmaporn Ungsongkhun
Supervisor: Dr Pichai Nimityongskul

**Production of Low Cost Self-Compacting
Concrete Using Fly Ash and Dolomite Powder**

by Salim Ahmed Barbhuiya
Supervisor: Dr Pichai Nimityongskul

**Relevance of Beam-Column Joint Damage
on Seismic Performance of RC Framed
Buildings**

by Alope Rajbhandary
Supervisor: Dr Pennung Warnitchai

**Repair of Reinforced Concrete Slabs Using
Modified Ferrocement Laminate**

by Montree Boonyapongphun
Supervisor: Dr Pichai Nimityongskul

**Response Analysis of a Cable Stayed Bridge
Under Wind Loading**

by Bhargab Mohan Das
Supervisor: Dr Pennung Warnitchai
Dr Kim Kidu

**Seismic Performance Evaluation of Bangkok
Mass Rapid Transit Authority Subway**

by S Selva Prakash
Supervisor: Dr William Barry

**Three Dimensional Analysis of Concrete
Structures with Continuum Damage Model**

by Panot Chobsilprakob
Supervisor: Dr Kim Kidu

**Three Dimensional Elasto-Plastic Constitutive
Relation for an 8-Node EAS (Enhanced
Assumed Strain) Solid Element**

by Sacharuck Pompeerakeat
Supervisor: Dr Kim Kidu

**Two Dimensional Model Development for
Numerical Simulation of Tsunami Propagation
Using the Semi Implicit Characteristic-Based
Split Method**

by Gunawan Budi Wijaya
Supervisor: Prof Worsak Kanok-Nukulchai

**Use of Natural Beach Sand and Powdered
Stone in Making High Strength Concrete**

by Alvin Proboyo
Supervisor: Dr Pichai Nimityongskul

Chapter 10: SET – TELECOMMUNICATIONS FIELD OF STUDY

10.1 Introduction

The Telecommunications program offers areas of specialization in transmission systems; switching systems; telematics; network planning, and in collaboration with the School of Management, telecommunications management.

The courses offered emphasize modern telecommunications skills in systems planning and engineering, telecommunications software development, and administrative and financial aspects of telecommunications management.

Graduates from the master's program form the nucleus for effective high-level technical planning and management operations at their employer organizations. Some of the graduates are engaged in planning, development, and service activities leading to the installation, commissioning, management, design etc. of value-added systems. Given the important role of our graduates in the development of the telecommunications sector, the learning is of significant benefit to the users of telecommunications services within the region.

Graduates of the doctoral program play key roles in enhancing the level of education and research in the national universities of the region, and promote and strengthen the R&D potential of emerging regional manufacturing industries.

Research covers a wide variety of topics at the cutting edge of research and development. Specific issues addressed in the broad fields of transmission and switching systems are, for example, coherent optical communications, multiple-access strategies for cellular-mobile and cabled networks, as well as questions of congestion control and new services in ISDN and future B-ISDN networks.

10.2 Research Facilities and Laboratories

Today's fast-booming world of Telecommunications and Computer networking plays a significant leadership role. To support this achievement the Telecommunications field of study puts the effort to continue the development of Telecommunications technologies and systems. It covers a wide variety of research in telecommunications ranging from modeling, analysis wire line and wireless systems to application and protocol development.

Its research subjects are in coherent optical communications; congestion control, ATM, and B-ISDN networks; error correction and detection methods; nobile and Internet traffic studies; multiple-access strategies for cellular-mobile, satellite systems, and cabled networks; network performance analysis, planning and design; and speech processing. Its research specialisations are in broadband networks; network planning; awitching systems; telecommunications management in collaboration with the School of Management; telematics; and transmission systems.

Transmission and Switching Lab (TSL)

The Transmission and Switching lab is equipped with Nokia Digital Switching Exchange DX200 (DX220, DX210) that supports PSTN and ISDN. There are also several telephone switches, traffic simulators, protocol analyzer, PDH/SDH (STM1 & STM4) transmission systems, fiber optic line equipment, transmission line analyzer, error rate meter which are available for experiment in switching, transmission and internetworking. The switching and transmission systems are integrated as real telecommunications network. Among the applications whose study has been made possible by these systems are Operation and Maintenance, performance measurements

of real narrowband and broadband telecommunication networks, as well as new services.

Network Planning Lab (NPL)

High performance computer aided network planning tools are supported by several workstations at the Network Planning lab. This lab provides hands-on experience design and optimization in radio network, fixed network and fiber optical network.

Wireless Lab (WL)

The main purpose of the Wireless laboratory is for measurement and performance analysis. It is equipped with Modulation and Error rate measurement meters, Simulation software like SATSIM, which was developed by the students, is a simulation package to calculate the subsatellite points of a LEO/MEO/GEO and its orbital parameters. It also displays graphically on a two-dimensional earth map the instantaneous position and path traced by the satellite (Multi orbit and Multi satellite). Another is NMS/X, is a measurement system for GSM, DCS and NMT networks tracing, capable of measuring up to four networks simultaneously. The results are used for benchmarking service quality of operational cellular networks. These results can be analyzed and can be used for tuning the network parameters in NPS/X.

Communications Labs (CL)

The Communications lab is used to perform experiments courses under Signal and Systems, Communications Electronics, Digital Transmission Technology and Digital Signal Processing. Test bench equipment includes analog and digital oscilloscopes, function generators, analog and digital Spectrum analyzers, Digital sampling oscilloscopes and DSP cards and workstations which have simulation applications like MATLAB.

Computer Laboratory (PCL)

There are two Computer Laboratories in Telecommunications Program. One is for Senior students and one is for Junior Students. All computers are latest powerful computers.

TC Library

In Telecommunications Program, there is a small library, from where students can borrow telecommunication related journals, manuals and reference books.

10.3 Faculty and Research Staff

Full-time Faculty

KAZI MOHIUDDIN AHMED, MSc, Inst of Communications, Leningrad, USSR; PhD, Univ of Newcastle, Australia.

Professor (*Telecommunication Networks; Digital Modulation Techniques; Satellite Communications; Cellular Mobile Communications; Digital Transmission and Communications*)

[Wireless Systems and Networks; Disaster Warning and Post-disaster Communications; Applications of ICT in Sustainable Development; Propagation and Channel Modeling in Mobile Communications; Multiple Access Techniques & Protocols; Satellite Communications; Antenna Array Processing; Signal Processing]

R M A P RAJATHEVA, BSc, Moratuwa Univ, Sri Lanka; MSc, PhD, Univ of Manitoba, Canada.

Associate Professor (*Equalization Algorithms for Frequency Selective Channels*)

[Digital and Mobile Communications, Space Time Processing- MIMO Performance analysis, OFDM and Multicarrier Techniques, Multiuser Detection, Application of Channel Coding for Distributed Source/Video Coding, Architectures for Emergency Communication Systems, Security Issues]

TEERAPAT SANGUANKOTCHAKORN, BEng, Chulalongkorn Univ, Thailand; MEng, DEng, Tokyo Institute of Technology, Japan.

Associate Professor (*Data Communications; Broadband Integrated Services Digital Networks;*

Multimedia Communications and Systems; Network Quality of Service
[Digital Signal Processing, especially Image Compression for Moving and Still Image, the routing algorithm in the network such as IP and MPLS network, High Speed Network, IP-based multimedia applications; QoS provisioning in Networks]

POOMPAT SAENGUDOMLERT, BSE, Princeton Univ; MS, PhD, Massachusetts Inst of Tech, USA

Assistant Professor

[Communication theory, optical networks, resource allocation problems, and array processing; Recent research activities have focused on optical network designs based on existing infrastructure networks and communications for disaster management]

Visiting Faculty

A B SHARMA, BSc, Univ of Newcastle-upon Tyne, UK; LicTech, DTech, Helsinki Univ of Tech, Finland.

Visiting Professor (*Fiber-Optic Systems; Digital Transmission Technologies; Signals and Systems; Modulation Techniques; Coding Theory*)

[High-speed all-optical networks (WDMA, TDMA, CDMA); Optical WDM local access using spectrally sliced ASE; Radio-over-fiber for future broadband cellular systems]

TAPIO J ERKE, MSc, Helsinki Univ of Tech, Finland.

Visiting Associate Professor

[Traffic measurements, modeling, and performance in various telecommunication networks, PSTN, Cellular, Internet, ATM, and optical networks; Resource allocation for different services, network dimensioning and optimization, and switching structures]

Research Staff

MIKKO KOVALAINEN, PhD

Visiting Senior Researcher

[Knowledge management, Project management, HighTech management, Software business, Technology strategies]

10.4 Ongoing / In Progress Grant and Sponsored Research

Algorithm and System Design of Signal Processing on Quantum Cryptography System: Simulations

Project Description: Experimental results and implementation of quantum key distribution (QKD) system which employs four polarization states encoding key bits in two non-orthogonal bases were reported. The transmitter uses four diode lasers with emission wavelength of 830 nm at 1 MHz repetition rate as weak coherent sources and passive optical components to assign individual photon polarization. The receiver comprises similarly passive optical components to analyze the polarization of arriving photons, and four silicon avalanche photodiodes operated in Geiger mode to detect single photons, and to optically synchronize the system. In a demonstration experiment the QKD system enabled to generate shifted-key about 5,000 bits/s, at an average of about 0.06 photons per pulse at clock rates of 1 MHz. An average quantum bit error rate (QBER) was about 6.5 % for a 6.5 m free space transmission test range.

Duration: 15 September 2004 to 31 March 2006

Investigator: Dr Teerapat Sanguankotchakorn

Sponsor: Royal Thai Government (RTG) Joint Research Fund

Total Contracted Amount: Baht 810,000.00

10.5 Publications

Refereed Journals

Dharmawansa, P and Rajatheva, R M A P, Pairwise Error Probability of Space-Time Codes in Frequency Selective Rician Channels, *IEEE Communication Letters*, October 2005, pp. 894-896.

Kocharoen, P, Ahmed, K M, Rajatheva, R M A P, and Fernando, W A C, Node Elimination Approach for Low Bit-Rate Content-Adaptive Mesh-Based Image

Coding, *Transc. on Electrical Eng., Electronics and Communications*, Vol. 3, No. 2., pp. 156-163, August 2005.

Mahfuz, M U and **Ahmed, K M**, A Review of Micro-Nano-Scale Wireless Sensor Networks for Environmental Protection: Prospects and Challenges, *Journal of Science and Technology of Advanced Materials*, Vol. 6, No. 3-4, July 2005, pp. 302-306, Elsevier Science Publishing, ISSN: 1468-6996.

Mahfuz, M U, **Ahmed, K M**, and **Ghimire, R**, On the Performance of Pulse Shapes in Ultra Wideband Indoor Channel with Multiuser Interference, *IADAT Journal of Advanced Technology on Telecommunications and Computer Networks*, Vol. 1, No. 1, pp. 38-41, ISSN: 1885-639X, September 2005.

Rahman, M A, **Mahfuz, M U**, **Ahmed, K M**, and **Rajatheva, R M A P**, ICT Based Sustainable Rural Business Opportunities in Developing Countries: A Wireless-Networked RCP-RAP Approach, *American Journal of Applied Sciences*, 2 (8): Science Publications, ISSN 1546-9239, p.1256-1260, 2005.

Saengudomlert, P, **Modiano, E H**, and **Gallager, R G**, Dynamic wavelength assignment for WDM all-optical tree networks, *IEEE/ACM Transactions on Networking*, vol. 13, no. 4, pp. 895-905, August 2005.

Zhou, M T, **Sharma, A B**, **Zhang, J G**, **Shao, Z H**, and **Fujise, M**, Extended Method of Fast Allocation of USC's for Millimeter-Wave DWDM-RoF Transmission over ZDSF, *International Journal of Infrared and Millimeter Waves*, vol. 26, no. 5, pp. 617-635, May 2005.

Conference Proceedings

Adhikari, S and **Sanguankotchakorn, T**, Advance Duplicate Address Detection (DAD) and Buffering-based Provision of Seamless Handover in Mobile IPv6, *The 2nd International Conference on E-Business and Telecommunication Networks (ICETE 2005)* Microsoft Convention Center at Reading U.K., October 3-7, 2005.

Chen, L W, **Saengudomlert, P**, and **Modiano, E H**, Uniform vs. non-uniform band switching in WDM networks, *Proceedings of IEEE BROADNETS 2005*, USA, 3-7 October 2005.

Dharmawansa, P and **Rajatheva, R M A P**, On the Pairwise Error Probability Bounds of STTC over Nakagami-m Fading Channels, *IEEE ICC 2005 Conference*, Seoul, Korea, Volume 5, pp. 2927-2931, May 2005.

Dharmawansa, P and **Rajatheva, R M A P**, Pairwise Error Probability of Space-Time Codes over Frequency Selective Rician Channels, *IEEE VTC Conference*, Dallas, USA, Vol. 3, pp. 2016-2019, 25-28 September 2005.

Hop, P Q and **Sharma, A B**, Simulation of QWS-DFB Lasers Affected by Spatial Hole Burning and ASE Noise, in *3rd Asian Inf-communications Council*, Jakarta, Indonesia, November (2005).

Kocharoen, P, **Ahmed, K M**, **Rajatheva, R M A P**, and **Fernando, W A C**, Adaptive Mesh Generation for Mesh-Based Image coding Using Node Elimination Approach, *IEEE International Conference on Communications (ICC05)*, Seoul, Korea, Volume 3, pp. 2052 - 2056, 16-20 May 2005.

Kocharoen, P, **Ahmed, K M**, **Rajatheva, R M A P**, and **Fernando, W A C**, Intensity Feature Filtering with Node Elimination Approach for Low Bit-Rate Mesh-Based Image Coding, *IASRD International Conference on Networks and Communication Systems, NCS2005*, Krabi, Thailand, pp. 161-166, 18-20 April 2005.

- Lamsrichan, P** and **Sanguankotchakorn, T**, Adaptive Wavelet Difference Reduction using High-Order Context Modeling for Embedded Image Compression, *The 5th IEEE International Conference on Information, Communications and Signal Processing (ICICS 2005)*, The Grand Hotel, Bangkok, Thailand, pp. 900-904, 6-9 December 2005.
- Mahfuz, M U, Ahmed, K M, and Rajatheva, R M A P**, On the Detection Methods for Indoor Ultra Wideband communications with Multiple User Interference, *The fifth IEEE International Conference on Information, Communications and Signal Processing (ICICS)*, Bangkok, Thailand, pp. 296-300, 6-9 December 2005.
- Mahfuz, M U, Ahmed, K M, and Rajatheva, R M A P**, On the Frequency Dependence of Indoor Path Loss for Ultra Wideband Communications, *Wireless Personal Multimedia Communications (WPMC-05)*, Aalborg, Denmark, pp. 789-793, 18-22 September 2005.
- Mahfuz, M U, Ahmed, K M, and Rajatheva, R M A P**, Performance Comparison of Pulse Shapes in STD-L and IEEE 802.15.3a Models of the UWB Channel with Multiple User Interference, *The fifth IEEE International Conference on Information, Communications and Signal Processing (ICICS)*, Bangkok, Thailand, pp. 811-815, 6-9 December 2005.
- Neeratanaphan, C, Ahmed, K M, and Rajatheva, R M A P**, Performance Of MIMO MC-CDMA Uplink System With V-Blast And Multiuser Detection In Frequency Selective Rayleigh Fading Channel, *WPMC 2005 Conference*, Aalborg, Denmark, 18-22 September 2005.
- Nguyen, G T, Sharma, A B, and Saengudomlert, P**, Optimization of the Core-Router Fiber-Delay-Line-Buffer Dimensions for Horizon-Based Optical Burst-Switching in WDM Networks, *Proceedings of International Conference on Optical Communications and Networks (ICOON) 2005*, Bangkok, Thailand, pp. 245-248, 14-16 December 2005.
- Panthong, P, Chiangga, S, Sripimanwat, K, Sanguankotchakorn, T, Li, C, and Liang, L**, Experimental Free Space Quantum Key Distribution, *The 4th International Conference on Optical Communications and Networks (ICOON 2005)*, The Intercontinental Hotel, Bangkok, Thailand, pp. 159-162, 14-16 December 2005.
- Patabandi, S and Rajatheva, R M A P**, Blind Frequency Offset Estimation for OFDM with Non Constant Modulus Constellations, *WPMC 2005 Conference*, Aalborg, Denmark, 18-22 September 2005.
- Pirabakaran, K and Rajatheva, R M A P**, Pilot Sequence Aided Channel Estimation for Space Time Coded OFDM Systems, *IEEE Canadian Conference on Electrical and Computer Engineering 2005*, Saskatchewan, Canada, pp. 896-899, 1-4 May 2005.
- Pragtong, P, Erke, T J, and Ahmed, K M**, Analysis and Modeling of VoIP Conversation Traffic in the Real Network, *The fifth International Conference on Information, Communications and Signal Processing (ICICS)*, Bangkok, Thailand, pp. 388-392, 6-9 December 2005.
- Pragtong, P, Erke, T J, and Ahmed, K M**, Modeling of VoIP Conversational Speech in Noisy Environment, *IEEE TENCON 2005*, Melbourne, Australia, pp. 2235-2239, 21-24 November 2005.
- Rahim, A, Ahmed, K M, and Rajatheva, R M A P**, Blind Channel Estimation in MIMO for MC-CDMA, *Wireless Personal Multimedia Communications (WPMC-05)*, Aalborg, Denmark, pp. 18-22, September 2005.
- Saengudomlert, P and Chan, V W S**, Hybrid optical and electronic signal processing for ultra-wideband RF antenna arrays, *Proceedings of IEEE*

ICC 2005, South Korea, pp. 2063-2069, 16-20 May 2005.

Saengudomlert, P, Ahmed, K M, and Rajatheva, R M A P, MAC protocol for contacts from survivors in disaster areas using multi-hop wireless transmissions, Proceedings of *Asian Internet Engineering Conference (AINTEC) 2005*, Thailand, 13-15 December 2005, also appearing in *Lecture Notes in Computer Science*, no. 3837, pp. 46-56, 2005.

Sanguankotchakorn, T and Arun, S, Investigation of the Mutual Effect of Packet Transmission in IPv4/IPv6 Dual Stack Network, *The 8th Asia-Pacific Network Operations and Management Symposium (APNOMS 2005) –Toward Managed Ubiquitous Information Society*- Okinawa Convention Center, Okinawa, Japan, September 27~30, 2005.

Sanguankotchakorn, T and Somrobru, M, Performance Evaluation of IPv6/IPv4 Deployment over Dedicated Data Links, *The 5th IEEE International Conference on Information, Communications and Signal Processing (ICICS 2005)*, The Grand Hotel, Bangkok, Thailand, pp. 244-248, 6-9 December 2005.

Sanguankotchakorn, T and Wibullanon, P, Study of Location Management for Next Generation Personal Communication Networks, *The 7th WSEAS International Conference on Telecommunications and Informatics (TELE-INFO'05)*, Prague, Czech Republic, March 13~15, 2005.

Sriyananda, M G S, and Rajatheva, R M A P, Performance of Space Time Coded MC-CDMA Systems with Multiuser Detection, *IEEE VTC Conference*, Dallas, USA, Vol. 1, pp. 83-87, 25-28 September 2005.

Tanthong, Pituk, Surasak Chaiangga, Keattisak Sripimanwat, Teerapat Sanguankotchakorn, Chengzu Li and Linmei Liang, Experimental Free Space Quantum Key Distribution, *The 4th*

International Conference on Optical Communications and Networks (ICICN 2005), The Intercontinental Hotel, Bangkok Thailand, December 14-16, 2005.

Other Publications

Saengudomlert, P, Research Challenges for Optical Networks, *Seminar on Research Issues and Trends for Next Generation Networks*, Thammasat University, Thailand, 26 May 2005.

Rajatheva, R M A P, PEP Bounds of Space Time Codes and Application of MC-CDMA in MIMO Communication Systems, Department of Electrical and Computer Engineering, University of Alberta, Canada, 05 May 2005.

Rajatheva, R M A P, Performance of Space Time Codes in Frequency Selective Rician Channels, Department of Electrical and Computer Engineering, University of British Columbia, Canada, 09 May 2005

10.6 Masters Students' Theses and Research Studies

Advanced Duplicate Address Detection (DAD) and Buffering-Based Provision of Seamless Handover in Mobile IPv6
by **Shobhan Adhikari**
Supervisor: Dr Teerapat Sanguankotchakorn

An Adaptive Multi-Threshold Bandwidth Reservation for Multi-Services in a Cellular System
by **Jairak Tanpaiboonkul**
Supervisor: Associate Professor Tapio J Erke

Blind Channel Estimation in MIMO for MC-CDMA
by **Abdur Rahim**
Supervisor: Prof Kazi Mohiuddin Ahmed

Cyclic-Based Maximum Likelihood Detection for Unknown Channel and Interferences: Differential Unitary Space Time Codes
by **Kyaw Moe Aung**
Supervisor: Prof Kazi Mohiuddin Ahmed

Optimization of the Core-Router Fiber-Delay-Line Buffer Dimensions for Horizon-Based Optical-Burst Switching in WDM Networks

by Nguyen Truong Giang
Supervisor: Prof A B Sharma

Performance Analysis of Enhanced IEEE 802.11 and Adaptive 802.11E Wireless Lans

by Orawan Tipmongkolsilp
Supervisor: Associate Professor Tapio J Erke

Performance Evaluation of an Indoor Ultra Wideband Channel for Different Pulse Shape Derivatives, Path Loss and Modulation Schemes

by Mohammad Upal Mahfuz
Supervisor: Prof Kazi Mohiuddin Ahmed

Performance Evaluation of Group Forming Service in Push to Talk Over Cellular for GSM/GPRS Network

by Tran Tuan Anh
Supervisor: Associate Professor Tapio J Erke

Performance of MIMO MC-CDMA Uplink System with V-BLAST and Multiuser Detection in Frequency Selective Rayleigh Fading Channel

by Chulawee Neeratanaphan
Supervisor: Prof Kazi Mohiuddin Ahmed

Measurement-Based Study of IP Access in a Fixed Network

by Aurupong Yiweak
Supervisor: Associate Professor Tapio J Erke

Space Time Code for Multi Band OFDM on IEEE Ultra Wideband Channels

by Le Thanh Quyen
Supervisor: Prof Kazi Mohiuddin Ahmed

Wavelength Assignment with Destination and Intermediate Node Initiated Reservation for Optical Networks with Sparse Wavelength Conversion

by Nguyen Huynh Minh Tam
Supervisor: Prof A B Sharma

Research Study: A Performance Study of QoS Using Traffic Engineering Over MPLS

by Nguyen Minh Tung
Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: A Study of Fuzzy-Based Ordering Routing Algorithm in Ad Hoc Wireless Network

by Ukrit Arom-oon
Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Broadband Wireless Data Transmission Through LMDs: A Case Study of Ho Chi Minh City

by Hoang Nam Thang
Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: CDMA Network Performance Improvement and Optimization: A Case Study of VPTelecom CDMA2000 Network, Vietnam

by Nguyen Khanh Tung
Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Frequency Planning and Management Issues in 3G and Beyond in Mobile Communication: A Case Study of Pakistan

by Abdul Qayoom Memon
Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Investigation of the Mutual Impact of Packet Transmission in IPv4/IPv6 Dual Stack Network

by Sudpakdee Arun
Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Management of Telecommunications after a Natural Disaster: The Effect of Tsunami in Aceh, Indonesia

by Jerome Albou
Supervisors: Associate Professor Tapio J Erke
Prof Kazi M Ahmed

Research Study: Measurement and Analysis of Internet Traffic in the ADSL Network of HCM P & T

by Pham Dang Cuong
Supervisor: Associate Professor Tapio J Erke

Research Study: Multirate Congestion Control for Multicast Environment

by Thuya Lwin
Supervisor: Associate Professor Tapio J Erke

Research Study: Performance Analysis of Multidimensional Traffic in a Cellular Network

by Thi Han Tun
Supervisor: Associate Professor Tapio J Erke

Research Study: Performance Evaluation of IPv6/IPv4 Deployment Over Dedicated Data Links

by Mongkol Somrobru
Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Performance Study of Concatenated Reed-Solomon and Convolutional Code on IEEE 802.11A WLAN

by Cung Tat Minh Tam
Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Planning Internet Access for a Personal Phonehandy System: A Case Study of HCM City, Vietnam

by Nguyen Thanh Tam

Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Planning of Satellite Communications for Rural and Remote Areas of Vietnam

by Dao Phuoc Linh

Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Power Line Communications: A Case Study of a Rural Area of Vietnam

by Nguyen Le Phuong Hien

Supervisor: Prof Kazi Mohiuddin Ahmed

Research Study: Quality of Service in CDMA Networks and Application to the CDMA2000-1X Network of VP Telecom

by Truong Do Lan

Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Tariff Structure for Mobile Communications Services: Case Study in Vietnam

by Nguyen Thanh Nghi

Supervisor: Prof Kazi M Ahmed

Research Study: The Mobility Effect on Hybrid the Hybrid Routing Protocol for Ad Hoc Wireless Networks

by Krit Buphavesa

Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Traffic Engineering and QoS: Improvements Based on MPLS

by Tran Xuan Duc

Supervisor: Dr Teerapat Sanguankotchakorn

Research Study: Traffic Measurement in a Broadband Remote Access Server in Ho Chi Minh City, Vietnam

by Le Thanh Tung

Supervisor: Associate Professor Tapio J Erke

Research Study: Traffic Measurement in an International Network, A Case Study of Ho Chi Minh City Gateway, Vietnam

by Mai Ly Tuan Anh

Supervisor: Associate Professor Tapio J Erke

Research Study: Voice Over IP Traffic Measurement in a Fixed Network: A Case Study of Ho Chi Minh City, Vietnam

by Vo Minh Chuong

Supervisor: Associate Professor Tapio J Erke

Chapter 11: SET – TRANSPORTATION ENGINEERING FIELD OF STUDY

11.1 Introduction

Industrialization and population growth have tremendous impacts in the movement of people and goods. Everyday, movement is hampered by congestion, insufficiency of public transport facilities, traffic accidents, and other conditions. Moreover, as manufacturing expands globally, businesses want to reduce transportation costs by limiting the number of distribution nodes. Concerns over congestion on highways, increasing pollution and hazardous materials all emphasize the need to effectively maximize transportation systems. Thus, the issue of transportation is obviously crucial, not only now but in the future.

The **Transportation Engineering** field exposes students to the process of alleviating transportation problems. The coursework and research in the area provide advanced knowledge in transportation planning and economics, traffic engineering and safety, and the design of highways/pavements and other transportation facilities. Transportation Engineering students acquire advanced skills concerning the planning, design, operations, maintenance, rehabilitation, performance, and evaluation of transportation systems, including their economic and public policy aspects.

The field imbibes in each student the development of analytic, problem-solving, design, and management skills suitable for public and private sector professional work.

11.2 Faculty and Research Staff

Full-time Faculty

YORDPHOL TANABORIBOON, BS, MS,
Oklahoma State Univ; PhD, Virginia
Polytechnic Univ, USA.

Professor (*Transportation Planning,
Traffic Engineering, Public
Transportation Systems*)

[Road safety audit, accident
investigation and reconstruction,
application of data mining in road
safety, road user behaviors, database
development, disaster management,
and sustainable development]

SHINYA HANAOKA, BEng, M Info Sc, D Info Sc,
Tohoku Univ, Japan.

Assistant Professor

[Transport planning and logistics; air
transport, which includes evaluation of
the air traffic distribution policies in
multiple-airport region and the activity
of low-cost carriers in Asia; transport
logistics, which includes city logistics,
intermodal logistics, maritime transport,
air cargo and so on; Public transport
market and the environmental impact
of transport, such as air pollution and
noise]

KUNNAWEE KANITPONG, PhD, University of
Wisconsin-Madison; MS, University of
Maryland at College Park, USA; BS,
Chulalongkorn University, Thailand.

Assistant Professor

[Highway pavements with emphasis on
several major aspects including:
highway materials and construction,
pavement design and analysis,
pavement management system,
asphalt rheology, and asphalt
concrete mixture design]

11.3 Completed Grant and Sponsored Research

Klong Prapa Canal Covering Project- Part III (Traffic Study)

Duration: 26 October 1999 to 30 June 2005
Investigator: Prof Yordphol Tanaboriboon
Collaborators: Prof Worsak Kanok-Nukulchai, AIT
Mr Krisda Tangkawachiranon
Department of Highways, Ministry of
Communication, Thailand
Sponsor:
Total Contracted Amount: Baht 1,513,000

11.4 Ongoing / In Progress Grant and Sponsored Research

Logistics Management at the Intermodal Terminals

Project Description: This project aims to find and determine the requirements for logistics management and to verify an optimum solution of performance at the intermodal freight terminal. It also intends to develop a framework for evaluating the logistics performance of mode choice. The research proposes fuzziness measurements which address the real situation of human judgment with mathematical formulation. Fuzzy set theory is applied to develop a set of performance as basic indicators. Once the patterns of freight mode choice are determined, optimization model can find the optimal solution to maximize the performance indicator. Sensitivity analysis shows the changes which can influence the shift of mode choice. The results give insight in the relation with constraints of various parameters.

Duration: 1 November 2005 to 31 October 2006
Investigator: Dr Shinya Hanaoka
Sponsor: Royal Thai Government (RTG)
Total Contracted Amount: Baht 876,000

Road Safety Audit Along the Chalong Rat and Burpha Withi Expressways

Project Description: This project, financed by the Expressway and Rapid Transit Authority of Thailand (ETA), is aimed to prevent the occurrences of accidents or reduce the severity of accidents taking place along the Chalong Rat and Burapha Withi Expressways by applying the concept of road safety audit which is a proactive tool for solving road accident problems.

Duration: 22 August 2005 to 21 April 2006
Investigator: Prof Yordphol Tanaboriboon
Sponsor: The Expressway and Rapid Transit Authority of Thailand (ETA)
Total Contracted Amount: Baht 1,000,000.00

Thailand Accident Research Center

Project Description: The establishment of TARC is to conduct in-depth study in road safety. The task involves the at-scene investigation of

the traffic accidents and database development for statistical analysis. Moreover, it focuses on the accident reconstruction to describe the events in sequences and the factors involved in these events. It aims to address to the road safety issues to promote the awareness of safety in the societies.

Duration: 1 July 2005 to 30 June 2007
Investigator: Prof Yordphol Tanaboriboon
Sponsor: Department of Highways
Total Contracted Amount: Baht 14,000,000.00

11.5 Publications

Refereed Journals

Borvornvongpitak, N and Tanaboriboon, Y, Development of Computerized Bangkok Bus Transit Analytical System, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 505-518, 2005.

Kanitpong, K and Bahia, H U, Relating Adhesion and Cohesion of Asphalts to Effect of Moisture on Asphalt Mixtures' Laboratory Performance, *Transportation Research Record 1901*, Journal of the Transportation Research Board, pp. 33-43, 2005.

Kanitpong, K, Bahia, H U, Russell, J S, and Schmitt, R, Predicting Field Permeability from Testing HMA Specimens Produced by the Superpave Gyratory Compactor, *Transportation Research Record 1929*, Journal of the Transportation Research Board, pp. 52-58, 2005.

Kowtanapanich, W, Tanaboriboon, Y, and Chadbunchachai, W, An Integration of Hand-held Computers, GPS Devices, and GIS to Improve the Efficiency of EMS Data System, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 3551-3561, 2005.

Leopairojna, S K and Hanaoka, S, Market structure of passenger vans in Bangkok, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 4192-4207, 2005.

Luathep, P and Tanaboriboon, Y,

Determination of Economic Losses due to Road Crashes in Thailand, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 3413-3425, 2005.

Paisalwattana, S and Tanaboriboon, Y,

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Paisalwattana, S and Tanaboriboon, Y, Study on the Impact of Short-Term Work Zone along an Un-interrupted Flow Highway: A Case Study in Thailand, *Journal of the Eastern Asia Society for Transportation Studies*, Vol.6, pp.1100-1112, 2005.

Ponboon, S and Tanaboriboon, Y,

Development of Road Accident Reporting Computerized System in Thailand, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 3453-3466, 2005.

Tanaboriboon, Y, and Satiennam, T, Road Accidents in Thailand, *Journal of the International Association of Traffic and Safety Sciences*, IATSS Research, Vol. 29, No. 1, pp. 88-100, 2005.

Tanadtang, P, Park, D, and Hanaoka, S, Incorporating uncertain and incomplete subjective judgment into the evaluation procedures of transportation demand management alternatives, *Transportation*, Vol. 32, No. 6, pp. 603-626, 2005.

Taneerananon, P, Chanwannakul, T, Saunpaga, V, Khompratya, T, Kronprasert, N, and Tanaboriboon, Y, An Evaluation of the Effectiveness of Private Vehicle Inspection Process in Thailand, *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 3482-3496, 2005.

Conference Proceedings

Anh, T T, Tanaboriboon, Y, and Hung, B Q, Analysis of Bus Service in Hanoi, Vietnam, Proceedings of the 6th *International Conference of Eastern Asia Society for Transportation Studies*, pp. 352-362, Bangkok, September 2005.

Hanaoka, S and Lilavivat, T (2005) Low cost carriers activity and passengers airline choice in Thailand, Proceedings of *Infrastructure Planning*, No.31.

Hanaoka, S and Qadir, F M (2005) Logistics problems in recovery assistance of Indian Ocean Earthquake and Tsunami Disaster, *Scientific Forum on the Tsunami, Its Impact and Recovery*, Asian Institute of Technology, Bangkok.

Hanaoka, S and Qureshi, A G (2005) Effects of a cooperative delivery system considering truck assignment in Bangkok, Proceedings of *Infrastructure Planning*, No.31.

Hanaoka, S and Lilavivat, T, The impact of low-cost carriers entry in Thailand, 9th *Air Transport Research Society World Conference 2005*, Rio de Janeiro, 2005. (in CD-Rom)

Islam, M B and Tanaboriboon, Y, Crash Investigation and Reconstruction. The New Experience in Developing Countries: Thailand Case Study, Proceedings of the 13th *International Conference Road Safety on Four Continents* (in CD-ROM), Warsaw, Poland, pp. 874-884, October 2005.

Kanitpong, K and Bahia, H U, Measuring Properties of Asphalts That Are Critical for Moisture Damage of Asphalt Paving Mixtures, Accepted for presentation and publication in the 15th *International Road Federation World Meeting 2005*, International Road Federation, Bangkok, Thailand, June 2005. (in CD-Rom)

Kanitpong, K and **Bahia, H U**, Predicting Field Permeability of Hot Mix Asphalt Mixtures from Laboratory Measurements, *The 15th International Road Federation World Meeting 2005, International Road Federation*, Bangkok, Thailand, June 2005. (in CD-Rom)

Leopairojna, S K and **Hanaoka, S**, Market segmentation analysis of passenger van commuters in Bangkok, Proceedings of *9th International Conference on Competition and Ownership of Land Passenger Transport (Thredbo)*, Lisbon, 2005. (in CD-Rom)

Phoosanabhongs, E and **Hanaoka, S**, Modeling the occurrence of the short-shipped in air cargo, Proceedings of the *1st International Conference on Transportation Logistics*, Singapore, 2005.

Raathanachonkun, P and **Hanaoka, S**, Evaluation of the decentralized plant distribution system in the logistics of Thai cement, Proceedings of the *Eastern Asia Society for Transportation Studies*, Vol. 6, pp. 1673-1686, Bangkok, 2005.

11.6 Doctoral Students' Dissertation

Development of the Computerized Bangkok Bus Transit Management System
by **Narongsak Borvornvongpitak**
Supervisor: Prof Yordphol Tanaboriboon

Development of Transportation Model for a Regional City with GIS Integration
by **Kritsda Tangkavachiranon**
Supervisor: Prof Yordphol Tanaboriboon

11.7 Masters Students' Theses and Research Studies

An Alternative Planning Approach to Alleviate Traffic Congestion Problems Through Public Participation in Dhaka, Bangladesh
by **Jobaida Naher**
Supervisor: Prof Yordphol Tanaboriboon

Analysis of the Effects of a Cooperative Delivery System in Bangkok
by **Ali Gul Qureshi**
Supervisor: Dr Shinya Hanaoka

An Evaluatin of the Accessibility of the New Rail Transit System in Bangkok
by **Morakot Thongsongkrit**
Supervisor: Prof Yordphol Tanaboriboon

A Study of Seat Belt Usage and Its Impact in Thailand
by **Nuttapong Boontob**
Supervisor: Prof Yordphol Tanaboriboon

A Travel Behaviour Analysis for Delhi: A Case Study of the Metro
by **Chhavi Dhingra**
Supervisor: Dr Shinya Hanaoka

Determination of Design Parameters for Mechanistic-Empirical Design of Flexible Pavements in Bhutan
by **Niralal Rai**
Supervisor: Prof Yordphol Tanaboriboon

Development of Interface for Motorcycle Routing Problems: A Case Study in Bangkok
by **Chaitas Ruenpanich**
Supervisor: Dr Shinya Hanaoka

Estimate the Value of Time of Container Cargo on Thailand
by **Aunchulee Thongsongkrit**
Supervisor: Dr Shinya Hanaoka

Identification of Factors in Road Crashes Through Accident Investigation and Reconstruction in Thailand
by **Mouyid Bin Islam**
Supervisor: Prof Yordphol Tanaboriboon

Impact on Thai Air Market by Occuring of Low-Cost Carriers
by **Thyne Lilavivat**
Supervisor: Dr Shinya Hanaoka

Modeling the Occurrence of the Short-Shipped in Air Cargo
by **Ekachai Phoosanabhongs**
Supervisor: Dr Shinya Hanaoka

Motorcycle Accident Analysis in Hanoi

by Nguyen Thi Thanh Hoa

Supervisor: Prof Yordphol Tanaboriboon

**Study of Travel Factors Through Structural
Equation Modeling and Market Segmentation
Approach in Bangkok**

by Pradeep Kumar Shrestha

Supervisor: Prof Yordphol Tanaboriboon

**Traveler Response Towards Advanced
Traveler Information Systems (ATIS) in
Bangkok**

by Agha Faisal Habib Pathan

Supervisor: Prof Yordphol Tanaboriboon

Chapter 12: SET – WATER ENGINEERING AND MANAGEMENT FIELD OF STUDY

12.1 Introduction

Today's major challenges for water engineers and managers include securing water for people and for food production; protecting vital ecosystems; and dealing with variability and uncertainty of water in space and time.

The Water Engineering and Management (WEM) field imparts education and training toward an understanding of the complexity of water use and water resources management problems. It offers a balanced curriculum, which covers both the engineering and management aspects of water resource development. Students are trained to acquire knowledge and hands-on practice in tools and techniques to come up with viable and sustainable solutions within the framework of the integrated water resources management at the river basin scale.

Water Engineering and Management covers five major areas - *Agricultural Water, Coastal Water, Urban Water, Water Resources, and Extreme Events and Risk Management*. The courses are designed in such a way that students can specialize according to their interests. Courses on watershed hydrology, hydrodynamics, water resources systems, and concepts in water modeling provide the solid foundation to the advanced courses. The field emphasizes on tools and techniques in resource planning and management in addition to laboratory and field practices.

Agricultural Water courses impart knowledge and skills necessary for the development and management of water resources for agriculture. They address various multi-disciplinary issues in the planning, design, implementation, operation and maintenance of irrigation and drainage projects and land and water conservation programs. Current researches in the area include irrigation and drainage system management, cropping systems, erosion and

water quality problems, soil conservation and land-use, and watershed management.

The management and design of sound engineering works for the control and effective use of coastal zones require in-depth knowledge of hydrodynamics and the understanding of coastal zone phenomena. Coursework and research in **Coastal Water** cover studies of wave characteristics and their action on beaches, coastal sedimentation, estuarine hydraulics and the applied aspects of coastal zone engineering and management.

Urban Water courses relate to water supply and sanitation, storm water, and domestic wastewater and urban drainage for sustainable management of urban areas. The research in relation to urban water focuses on application of state-of-the-art theory in water demand forecasting and management, design and management of water distribution systems in urban and rural areas, real-time hydrological information systems for urban flooding and drainage.

Given the ever-growing importance of water quality, an integrated water quantity-quality approach is essential. Courses in **Water Resources** focus on techniques to assess the occurrence and availability of surface and groundwater. Students acquire a sound understanding of basic principles in river engineering and modeling, water resources planning, conjunctive use of surface and groundwater; integrated water resources management and social and environmental impact assessment of water resources projects. In-depth knowledge and hands-on practice on mathematical modeling of water resources systems is provided.

Flooding is a natural phenomenon and various human activities as well as climatic changes have aggravated the problem causing economic losses. Students are exposed to an understanding of the behavior of rivers, and to design appropriate structural and non-structural alternatives for

the effective management of rivers and waterways. Research in the area of **Extreme Events and Risk Management** includes river flow analysis, and flood control and mitigation, flood modeling and forecasting, flood plain development and management.

12.2 Faculty and Research Staff

Full-time Faculty

ASHIM DAS GUPTA, BEng, Gauhati Univ, India; MEng, DEng, AIT, Thailand.
Professor

TAWATCHAI TINGSANCHALI, BEng, Chulalongkorn Univ, Thailand; MEng, DEng, AIT, Thailand.
Professor
[Flood Control Engineering and Management; Flood Forecasting, Warning and Flood Disaster Management; River Engineering and Hydropower; Water Resources Project System Optimization]

MUKAND S BABEL, BEng, Rajasthan Agr Univ, India; MEng, DEng, AIT.
Associate Professor
[From hydrologic and water resources modeling to integrated water resources management; particularly in watershed modeling and management; drought analysis, forecasting and management; water resources allocation and management at river basin level; and water resources and socio-economic development; Research related to groundwater resources management and water supply system and management]

ROBERTO CLEMENTE, BSAE, Univ of the Philippines at Los Baños; MS, AIT, Thailand; PhD, McGill Univ, Canada.
Associate Professor
[Focal areas related to irrigation/ drainage, and land and water resource assessment and management; Studies on the impacts of fertigation on water quality, modeling surface/subsurface transport of water and solutes, performance

evaluation of irrigation and drainage systems, and assessment of soil erosion hazard and soil quality dynamics in agricultural watersheds; Joint research on water harvesting and management and soil hydraulic characterization in sloping agricultural lands; Future research on evaluation and optimization of soil, water, chemical and crop management schemes to enhance agricultural productivity without jeopardizing environmental quality]

Visiting Faculty

DUSHMANTA DUTTA, BEng, Dibrugarh Univ, India; MEng, AIT, Thailand; PhD, Univ of Tokyo, Japan.
Visiting Associate Professor

Research Staff

SUTAT WEESAKUL, DEng, MEng, Asian Institute of Technology; BEng, Chulalongkorn University, Thailand
Senior Research Engineer
[Numerical computation in sea and coastal area including flood propagation using developed computer programs; Application in solving urban drainage problem using both engineering and management approaches; By collaboration with Dr. Ole Mark from DHI, the on-line urban flood warning system at Sukumvit , Bangkok , Thailand providing useful information in daily life during rainy season are disseminated in <http://www.wap.ait.ac.th>; Improvement of hydraulic design using physical hydraulic model test in hydropower; hydropower development projects in Lao and Myanmar and improvement in design of intake, diversion tunnel, riparian outlet, energy dissipater, spillway and head pond]

12.3 Completed Grant and Sponsored Research

An assessment of socio-economic Impacts of Floods under Climate Change Conditions in Large Coastal Cities in South and Southeast Asia

Project Description: The project aims at assessing, through distributed flood risk modeling, the socio-economic impacts of flooding under climate change conditions in six large coastal cities in South and Southeast Asia. A comprehensive database of datasets of hydrologic characteristics, urban development, and socio-economic situations from participating countries, comprising Bangladesh, India, Pakistan, Sri Lanka, Thailand, and Vietnam, is developed. Flooding simulations are carried out for present climatic conditions and climate change scenarios in 2025, 2050, 2075, and 2100. The project provided opportunities to partner institutions for application of flood simulation and risk analysis tools and methodologies to assess the regional impacts of climatic changes facilitating policy development for urban flood risk management in coastal cities in South and Southeast Asia.

Investigators: **Dr Mukand Singh Babel**
Prof Ashim Das Gupta
Duration: **1 September 2004 to 31 January 2006**
Sponsor: **Asia Pacific Network for Global Change Research CAPaBLE Programme**
Total Contracted Amount: **Baht 1,800,000**

Flood Forecasting for Lower Chao Phraya River Basin

Project Description: This project focus on development flood Forecasting Model for Lower Chao Phraya River Basin, to calibrate model using flood data in 1995, 1996, and 2002. To study scenario for flood management using model. To prepare reports for flood forecast model. To deliver models prepared under this agreement to the client.

Duration: **1 January 2004 to 31 October 2005**
Investigator: **Dr Sutat Weesakul**
Collaborator: **Dr Mukand S Babel**
Sponsor: **Panya Consultants Co. Ltd., Thailand**
Total Contracted Amount: **Baht 2,046,356**

Hydro-political Vulnerability and Resilience in South and Southeast Asia

Project Description: The objective of the project is to carry out a regional study on hydro-political vulnerability of river basins. The study, carried out in collaboration with Oregon State University (OSU), focuses on basins at risk as well as highlight regional successes. Issues relating to surface and groundwater quality and quantity are addressed together with the issues of scale, conflict and cooperation. Representative case studies, highlighting both tension and cooperation, are also conducted.

Appropriate maps are generated highlighting hydro-political vulnerability of river basins.

Investigators: **Prof Ashim Das Gupta**
Dr Mukand Singh Babel
Duration: **1 February 2005 to 31 December 2005**
Sponsor: **Oregon State University, USA**
Total Contracted Amount: **Baht 200,000**

Joint Research Project on Land Use and Soil Quality Dynamics in Welimada Watershed, Sri Lanka

Project Description: A research project funded by Danida which focused on "Land use dependent soil quality dynamics" was undertaken in Welimada watershed, Sri Lanka in August 2005, where 2 faculty from ASE and 2 faculty from WEM pooled its research allocation of \$4,100 each to generate a total budget of \$16,400 or 636,320 bahts for the joint research. From this budget, each faculty was allocated \$1,500 to participate in International Conference and the rest of the budget was allocated for research expenses, travel, equipment, office supplies and personnel expenses. Dr. Clemente made use of the Conference budget when he presented a paper at the FRONTIS International Conference on Unsaturated Zone Modeling at Wageningen the Netherlands in Oct. 2004. Part of the budget was also used to finance Dr. Clemente's masteral student's thesis research in the watershed in Sri Lanka. A paper authored by the student (Mr. Rivas) and co-authored by the 4 faculty (i.e. Dr. Clemente, Dr. Ranamukhaarachchi, Prof. Das Gupta and Dr. Zoebisch) was prepared and presented at the MTERM International Conference held at AIT on June 8-10 2005.

Investigators: **Dr S Ranamukhaarachchi**
Dr Roberto Clemente
Duration: **15 June 2004 to 15 April 2005**
Sponsor: **Danida (IWDM)**
Total Contracted Amount: **Baht 160,000**

Klong Prapa Corridor Project, A Bridge Over Raw Drinking Water (sub-project on Water and Architect)

Project Description: The research project involves multi disciplinary engineering aspects in structural, geotechnical, transportation, hydraulic engineering and environmental engineering. As one of the principal investigators on hydraulic and environmental engineering, the effect of structures or roads designed to cover the Klong Prapa canal of the Metropolitan Waterworks Authority to prevent the effect of air pollution due to traffic and intrusion of domestic sewage water on the hydraulics of flow and raw water quality of raw water are investigated and recommendations are given on design improvement of the covering structures to maintain water quantity and quality within the acceptable standard of MWA.

Duration: **26 October 1999 to 30 June 2005**
Investigator: **Prof Tawatchai Tingsanchali**

Collaborators: Prof Worsak Kanok-Nukulchai, AIT
Prof Ajit Annachatre, AIT
YP Consultants Co Ltd, Thailand
Dr Apichart Wongkaew
Dr Yingplew Suphakitwong
Sponsor: Department of Highways, Ministry of
Communication, Thailand
Total Contracted Amount: Baht 1,228,748

Measurement of Water Quality in the Mun River Basin

Project Description: The proposed work comprises collection and analyses of water samples from selected monitoring locations along the Mun River in the Northeast of Thailand at a weekly interval during the rainy season of 2004. The laboratory analyses of the water samples are carried out at the WEM laboratories to determine concentrations of SS, T-P, T-N, NH₄-N, NO_x-N, NO₂-N, AND PO₄-P. The output from the project is used for the calibration of nutrient transport models. In addition, research results are also useful as teaching material and as data for research by master/doctoral students in WEM.

Duration: 1 March 2004 to 28 February 2005
Investigators: Dr Mukand Singh Babel
Prof Ashim Das Gupta
Sponsor: Department of Civil Engineering, Tokohu
University, Japan
Total Contracted Amount: Baht 500,000

Rainfall Forecast for Eastern Bangkok

Project Description: This project focus on development a rainfall forecast model which can forecast hourly rainfall starting from hour no. 1 to hour no. 6 after raining at the 33 rain gauge station of DDS, BMA in the Eastern Bangkok area and numerical model will be applied in the present study. Methodology will be artificial Neural Network (ANN) or equivalent. To carry out mathematical model testing and training using historical hourly rainfall records from stations of Department of Drainage and Sewerage (DDS), Bangkok Metropolitan Administration (BMA).

Duration: 1 January 2004 to 31 October 2005
Investigator: Dr Sutat Weesakul
Collaborator: Dr Uruya Weesakul, Thammasat University
Sponsors: Bangkok Metropolitan Administration
Team Consulting Engineering and
Management Co. Ltd., Thailand
Total Contracted Amount: Baht 1,200,005

Real Time Hydrological Information for the People of Thailand

Project Description: To compute and forecast flood level in Sukumvit urban area using a mathematical model, MOUSE and disseminate real time information flood and rainfall data through web page and mobile phone to people of Thailand.

Duration: 1 April 2003 to 30 June 2005
Investigator: Dr Sutat Weesakul
Collaborators: Dr Uruya Weesakul, Thammasat University,
Thailand
Dr Chavalit Chaleeratrakul, Thammasat
University, Thailand

Dr Ole Mark, DHI Water and Environment,
Denmark
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 953,000

Risk Analysis due to Catastrophic Urban Floods in Bangkok using GIS, Remote Sensing and Surface-River Model

Duration: 1 September 2004 to 30 November 2005
Investigator: Dr Yoshitaka Kato
Collaborator: Dr Dushmanta Dutta, AIT
Sponsor: United Nations University, Japan
Total Contracted Amount: Baht 360,000

Training Course on Urban Drainage Management and Irrigation and Drainage in Cebu, Philippines

Project Description: A Training course on Urban Drainage and Irrigation/Drainage Engineering was prepared and implemented by Dr. Sutat and Dr. Clemente for the University of San Carlos (USC) Cebu, Philippines in July 2004. The training program consisted of teaching each of the 2 courses for 45 hours in 9 working days which was equivalent to the regular credit hours for one course at AIT. The 10 students from USC who participated in the course consisted of 2 faculty and 8 masteral students in the Dept. of Civil Engg, USC. The total budget allocated for the 2 courses amounted to 343,480 bahts which covered travel, food and lodging and faculty time of Dr. Sutat and Dr. Clemente. Part of this project fund was used by Dr. Clemente to support a masteral student at WEM (Mr. Tamrakar) for 12 months from Sept. 2004 to August 2005.

Duration: July 2004 to May 2005
Investigators: Dr Sutat Weesakul
Dr Roberto Clemente
Sponsor: University of San Carlos, Cebu, Philippines
Total Contracted Amount: Baht 343,480.00

Urban Flood Inundation Modeling in Mekong River Basin Using a Physically based Surface-River Model

Duration: 1 November 2003 to 30 September 2005
Investigator: Dr Dushmanta Dutta
Sponsor: Engineering Consultants NEWJEC Inc.
Osaka, Japan
Total Contracted Amount: Baht 720,000

Workshop on Governance on Transboundary Water

Duration: June 2005 to October 2005
Investigators: Dr Mukand Singh Babel
Prof Ashim Das Gupta
Sponsor: United Nation University
Total Contracted Amount: Baht 221,968.16

12.4 Ongoing / In Progress Grant and Sponsored Research

12th Congress of the Asia and Pacific Division of IAHR

Project Description: The Water Engineering and Management (WEM) Field of Study of the School of Engineering and Technology (SET) serve as the secretariat of the APD-IAHR and from time to time organize congresses and conferences for the Asia and Pacific Region.

Duration: 13 November 2000 to 30 June 2006

Investigators: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Sponsor: IAHR

Total Contracted Amount: Baht 2,579,383

An Assessment of Groundwater Vulnerability to Contamination and Estimation of Potential Areas Contributing Risk and Hazard to Groundwater in Chao Phraya River Basin by Numerical Modeling

Project Description: The scientific purposes of the project are to identify areas vulnerable to groundwater contamination, estimation of areas contributing risk and hazard to identified vulnerable areas. Pilot study is carried out for land and groundwater planning and management using integrated numerical modeling, characterization of the Chao Phraya Basin geological system and its effects on contamination transport.

Duration: 1 October 2004 to 31 March 2006

Investigator: Prof Ashim Das Gupta

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 999,000

Assessment of Water Vulnerability in South and Southeast Asia

Project Description: The project involves the assessment of vulnerability of water resources to environmental change in key water basins in Asia covering issues of water stress, water scarcity, water budget, and climate variability and climate change. Through the study, scientifically credible information is generated, which will be used to support sound decision and policy making at local and national levels for the achievement of relevant Millennium Development Goals and to ensure environmental sustainability. In addition, the project also aims to identify options for the promotion of environmental cooperation at sub-regional levels.

Duration: 1 January 2006 to 31 December 2006

Investigators: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Sponsor: United Nations Environment Programme

Total Contracted Amount: Baht 3,600,000

Collaborative Research in Water Resources and Environment Modeling

Project Description: The project involves the conduct of research activities in the area of water resources and environmental modeling by AIT in collaboration with UNU. The results of the research are disseminated through seminars and workshops. The specific areas for research involve: the development of methodologies and tools for water allocation in trans-boundary river basin; analyses of links between water resources management and socio-economic changes; development of appropriate methodologies for socio-economic vulnerability assessment for urban flood disaster risk management; and study of soil erosion and sediment transport in a large river basin. Under the project, UNU, through grants, supports a number of selected graduate students' research in above areas.

Duration: 1 September 2004 to 31 August 2006

Investigators: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Sponsor: United Nation University, Tokyo, Japan

Total Contracted Amount: Baht 500,000

Development of Operation Flood Forecasting System Case Study: Chao Phraya River Basin

Project Description: The objective of the project is to develop a mathematical model for flood forecasting including rainfall forecasting and decision support system. The study area is Chao Phraya River Basin. On line data communication system will be installed at 3 locations along the river and linked with server at AIT.

Duration: 1 June 2004 to 30 June 2006

Investigator: Dr Sutat Weesakul

Sponsor: National Electronic and Computer Technology Center (NECTEC)

Total Contracted Amount: Baht 5,027,400

Experimental Investigation of Hyper-Concentrated Tsunami Run-up

Project Description: The project will involve an experiment of a new study of hyper-concentrated tsunami run-up. The result of experiment at Khao Luk, Phang-ga will be used to investigate how Tsunami have impacted to infrastructure on land and determine the preliminary measure to alleviate its impact.

Duration: 1 November 2005 to 31 October 2006

Investigator: Dr Sutat Weesakul

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 875,000

Hydraulic and Leakage Investigations in Pipe Networks for Water Supply Distribution in Bangkok

Project Description: The research project involves the investigation of leakage of water flow in pipes and the ways to reduce the amount of leakage in the water supply distribution network of Metropolitan Waterworks Authority of Bangkok and its suburban areas. The study involves the determination of flow and pressure distribution in the pipe

networks by using field measurement and simulation models. Locations of possible pipe leakage and causes are identified and measures to stop or minimize leakage are recommended. The project is working in collaboration with other contractors that are employed by MWA to install pressure meters, flow meters and to replace old or leaking pipes and their connectors. The project is expected to provide improvement in the water supply distribution of Bangkok with significant reduction in water leakages.

Duration: **1 April 2005 to 30 November 2006**
Investigator: **Prof Tawatchai Tingsanchali**
Sponsor: **ISONET Co, Ltd, Thailand**
Total Contracted Amount: **Baht 1,400,000**

Hydraulic Model Study of Diversion Tunnel Nam Ngum 2 Hydroelectric

Project Description: The scope of the services consists of furnishing labor, equipment and materials as well as technical expertise for the physical model construction and hydraulic model tests of the diversion tunnels. The Hydraulic Model Tests will focus on study of the hydraulic conditions in the tunnel for the sub-critical and supercritical flow alternatives, study of overall diversion operation with emphasis in investigating the occurrence of waves at the surface, occlusion of air pockets and the critical transient state between both operation modes, study of tunnel inlet for free surface flow and pressure flow modes including the introduction of sill at the inlet and study of tunnel outlet under submerged operation due to backwater of Nam Ngum 1 and the variation of discharges to cover the non-submergence case.

Duration: **1 September 2005 to 31 May 2006**
Investigator: **Dr Sutat Weesakul**
Sponsor: **Team Engineering Consulting and Management Co.,Ltd.**
Total Contracted Amount: **2,990,650.00**

Hydraulic Model Study on overflow Spillway for Nam Ngum 2 Hydroelectric: Spillway

Project Description: The scope of the services consists of furnishing labor, equipment and materials as well as technical expertise for the physical model construction and hydraulic model tests of the overflow spillway. The Hydraulic Model Tests will focus on studying the hydraulic condition of the ogee crest, chute, flow over flip bucket and capacity of weir (uncontrolled and controlled with the radial gates), suitable operation of both aerators and study downstream erosion in order to optimize the splitter design.

Duration: **February 2006 to August 2006**
Investigator: **Dr Sutat Weesakul**
Sponsor: **Team Engineering Consulting and Management Co, Ltd**
Total Contracted Amount: **Baht 6,300,000**

MTERM Conference

Duration: **January 2005 to December 2006**
Investigators: **Dr Mukand Singh Babel
Prof Ashim Das Gupta**
Sponsor: **MTERM Conference Participants**
Total Contracted Amount: **Baht 664,255**

Regional Network for Center of Excellence for Integrated River Basin Management in Asian Monsoon Region

Project Description: The regional network office is established in June 2005 at WEM in accordance to MOU between AIT and the University of Yamanashi (UY), Japan. The purpose of the center regional office is to coordinate and facilitate project collaboration between UY, AIT and other local partners such as the Thai Government agencies. The center will focus its collaboration on integrated river basin management in the Asian Monsoon Region. Other activities of the center include exchange of faculty, staff and students. The center also provides scholarships for higher studies for doctoral programs at University of Yamanashi. The regional network office starts in June 2005 for an initial period of 1 year and will be extended on annual basis for a period of 3 years.

Duration: **15 June 2005 – 14 June 006**
Investigator: **Prof Tawatchai Tingsanchali**
Sponsor: **Yamanashi University**
Total Contracted Amount: **Baht 347,500**

Review and Investigation in Flood Drainage around Suwanna Bhumi Airport

Project Description: The research project involves the study on project feasibility study, design and implementation of the Suwanna Bhumi International Airport (Second Bangkok International Airport) on flood drainage in the surrounding area of the new airport. The study also takes into account aspects on socio-economic impact assessment of the project and mitigation measures to the affected people and communities. Started since 2004, the project is required to continue its responsibility for the detail design and any further design modification as needed during the project construction until it is complete. The study is jointly carried out by three institutions namely AIT, Kasetsart University and Thammasat University in which AIT serves as the project team leader.

Duration: **1 September 2003 to 30 September 2006**
Investigators: **Prof Tawatchai Tingsanchali
Dr Noppadol Phien-wej**
Sponsor: **Royal Irrigation Department, Thailand**
Total Contracted Amount: **Baht 2,730,000**

Sustainable Water Management Policy under the Freshwater Resources Management Project

Project Description: The objective of the project is to propose integrated policy designs for sustainable water resources management with emphasis on groundwater resources in Bangkok and its vicinity. Groundwater use trends are analyzed and policies/measures for the sustainable management of groundwater resources in the study area are developed based on analysis of relevant secondary data on groundwater availability and use, piezometric levels, and land subsidence, which are obtained from concerned government agencies and various past studies/project reports. The input from groundwater users and managers, especially with respect to the recommendations for suitable policies and measures for improved groundwater management is obtained through the meetings with the stakeholders.

Duration: 1 September 2004 to 30 September 2007
Investigator: Dr Mukand Singh Babel
Sponsor: Institute for Global Environmental Strategies, Japan
Total Contracted Amount: Baht 1,700,000

The Study of Water Resources Management Review

Project Description: To review the present management of three river basins and to propose a new management tool using mathematical model and investigate the indice for WRE.

Duration: January 2006 to April 2006
Investigator: Dr Sutat Weesakul
Sponsor: Hydro and Agro Informatics Institute
Total Contracted Amount: Baht 1,120,000

Water Quality Modeling in Tachin River

Project Description: The object of the project is to carry out real time water quality modeling of Tachin River and to have preliminary study of modeling of non-point source pollutant.

Duration: 1 June 2005 to May 2006
Investigator: Dr Sutat Weesakul
Sponsor: Hydro and Agro on Formatics Institute
Total Contracted Amount: Baht 1,140,000

Water SPS, WRU/Vietnam Consultant for Course curriculum development on Irrigation Management at the Bachelors and Masteral Degrees levels

Contribution: 1 man month
Sponsor: Water Resource University (WRU), Vietnam

WWLC e-Learning Program on IWRM

Duration: January 2005 to December 2006
Investigators: Dr Mukand Singh Babel
 Prof Ashim Das Gupta
Short-term Consultant: Dr Roberto Clemente
Sponsor: UNU-INWEH, Canada
Total Contracted Amount: US\$ 68,900

12.5 Publications

Refereed Journals

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Chonwattana S, Weesakul, S, and Vongvisessomjai, S, 3-D Modeling of Morphological Changes Using Representatives Waves, *Coastal Engineering Journal*, Vol. 47, No. 4 (2005), p.1-25, 2005.

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- Shrestha, S, Babel, M S, Das Gupta, A, and Kazama, F** (2005), Evaluation of AnnAGNPS Model for a Watershed in the Siwalik Hills of Nepal, Accepted for publication in *Environmental Modeling and Software Journal*. (in press), 2005.
- Suaidee, W and Tingsanchali, T**, A Combined Simulation-GA Optimization Model for Operational Rule Curves of A Reservoir: A Case Study of Nam Oon Irrigation Project, Thailand, *Journal of Hydrological Processes*, John Wiley and Sons, U.K. (in press), 2005.
- Tingsanchali, T and Boonyasirikul, T**, Stochastic Dynamic Programming with Risk Consideration for Trans-basin Diversion System, *Journal of Water Resources Planning and Management*, ASCE, New York, U.S.A. (in press), 2005.
- Tingsanchali, T and Karim, M F**, Flood Hazard and Risk Analysis in the Southwest Region of Bangladesh, *Journal of Hydrological Processes*, Vol. 19, Issue 10, pp. 2055-2069, John Wiley and Sons, U.K., June, 2005.
- Tingsanchali, T and Wang, F**, Simulation of Flood Flow over Bangkok Flood Plain by Using Artificial Neural Network, IWA Publishing Journal, *Water and Environmental Management Series*, Paper No. WEMS06 (River Basin Restoration & Mgt.), U.K., pp. 77-86, 2005.
- Tingsanchali, T**, Management of Water-related Natural Disasters in Thailand, *International Journal on Hydropower and Dams*, Issue no.1, pp. 31-35, Surrey, U.K, 2005.
- Trung, T C, Das Gupta, A, Babel, M S, and Clemente, R C**, Assessment of Different Irrigation Management Models in Vietnam, *International Journal of Water Resources Development*, Vol. 23, No. 3, 525-535, 2005.
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Babel, M S and Das Gupta, A, (Editors), MTERM Research Compendium, p. 491, 2005.

Babel, M S and Das Gupta, A, (Editors), Proceedings of the *International Conference on Modeling Tools for Environment and Resources Management (MTERM)* held at AITCC, p 644, 8-10 June 2005.

Babel, M S, Das Gupta, A, and Nayak, D K, A Scientific Approach for Allocating Water to Competing Sectors. A contribution to a book to be published by IWA Publishing, pp. 123-130, 2005.

Desalegn Ch E, Awulachew, S B, Namara, R E, Babel, M S, and Das Gupta, A, Indigenous Systems of Conflict Resolution in Oromia, Ethiopia. In *Community-based Water Law and Water Resources Management Reform in Developing Countries* published by CABI, 2005.

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Andong, R F, Babel, M S, Boromthanasrat, S, and Md Wahid, S, Water Resources Management in Pak Phanang River Basin: Problems and Prospects. Proceedings of the *International Conference on Modeling Tools for Environment and Resources Management (MTERM)* held at AITCC, pp. 55-62, 8-10 June 2005.

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Grover, V I, Mayfield, C, Daley, R J, Babel, M S, Kahsai, K, and Ofori-Danson, P K, Integrated Water Resources Management – Its Development and Water Virtual Learning Center. Proceedings of the *International Conference on Modeling Tools for Environment and Resources Management (MTERM)* held at AITCC, pp. 29-36, 8-11 June 2005.

Islam, M S, Babel, M S, and Das Gupta, A, Pressure Management for Leakage Reduction in a Water Distribution Network, Proceedings of the *International Conference on Modeling Tools for Environment and Resources Management (MTERM)* held at AITCC, pp. 587-594, 8-10 June 2005.

Kurniawan, T A, Chan, G Y S, Lo, W-H, Babel, M S, and Babel, S, Problems and Challenges of Water Resources Management in Southeast Asia: The China's Water Agenda 21 as a Source of Inspiration, Proceedings of *1st IWA-ASPIRE Conference* held at Pan-Pacific

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- Thaicharoen, C, Weesakul, S, and Das Gupta, A,** Tsumani Propagation to Thailand A Case Study: Phi Phi Island, *MTERM International Conference*, pp. 301-312, 8-10 June 2005.
- Thang, C C, Eiumnoh, A, Shivakoti, G P, and Clemente, R S,** Spatial Modeling to Land Degradation Assessment using Remotely Sensed Data and Geographic Information System: A Case Study of Daunghay Watershed, Magway District, Myanmar, Proceedings *Map Asia Conference*, Jakarta, August 2005 (CD ROM).
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- Tingsanchali, T and Luengbootnak, N,** Improvement of Water Related Disaster Management in Thailand, Proceedings, *Regional Symposium on Scientific Forum on Tsunami, Its Impacts and Recovery*, AIT, Thailand, August 2005. (in press)
- Tingsanchali, T and Soe Min,** Estimation of Change in Raw Water Quality of Water Supply Canal of Bangkok due to Covering Structures, Proceedings, *Aqua Asia Forum 2005, International Symposium on Sustainable Water Resources Management and Sustainable Wastewater Technology*, BITEC, Bangkok, Thailand, pp.15-24, October 2005.
- Tingsanchali, T and Suiadee, W,** Application of Forecasting Weekly Rainfall by TDNN for Irrigation Water Allocation Scheduling, Proceedings, *XII IWRA World Water Congress Water for Sustainable Development-Towards Innovative Solutions*, New Delhi, India, p. 12, (in CD ROM), November 2005.
- Tingsanchali, T and Teeraoranit, A,** Flood Control Investigation of Had Yai City, Southern Thailand, Proceedings, *International Symposium on Urban Safety in Mega Cities in Asia*, Singapore (in CD ROM), October 2005.
- Tingsanchali, T and Yuannita, N,** Hydrodynamic Simulation of Java Sea, Indonesia, Proceedings, *International Conference on MTERM*, AIT, Thailand, pp. 313-322, June 2005.

- Tingsanchali, T**, Application of Time-delayed Neural Network for daily Flood Forecasting in Klong Darn Flood Plain, East Bangkok, Proceedings, *International Conference on Monitoring, Prediction, Mitigation of Water-related Natural Disasters (MPMD 2005)*, Kyoto University, Japan, pp. 239-244, January 2005.
- Tingsanchali, T**, Guidance to Become Distinguished Research Engineers for Development of Thailand, Invited Paper, Proceedings, *10th National Convention in Civil Engineering*, Pattaya, Thailand, page Inv-1 to Inv-11, May 2005.
- Tingsanchali, T**, Optimization of Kok-Ing-Nan Transbasin Diversion for Sirikit Reservoir, Thailand, Proceedings, *International Symposium on Role of Water Sciences in Transboundary River Basin Management*, Organized by United Nations University and AIT, Ubon Ratchathani, Thailand, pp.139-145, March 2005.
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- Other Publications**
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- Clemente, Roberto S**, Project Report on Course Curriculum Development at Bachelors level for WRU/Vietnam on Management of Irrigation and Drainage Systems (MIDS) April 2005
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- Das Gupta, A** (2005), Groundwater Resources Management: Policy and Social Implications, Keynote Address, Special session on Integrated River Basin Management in Monsoon Asia, *3rd. International Symposium on Southeast Asian Water Environment*, December 07-10.
- Das Gupta, A** (2005), Environmental Consequences of Groundwater Overdraft: Modeling and Application, Invited Presentation, *International Conference on Environmental Fluid Mechanics (ICEFM-2005)*, Indian Institute of Technology, Guwahati, India, March 03-05, 2005.
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Das Gupta, A (2005), Output 3: Development of Courses and Curricula for the Course on "Water Resources Systems Planning and Analysis", Consultant Report, AIT Project on "Support of Capacity Building at the Water Resources University, Hanoi, Vietnam", National Capacity Building (WATERSPS) Sub-component 1.3: Support to Capacity Building at the Water Resources University, MARD-Danida, Government of Vietnam.

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Dutta, D, Babel, M S and **Das Gupta, A** (2005), An Assessment of the Socio-economic Impacts of Floods under Climate Change Conditions in Large Coastal Cities in South and Southeast Asia, Project Report, Submitted to APN Secretariat.

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Weesakul, Sutat, Final Report "Flood Forecasting for Lower Chao Phraya River Basin", for Panya Consultants Co.,Ltd.

Weesakul, Sutat, Final Report "Real Time Hydrological Information for the People of Thailand", Royal Thai Government

12.6 Doctoral Students' Dissertation

Drought Analysis and Forecasting for Agricultural Water Management in Awash River Basin, Ethiopia

by Desalegn Chemeda Edossa
Supervisors: Dr Mukand S Babel
Prof Ashim Das Gupta

Evaluation of Alternative Irrigation Management Models in Vietnam

by Tran Chi Trung
Supervisors: Prof Ashim Das Gupta
Dr Roberto S Clemente

12.7 Masters Students' Theses and Research Studies

A Model for Water Allocation in the Lower Mekong River Basin

by Nguyen Hoai Thanh
Supervisors: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Analysis of Soil Erosion and Sediment Transport Using Empirical Models and a Process-Based Distributed Model

by Rabin Bhattacharai
Supervisor: Dr Dushmanta Dutta

An Assessment of Environmental Flow Requirements for the Thachin River, Thailand

by Md Shofiul Islam
Supervisors: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Application of Benchmarking in Selected Irrigation Projects in Malaysia and Thailand

by Ambili G K
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Application of Drastic Methodology for Vulnerability Assessment of Chiang Mai - Lamphun Basin, Thailand

by Arasananth Mariappan
Supervisors: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Application of a Genetic Algorithm for Water Allocation in Song Chu Irrigation System, Vietnam

by Nguyen Thi Van
Supervisor: Prof Tawatchai Tingsanchali

Application of Genetic Algorithm for Analysis of Pasak Jolasid Reservoir Operation, Thailand

by Chawakorn Rewtragulpaibul
Supervisor: Prof Tawatchai Tingsanchali

Application of GIS for Assessment of Water Resources in Irrawaddy River Basin, Myanmar

by Myint Aye
Supervisor: Dr Roberto S Clemente

Application of Soil and Water Analysis Tool (SWAT) for Water Quality in Upper Cong Watershed, Vietnam

by Le Bao Trung
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Assessment of Salinity Intrusion in the Red River Delta, Vietnam

by Le Thi Thu Hien
Supervisors: Dr Roberto Clemente
Dr Sutat Weesakul

Assessment of the Economic Impacts of Floods Under Climate Change Conditions in a Coastal City in Bangladesh

by Md Javed Abdul Naser Bhuiyan
Supervisor: Dr Dushmanta Dutta

Assessment of Urban Water Quality in Nhieu Loc - Thi Nghe Basin, Vietnam

by Ngo Thi Thanh Nhan
Supervisors: Dr Roberto Clemente
Dr Sutat Weesakul

Evaluation of Rural Water Supply Management Models in Tien Giang Province of Vietnam

by Giang Thi Thu Thao
Supervisors: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Evaluation of the Bulk Water Allocation Concept in the Mahaweli System H, Sri Lanka

by L V P Nilanthi Jayawardena
Supervisor: Prof Tawatchai Tingsanchali

Experimental Study on Development of Dynamic Bay Shape

by Chatchai Pedugsorn
Supervisors: Dr Mukand S Babel
Dr Sutat Weesakul

Experimental Verification of GSTARS 3 for Bed Scour and Deposition in an Open Channel

by Muhammad Uzair
Supervisor: Prof Tawatchai Tingsanchali

Flood Control Analysis in the Yom River Basin, Thailand

by Vu Minh Thien
Supervisors: Dr Dushmanta Dutta
Dr Sutat Weesakul

Flood Risk Analysis in Bangkok Using GIS, Remote Sensing and a Distributed Flood Model

by Sin Wongwiwat
Supervisor: Dr Dushmanta Dutta

Impact of Water Policy on Socio-Economic Development in Pakistan

by Rashida Majeed
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Leakage Analysis and Management in the Water Distribution Network in a Selected Area of Bangkok

by Mohammad Shafiqul Islam
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Methodology for Socio-Economic Vulnerability Assessment for Urban Flood Disaster Risk Management in Bangkok and Hanoi

by Mst Fahmida Khatun
Supervisors: Dr Dushmanta Dutta
Dr Sutat Weesakul

Modeling of Contaminant Transport in Subsurface Environment in the Vicinity of the Landfill Site in Ayutthaya, Thailand

by Smrita Joshi
Supervisors: Prof Ashim Das Gupta
Dr Mukand Singh Babel

Modeling of Non-Point Source Pollution in the Mun River Basin, Thailand

by Aysha Akter
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

Public Health Impact of Urban Flooding: A Case Study of Jakarta, Indonesia

by Anastasia Yunika
Supervisors: Dr Mukand Singh Babel
Prof Ashim Das Gupta

**Soil Hydraulic Characterization and
Hydrologic Modeling of Sloping Agricultural
Lands in Uma Oya Watershed, Sri Lanka**

by Aldrin Alameda Rivas

Supervisor: Dr Roberto Clemente

**Sustainable Groundwater Resources
Management for the Bangkok Aquifer System**

by Mana Kitirat

Supervisors: Prof Ashim Das Gupta

Dr Mukand Singh Babel

**Water Resources Analysis Under Projected
Climate Conditions in the Mahanadi River
Basin, India**

by Shilpa M Asokan

Supervisor: Dr Dushmanta Dutta

Chapter 13: SET- INFORMATION AND COMMUNICATIONS TECHNOLOGIES AREA OF STUDY

13.1 Introduction

Information and Communications Technologies field is a newly established area of study in response to the needs for the offering of a curriculum selectively drawn from the curricula of Telecommunications (TC), Computer Science, and Information Management (CSIM). With strong emphasis on communications aspects - rather than on the aggregation of hardware, software, networks, equipment and related industries - ICT recognizes the important role of information services and applications in the creation of a complete ICT infrastructure.

13.2 Research Facilities and Laboratories

There is a rapidly growing and constantly evolving interest in ICT throughout the academia and society. To support this, the evolution and the benefits of ICT in our lives, the ICT field of study at AIT continues to research and develop of ICT. The field of study covers a wide variety of research supported by the body of faculty consisting of a multi-professional team of international experts in telecommunication, computer science, educational technology and related fields.

The faculty has a strong academic background ranging from wireless and optical networks, through hardware and software, to web education and other e-services.

Research subjects include those on ICT applications (e-services such as e-learning, e-health, e-governance, rural development, knowledge creation and knowledge dissemination); on the information technologies (e.g. operating systems, programming languages, information

storage and retrieval); on the communication infrastructure (e.g. networks, transmission technologies, switching and routing). Research specializations are in adaptive technologies; computer-supported collaboration; Home networking; ICT security; Online communities; and voice over IP.

The ICT area of study shares the research facilities and laboratories of the Telecommunications field of study.

13.3 Faculty and Research Staff

The ICT Field of Study draws from the faculty and research staff of the Computer Science, Information Management, Remote Sensing & Geographic Information Systems, and Telecommunications Fields of Study.

Full-time Faculty

Kazi Mohiuddin Ahmed, Professor
Dencho N Batanov, Professor
Phan Minh Dung, Professor
Peter Haddawy, Professor
Kanchana Kanchanasut, Professor
Vilas Wuwongse, Professor

Xiaoyong Chen, Associate Professor
Vatcharaporn Esichaikul, Associate Professor

Sumanta Guha, Associate Professor
Kiyoshi Honda, Associate Professor
R M A P Rajatheva, Associate Professor
Teerapat Sanguankotchakorn, Associate Professor
Nitin Kumar Tripathi, Associate Professor

Poompat Saengudomlert, Assistant Professor

Visiting Faculty

Michiro Kusanagi, Visiting Professor
A B Sharma, Visiting Professor
Tapio J Erke, Visiting Associate
Professor
Junichi Susaki, Visiting Assistant
Professor
Paul Janecek, Visiting Lecturer

Research Staff

Manzul Kumar Hazarika, Senior
Research and Training Specialist
Mikko Kovalainen, Visiting Senior
Researcher
Surat Lertlum, Research Scientist
Lal Samarakoon, Visiting Senior
Scientist
Marc Souris, Visiting Research Scientist

13.4 Masters Students' Theses and Research Studies

Research Study: Analysis of the Role of Universities for Telecenter Development

by Than Byin Soe

Supervisor: Dr Mikko Kovalainen

Research Study: A Prototype Internet Voting System for Election in a Small Community

by Kowit Kowito

Supervisor: Dr R M A P Rajatheva

Research Study: Designing of E-Commerce Website: A Case Study of Usability in Two Websites

by Tanachon Srisaidee

Supervisor: Dr Mikko Kovalainen

Research Study: Supporting Communications, Coordination and Information Sharing in ICT Projects: A Case Study of ICT Project Design

by Thet Oo Maung

Supervisor: Dr Mikko Kovalainen

Chapter 14: SCHOOL OF ENVIRONMENT, RESOURCES AND DEVELOPMENT

14.1 *Mission, Vision, and Core Values*

SERD Mission

The School of Environment, Resources and Development is committed to excellence in graduate education as well as research and outreach activities. Through its academic programs and outreach units, SERD, AIT's largest School, has been working towards capacity building and human resource development in the areas of environmental and resources management, poverty alleviation and socio-economic/gender development.

SERD responds to regional needs by mobilizing and enhancing capacities for socially, economically and environmentally sound development in partnerships with public and private sectors. The School's interdisciplinary approach integrates technological, natural and social sciences.

SERD Vision

- SERD will continue its leadership role in offering excellent academic programs relevant to regional needs.
- SERD research will be concentrated toward focal areas and are to be conducted by core teams.
- SERD outreach will be community service-oriented.
- SERD Programs will be consolidated and financially viable. The School/ Program activities including the students, staff, faculty and curricula, will be subject to quality assessment.

SERD Core Values

- Interdisciplinarity
- Innovativeness
- Excellence
- Responsiveness

14.2 *Fields of Study and Multidisciplinary Programs*

Fields of Study

- Agricultural Systems and Engineering
- Aquaculture and Aquatic Resources Management
- Energy
- Environmental Engineering and Management
- Food Engineering and Bioprocess Technology
- Gender and Development Studies
- Natural Resources Management
- Pulp and Paper Technology
- Regional and Rural Development Planning
- Urban Environmental Management

Inter-university Program

- Environmental Toxicology, Technology and Management

Interdisciplinary Programs

- Cleaner Production
- Integrated Tropical Coastal Zone Management
- Integrated Watershed Development and Management
- Modeling Tools in Environmental Resources and Management

Executive Master's Program

- Environmental Technology and Management

14.3 Outreach Centers

Environment and Resources Management Group

The Environment and Resources Management Group is the unit for outreach environment-related activities on Urban Environmental Engineering and Management in the School of Environment, Resources and Development, Asian Institute of Technology.

Flexibility and continuous search for innovation and creativity characterize all activities of ERMG. The purpose of ERMG is to provide environmental services and apply academic knowledge, adapting theory and research findings to practical needs.

ERMG serves as a bridge between the university, society, and industry. It relays research topics, carries on research and organizes major environmental projects. The group's primary duty is to market in society the wide variety of expertise available inside and outside UEEM. Multi-disciplinary approach is the group's great strength.

Another vision of ERMG is to manage change and exploit opportunities. Changes may happen so fast that the present has hardly begun before the future is already upon us. The indications are that the rate of change is accelerating. Change must be welcomed, embraced and turned to good effect, even though it may be threatening. Innovation and adaptability become part of its everyday habit.

14.4 Research Facilities and Laboratories

The SERD Computer Laboratories I and II in the Main SERD Building, comprising of 80 high-end PCs connected to the campus-wide Ethernet and ATM Network, provide

support to all students, faculty and staff in their computer-aided courses, training and research. Full internet access is available to these PCs through a high speed network backbone which connects all academic buildings including the residence halls. A large number of PC software packages for applications such as word-processing, spreadsheets, network communications, multimedia and file transfer utilities are available. High quality laser printers, scanning and CD writing facilities are available for students' uses. These two computer laboratories have a server to host and maintain the School's homepages as well as other WebPages for project and newsletters.

14.5 School Governance

Dean of School

SIVANAPPAN KUMAR, BE, Univ of Madras, India; MEng, AIT, Thailand; PhD, Inst Natl Polytechnique, Toulouse, France.

Professor (*Cleaner Production; Rational Use of Energy; Solar Energy*)
[Solar Energy (Radiation, Thermal and Photovoltaics); Cleaner Production; Heat Pumps]

Associate Dean

KYOKO KUSAKABE, BA, Sophia Univ, Tokyo, Japan; MSc, PhD, AIT, Thailand.

Assistant Professor
[Impact of economic globalization on gender relations especially focusing on women's work; Gender issues in aquaculture and fisheries/ women's access to technology, women's role in trade chain, and the relationship with women's mobility; Informal economy and social security; Border, market and state: ways women in the borderlands negotiate with markets and states; Gender analysis of organizations and gender mainstreaming]

Chapter 15: SERD – AGRICULTURAL SYSTEMS AND ENGINEERING FIELD OF STUDY

15.1 Introduction

This field of study emphasizes on sustainable agricultural and related technologies development through holistic approach for efficient food production from small holder agriculture.

15.2 Research Facilities and Laboratories

Agricultural Systems and Engineering (ASE) Laboratory caters to researchers, which address sustainability in agricultural production. The facilities are capable for implementing excellent agronomic and engineering researches on soils, water and plant, such as, plant growth, soil fertility and management, integrated pest management, plant water requirement, etc. Facilities to conduct researches on terramechanics, ergonomics and tillage are also available. The engineering aspects of agricultural production are dealt with through innovations and development of machines and equipment to enhance productivity and reduce human drudgery. These innovations are constructed at the ASE workshop.

Major laboratory equipment include a Soil bin carriage system; Porometer; Sony CXC-390 1/3" 3 CCD Camera; Spider 8: data logger; Dynamic strain amplifier; and an SC-900 Soil compaction meter.

The SERD Computer Lab III in the Agricultural and Food Engineering Building has various kinds of software packages for system analysis and simulation, including DSSAT (Decision Support System for Agro-technology Transfer), ArcView etc. A Computer-Aided Design (CAD) workstation is also available for training the design of agricultural equipment. There is a machine workshop with facilities for fabricating various types of laboratory and experimental

apparatus and models. Consultation and fabrication of different types of transducers can be provided. About 20 high-end PCs connected to the campus-wide Ethernet and ATM network and a high quality laser printer, scanning and CD writing facilities are available for students' uses.

15.3 Faculty and Research Staff

Full-time Faculty

VILAS M SALOKHE, BTech, Mahatma Phule Agricultural Univ., India; MEng, Univ of Sukhdia, India; DEng, AIT, Thailand.

Professor (*Agricultural Machinery; Ergonomics; Protected Cultivation & Greenhouse Technology; Terramechanics, Agricultural Systems Analysis*)

[Terramechanics, Tillage and Traction; Design and Development of Agricultural Machines, Ergonomics, Applied Instrumentation; Controlled Environment Agriculture; Biomimetics; Agricultural Automation and Mechanized Farming; Low-cost Site-specific Technology]

S L RANAMUKHAARACHCHI, BSc, Univ of Peradeniya, Sri Lanka; MSc, PhD, Pennsylvania State Univ, USA.

Associate Professor (*Agronomy; Crop Ecophysiology; Cropping Systems; Farming Systems; Pest Management; Soil Fertility Management; Agricultural Systems; Weed Science and Management*)

[Cropping Systems Research & development; Farming Systems Research & development; Crop Physiology; Stress Physiology; Agronomic Research - weed science, soil fertility management; Integrated Pest Management; Organic Farming; Watershed Development Management Research]

GANESH P SHIVAKOTI, BS, MS, Udaipur Univ, India; PhD, Michigan State Univ, USA.
Associate Professor (*agricultural economics; resource development; farming systems*)

HEMANTHA P W JAYASURIYA, BScEng, Univ of Peradeniya, Sri Lanka; MEng, DEng, AIT, Thailand.
Assistant Professor (*Agricultural Systems Analysis; Design and Development of Agricultural and Processing Equipment; Instrumentation and data acquisition systems; Power and Energy in Agriculture; Precision Agriculture; Controlled Environment Agriculture; Soil-Tool Interactions; Terramechanics; Agricultural Engineering; Measurement Techniques*)
[Design and Development of Agricultural and Processing Equipment; Precision Agriculture; Controlled Environment Agriculture; Power and Energy in Agriculture; Agricultural Systems Analysis; Soil-Tool Interactions; Terramechanics]

Visiting Faculty

PETER AUN-CHUAN OOI, PhD
Adjunct Lecturer (*crop protection, integrated pest management; agricultural systems*)

Research Staff

EMMANUEL C CANILLAS, DEng
Senior Laboratory Supervisor
(*supervises instrumentation and data acquisition; calibration and testing of agricultural equipment; soil testing and other laboratory sessions*)

WATTANAPORN MESKUNTAVON, DTechSc
Senior Laboratory Supervisor (*manages researches on farm and crop management and other laboratory sessions including soil analysis*)

JOHANNES MAX, Dip-Ing
Project staff (*plant nutrition, root-research, protected cultivation, horticulture*)

PRABHAT KUMAR, Dip-Ing
Project staff (*entomology and integrated pest management*)

LIANG HENGTONG, MEng
Project staff (*food and bioprocess engineering*)

15.4 Completed Grant and Sponsored Research

Adapted Greenhouse System for Integrated Vegetable Production in Tropical Climates

Duration: 1 January 2001 to 30 June 2005
Investigator: Prof Vilas M Salokhe
Sponsor: German Research Fund
Total Contracted Amount: Baht 2,007,430

Asian Irrigation Institution Systems in Transition: Sustainability and Implications

Duration: 1 March 2001 to 31 December 2005
Investigator: Dr Ganesh Shivakoti
Collaborator: International Water Management Association, Sri Lanka
Sage Publications, India
Sponsor: The Ford Foundation
Total Contracted Amount: Baht 2,105,306

Development of Rotary Tiller for Mixing Sugarcane Residues

Duration: 1 March 2003 to 30 June 2005
Investigator: Prof Vilas M Salokhe
Collaborator: Kasetsart University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 1,000,000

Hannover-AIT Protected Cultivation Project

Duration: 1 September 2001 to 30 June 2005
Investigator: Prof Vilas M Salokhe
Collaborator: Dr Thomas Achilles, AIT
Sponsors: Hannover University, Germany
Kasetsart University, Thailand
Total Contracted Amount: Baht 15,500,755

Human resource development network in food quality and safety for sustainable food production

Duration: 2004-2005
Investigator: Prof Vilas M Salokhe
Sponsor: European Union
Total Contracted Amount: Euro 196,612

Michigan State University Study Abroad Program in Thailand

Duration: January 12-April 09, 2005
Investigator: Dr Ganesh Shivakoti
Sponsor: Michigan State University
Total Contracted Amount: US \$ 12,500

Michigan State University Study Abroad Program in Thailand

Duration: May 15-June 18, 2005
Investigator: Dr Ganesh Shivakoti
Sponsor: Michigan State University
Total Contracted Amount: US \$ 14,500

Protected Cultivation- An Approach to Sustainable Vegetable Production in the Humid Tropics

Project Description: Vegetable production in Southeast Asia is characterized by a strong dependency on chemical plant protection with all the inherent environmental and health hazard for farmers and consumers. Through a holistic research approach, the project intends to develop an environmentally friendly and sustainable vegetable production for the humid tropics with a special emphasis on tomato production through protective cultivation.

Duration: 1 January 2001 to 30 June 2005
Investigator: Prof Vilas M Salokhe
Sponsor: German Research Fund
Total Contracted Amount: Baht 14,777,309

Training cum Internship on Asian Governance and Leadership Training and Internship

Duration: April 17-May 08, 2005
Investigator: Dr Ganesh Shivakoti
Sponsor: SungKyunKwan University, South Korea
Total Contracted Amount: US \$ 21,500

15.5 Ongoing / In Progress Grant and Sponsored Research

Asian Irrigation Institutions and Systems (AIIS) Dynamics study and Database Management

Duration: September 2003 to Decmber 2006
Investigators: Wai Fung Lam
 Dr Ganesh Shivakoti
Sponsor: Government of Hong Kong Grant to University of Hong Kong
Total Contracted Amount: US \$ 110,000

Collaboration in Integrated Natural Resource Management in Indonesia: Decentralization, Local people and Resources

Duration: February 2005 to December 2008
Investigator: Dr Ganesh Shivakoti
Sponsor: Ford Foundation Grant to AIT and Andalas University
Total Contracted Amount: US \$ 225,000 [\$ 100,000 to AIT and \$ 125,000 to Andalas University, Indonesia] (a sub-contract of US \$ 100,000 to AIT for five doctoral training program of Andalas faculty and three best Masters graduates in INRM from Andalas)

Development, Land Use Change, and Forest Conservation in Tua Thien Hue Province, Vietnam

Duration: June 2003 to December 2006
Investigators: Dr Edward Webb
 Ganesh Shivakoti
Sponsor: MacArthur Grant
Total Contracted Amount: US \$ 230,000

Hannover-AIT Greenhouse Project – Phase-II

Duration: 2004-2007
Investigator: Prof Vilas M Salokhe
Sponsor: German Research Grant
Total Contracted Amount: Baht 15,550,000

Professional enhancement and curriculum development to strengthen its new Master's degree program in integrated natural resources management and development

Duration: August 2003 to December 2006
Investigator: Dr Ganesh Shivakoti
Sponsor: Ford Foundation Grant to Andalas University, Indonesia
Total Contracted Amount: US \$ 180,000 (a sub-contract of US \$ 50,000 to AIT for doctoral training program of Andalas faculty and support for AIT faculty to teach graduate level courses at Andalas)

Protected Cultivation – An Approach to Sustainable Vegetable Production in the Humid Tropics- Phase II

Duration: 2004-2007
Investigator: Prof Vilas M Salokhe
Sponsor: German Research Grant
Total Contracted Amount: Baht 10,000,000

Upgrading of Green House Facility

Duration: 2004-2006
Investigator: Prof Vilas M Salokhe
Sponsor: Hanover University, Germany
Total Contracted Amount: Baht 986,995

15.6 Publications

Refereed Journals

Dendi, A, Shivakoti, G P, Dale, R and Ranamukhaarachchi, S L (2005), Evolution of the Minangkabau's shifting cultivation in the west Sumatra highland of Indonesia and its strategic implications for dynamic farming systems, *Land Degradation & Development*, 16(1):13-26. (This paper is also published online 14 Dec 2004, vol. 15:1-14

- Dhakal, U, Salokhe, V, Tantau, H, and Max, J** (2005), Development of a Greenhouse Nutrient Recycling System for Tomato Production in the Humid, *The CIGR Journal of Scientific Research and Development*, Manuscript BC 05 008, Vol. VII, 1-14, October, 2005.
- Gautam, A and Shivakoti, G** (2005), Conditions for successful local collective action in forestry: Some evidences from the hills of Nepal, *Society and Natural Resources*.18(2):153-171.
- Harmanto, Salokhe, V M, Babel, M S and Tantau, H J** (2005), Water requirement of drip irrigated tomatoes grown in greenhouse in tropical environment, *Agricultural Water Management*, 71(3):225-242.
- Jebessa, Mitiku Tesso and Ranamukhaarachchi, S L** (2005), Attempts to biologically control anthracnose disease in chilli peppers, *Tropical Science* (UK) (Accepted for publication on 17 May 2005)
- Ogunlana, E, Salokhe, V M and Lund, R** (2005), Alley farming: A sustainable technology for crops and livestock production, *Journal of Sustainable Agriculture* (in press).
- Pranato, Yudi, Salokhe, V M and Rakshit, S K** (2005), Physical and antibacterial properties of alginate-based edible film incorporated with garlic oil, *Food Research International*, 38(3):267-272.
- Pranoto, Y, Rakshit, S and Salokhe, V M** (2005), Enhancing antimicrobial activity of chitosan films by incorporating garlic oil, potassium sorbate and nisin, *Food Science and Technology*, 38:859-865.
- Pranoto, Y, Rakshit, S K and Salokhe, V M** (2005), Mechanical and antimicrobial characterization of edible films based on alginate and chitosan containing garlic oil, *Developments in Chemical Engineering and Mineral Processing, The Australian Research Journal*, 13(5/6):617-626. In special theme Issue : Bioprocess and Environmental Biotechnology Research.
- Rahman, Md Mizanur, Yakupitiyage, Amaratne and Ranamukhaarachchi, S L** (2005), Fertilizer Requirements of Morning Glory (*Ipomoea reptans*, L.), *Asia Pacific Journal of Rural Development*, Vol. XV, No.1 December 2005. (Accepted for publication).
- Ranamukhaarachchi, S L and Ratnayake, W M** (2005), Straw and stubble management and potassium application on grain yield of rice in rice-rice cropping systems in the mid-country wet zone of Sri Lanka, *ScienceAsia*, Vol 31 No. 3 (accepted for publication on 06 December 2005)
- Ranamukhaarachchi, S L, Rahman, Md Mizanur, Begum, Shamsun Nahar** (2005), Soil fertility and land productivity under different cropping patterns in highlands and medium highlands of Chandina upazilla, Bangladesh, *Asia Pacific Journal of Rural Development*, Vol. XV (1): 63-76.
- Salokhe, V M, Soni, P and Tantau, H J** (2005), Effect of net size on horizontal temperature gradients in naturally-ventilated tropical greenhouses, *Journal of Food, Agriculture and Environment*, 3(2):316-322.
- Salokhe, V M, Soni, P and Tantau, H J** (2005), Spatial variability of air-humidity inside naturally ventilated tropical greenhouse, *International Agrophysics*, 19(4):329-336.
- Shivakoti, Ganesh and Shrestha, S** (2005), Analysis of Livelihood Asset Pentagon to Assess the Performance of an Irrigation System - Part 2: Application of Analytical Framework, Part 1, *Water International*. 30(3):363-371.
- Shivakoti, Ganesh and Shrestha, S** (2005) Analysis of Livelihood Asset Pentagon to Assess the Performance of an Irrigation System - Part 1: Analytical Framework, *Water International*. 30(3):356-362.

Shivakoti, Ganesh and S B Thapa, (2005), Farmers' Perceptions of Institutional Participation and Effectiveness in Management of Mid-hill Watersheds in Nepal, *Environmental and Development Economics*, Volume 10(5):665-688.

Shivakoti, Ganesh, Ghale, Yamuna and Upreti, Bishnu (2005), The Ecological Dynamics of Low-External-Input Agriculture: A Case Study of Hill Farming in Developing Country Setting, *The International Journal of Sustainable Development and World Ecology*, 12(4):385-397.

Soekarno, S and Salokhe, V M (2005), Performance of cage wheel with opposing circumferential lugs and normal cage wheel in wet clay soil, *Agricultural Mechanization in Asia, Africa and Latin America* (in press).

Soni, P, Salokhe, V M and Tantau, H J (2005), Effect of screen size on vertical temperature distribution in naturally ventilated tropical greenhouses, *Biosystems Engineering*, 92(4):469-482.

Soni, P, Salokhe, V M and Tantau, H (2005), Effects of screen porosity on selected microclimatic parameters of naturally ventilated tropical greenhouses, *The CIGR Journal of Scientific Research and Development*, Manuscript BC 05 002, Vol. VII, 1-14.

Sudajan, S, Salokhe, V M and Somnuk, C (2005), Effect of concave size, concave clearance and drum speed on rasp-bar drum performance for threshing sunflower, *Agricultural Mechanization in Asia, Africa and Latin America (AMA)*, 36(1):52-60.

Wickramarachchi, K S and Ranamukhaarachchi, S L (2005), Preservation of fiber-rich banana blossom as a dehydrated vegetable, *ScienceAsia* Vol 31 No. 3 (in press)

Refereed Books/Chapters

Shivakoti, Ganesh, Vermillion, Douglas, Lam, Wai Fung, Ostrom, Elinor, Pradhan, Ujjwal and Yoder, Robert (2005), *Asian Irrigation in Transition-Responding to Challenges*. Sage Publications-New Delhi/Thousand Oaks/London jointly published with AIT/IWMI/ Indiana University, 520 pages. (Out of Total 20 chapters: Two Chapters; one as first author and another second author): (i) **Shivakoti, Ganesh, Lam, W F and Pradhan, Ujjwal** (Chapter1) "Asian Irrigation Problems and Prospects"; (ii) **Bhandari, Hum N and Shivakoti, Ganesh P** (Chapter 5) "Groundwater Irrigation in South Asia: A Micro Level Study from Nepal."

Conference Proceedings

Bastakoti, R C, Shivakoti, Ganesh P and Lam, W F (2005), Institutional Dynamism and Political Economy of Irrigation Governance in Thailand, Paper prepared for presentation at the *XII World Water Congress of International Water Resources Association* to be held in New Delhi, November 22-26, 2005.

Faber, M H, Kos, A, Becker, B, Kaufmann, M, Stamp, P, Seeland, K, Grün, A, Ranamukhaarachchi, S L, Shivakoti, G P, Samarakoon, L, Shipin, O and Rego, Loy (2005), Sustainable Management Of Natural Hazards In The Region Of South-East Asia And South Asia, Proceedings of the *International Symposium on "Disaster Reduction on Coasts : Scientific Sustainable Holistic Accessible* held during 14-16 November 2005 at Monash University, Clayton Campus, Melbourne, Australia.

Haque, Abu Ahmed Mokammel, and Jayasuriya, H P W (2005), Soil nutrient Assessment by GIS for fertilizer management of irrigated rice production in Bangladesh, Presentation and in Proceedings of the *International Agricultural Engineering*

Conference, 6-9 December 2005, Bangkok, Thailand. PAG018 in CDROM.

Haque, Abu Ahmed Mokammel and Jayasuriya, H P W (2005), Soil-nutrient-based inorganic fertilizer management for irrigated rice production using GIS in Trishal Sub-district in Bangladesh, Presentation and in Proceedings of the *First Asian Conference on Precision Agriculture (FACPA)*, 5-6 August, Toyohashi, Japan. Pp .

Jayasuriya, H P W and Sangpradit, Kiattisak (2005), Development of a seat suspension system for a small four wheel tractor, Presentation at the *International Engineering Conference 2005*, March 5, University of San Carlos, Talamban, Cebu City, The Philippines.

Khot, L R, Salokhe, V M and Jayasuriya, H P W (2005), Experimental Validation of Distinct Element Simulation for Dynamic Wheel-Soil Interaction, Paper presented at *ASAE Annual International Meeting*, Florida, U. S. A.

Madhukar, Kulal Dnyandeo, Dashrath, Kambli Baburao and Jayasuriya, H P W (2005), Precision Farming: An overview of facts and strategies for meaningful adoption in the developing countries, Proceedings of the *International conference on Plasticulture and Precision Farming (ICPPF)*, 17-21 November 2005, New Delhi, India.

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Rahman, Md Mizanur, Yakupitiyage, A and Ranamukhaarachchi, S L (2005), Agricultural value of Tilapia Pond sediment in terms of phosphorus fertilization and soil conditioner, Paper presented at the *World Aquaculture 2005*, May 9-13, 2005 at Bali International Convention Center, Nusa

Dua, Bali, Indonesia. Organized by World Aquaculture Society.

Ramachandra, Khot Lav, Salokhe, V M, and Jayasuriya, H P W (2005), Experimental validation of distinct element simulation for dynamic wheel-soil interaction, Presentation and in Proceedings of the *2005 ASAE Annual International Meeting*, Paper No. 053120, 17-20 July, Tampa, Florida, USA.

Rivas, A A, Clemente, R S, Ranamukhaarachchi, S L, Thevachandran, S, Zoebisch, M A and Das Gupta, A (2005), Characterization of soil hydraulic properties and development of soil hydraulic quality index (SHQI) under different land use systems in a sloping watershed in Sri Lanka, Proceedings of the *MTERM International Conference* held during 06-10 June, 2005, Asian Institute of Technology, Thailand.

Rupasinghe, C P and Jayasuriya, H P W (2005), Modifications of the scoop type rotary tiller blades for reverse rotation, Presentation at the *International Agricultural Engineering Conference*, 6-9 December 2005, Bangkok, Thailand.

Salokhe, V M (2005), Development and Utilization of Small Farm Mechanization Systems in Asia: Status and Challenges, *International Workshop on Small Farm Mechanization Systems Development, Adoption and Utilization*, Las Banos, Laguna, Philippines, 13-17 June 2005.

Salokhe, V M (2005), Thai agriculture on global track: Growing success through engineering and economics, Paper presented as a key note lecture during *Thai Society of Agricultural Engineering*, 30-31 March 2005.

Salokhe, V M (2005), The agricultural product export of Thailand, Paper presented at the *ASEAN-EU University Network Program (AUNP) meeting*, Surabaya, 20 September.

- Salokhe, V M and Soni, P** (2005), Microclimatic response to cladding properties of net houses, Paper presented at *International Conference on Plasticulture and Precision Farming*, 17-21 November, New Delhi, India.
- Sangpradit, Kiattisak and Jayasuriya, H P W** (2005), Development of tractor seat suspension system to attenuate low frequency vibration transmission: An ergonomic design, Presentation at the *International Agricultural Engineering Conference*, 6-9 December 2005, Bangkok, Thailand.
- Shivakoti, Ganesh P and Shrestha, S G** (2005), Socio-economic Participation for Irrigation Development and Improvement in Agricultural Performance in Nepal, Paper prepared for presentation at *XII World Water Congress of International Water Resources Association* to be held in New Delhi, November 22-26, 2005.
- Soni, Peeyush and Salokhe, V M** (2005), Microclimatic response of insect-screen porosity: Naturally ventilated screen houses under tropics, Paper presented at the *39th ISAE Annual Convention and Symposium*, Hyderabad, India, 9-11 March.
- Sornpoon, W, Jayasuriya, H P W and Kitiyopas, D** (2005), Effect of different tillage and residue management practices on corn production, Presentation and in Proceedings of the *International Agricultural Engineering Conference*, 6-9 December 2005, Bangkok, Thailand. STR009 in CDROM.
- Swain, Kishore C and Jayasuriya, H P W** (2005), A GIS Application in Precision Agriculture for Land-use Suitability Evaluation: A Case Study Conducted in Khon Kaen, Thailand, Presentation and in Proceedings of the *First Asian Conference on Precision Agriculture (FACPA)*, 5-6 August, Toyohashi, Japan. Pp.
- Swain, Kishore C and Jayasuriya, H P W** (2005), A land use suitability criteria using GIS for evaluating the adoption feasibility of Precision Agriculture technology for Soybean cultivation in Thailand, Presentation and in Proceedings of the *International Agricultural Engineering Conference*, 6-9 December 2005, Bangkok, Thailand. PAG011 in CDROM.
- Tangwongkit, Ratanna, Salokhe, V M, and Jayasuriya, H P W** (2005), Development of a tractor mounted, low-cost, real-time, site-specific herbicide applicator for sugarcane, Presentation and in the Proceedings of the *4th Asian Conference on Industrial Automation and Robotics (ACIAR)*, May 11-13, Bangkok, Thailand.
- Viswanathan, P K and Shivakoti, Ganesh P** (2005), Promotion of Rubber Agro Forestry Systems in India: Institutional Constraints and Development Potential, Paper Prepared for presentation at the *Appraisal Meeting on "Improving the Productivity of Rubber Smallholdings through Rubber Agroforestry Systems"*, 5-7 September 2005, Prince of Songkla University, Thailand, Organised by World Agroforestry Centre (ICRAF), SE Asia.
- Wada, M, Kamiya, A, Kita-Tsukamoto, K, Ikejima, K, Nishida, M and Kogure, K**, RFLP analysis of the *luxA* genes of *Photobacterium leiognathi* isolates derived from the symbiotic light organ of Leiognathid fish, *Leiognathus rivulatus*. In: **Tsuji, A, Matsumoto, M, Maeda, M, Kricka, L J, Stanley, P E** (eds) Bioluminescence and Chemiluminescence. *World Scientific Publishers*, Singapore, pp103-106 (2005).

Other Publications

Salokhe, V M, Role of Rural Transport in Agrifood System of Asia, FAO, Rome, 2005.

15.7 Doctoral Students' Dissertation

Exploration of Biological and Chemical Control Measures for the Suppression of Colletotrichum Gloeosporioides (Anthracnose disease) of Chili Pepper (Capsicum annum) in Ethiopia
by Mitiku Tesso Jebessa
Supervisor: Dr S L Ranamukhaarachchi

15.8 Masters Students' Theses and Research Studies

An Assessment of Agricultural Land and Watershed Conditions in West Java Indonesia: A Case Study of Upper Ciliwung Watershed
by Nita Martiani
Supervisor: Dr Ganesh P Shivakoti

Application of Bionics to Disc Plows in Wet Clay Soil
by Guljamal Jumamuratova
Supervisor: Prof Vilas M Salokhe

Assessment of Performance and Profitability of the Private Sugarcane Production System in Myanmar: A Case Study in Mandalay Division
by Yu Yu Mon
Supervisor: Dr Ganesh P Shivakoti

Development of a Greenhouse Nutrient Recycling System
by Uttam Dhakal
Supervisor: Prof Vilas M Salokhe

Development of a Mechanical Rotary Tea Dryer
by Tanabordee Ruangrod
Supervisor: Dr Hemantha P W Jayasuriya

Development of a Variable Rate Fertilizer Applicator for Precision Farming
by Supana Pugasap
Supervisor: Dr Hemantha P W Jayasuriya

Effect of Additional Mechanical Ventilation on a Tropical Greenhouse Microclimate for Growing Tomatoes
by Rika Yuana Indriasari
Supervisor: Prof Vilas M Salokhe

Evaluation of Agricultural Mechanization Status and Potential Using GIS in Sunsari District, Nepal
by Anup Pradhan
Supervisor: Dr Hemantha P W Jayasuriya

Farming Systems and Land Productivity Analysis: Case Study in Union Council Tando Qaiser, Hyderabad District, Pakistan
by Ihsanul Haq Kakar
Supervisor: Dr S L Ranamukhaarachchi

Human Carrying Capacity Analysis of Land Resources for Sustainable Development: A Case Study of Nakla Upazila, Bangladesh
by Kaniz Aklima Sultana
Supervisor: Dr S L Ranamukhaarachchi

Livestock Carrying Capacity Evaluation of Land Resources in Integrated Farming Systems: A Case Study from the Mid Hills of Nepal
by Romy Das
Supervisor: Dr Ganesh P Shivakoti

Modification of the Design Parameters of Scoop Type Rotary Tiller Blades for Reverse Rotation
by Chintha Priyangani Rupasingha
Supervisor: Dr Hemantha P W Jayasuriya

Simulation of Soil-disc-plow Interaction for Sandy Soil Using Distinct Element Method (DEM)
by Deepa Hada
Supervisor: Prof Vilas M Salokhe

Simulation of Soil-Tine Interaction Using Distinct Element Method (DEM)
by Suhas Laxman Patil
Supervisor: Prof Vilas M Salokhe

Soil Quality Dynamics under Varying Cropping Patterns in the Uma Oya Watershed, Sri Lanka
by Shiamala Thevachandran
Supervisor: Dr S L Ranamukhaarachchi

The Effect by Different Tillage Methods on Corn Production
by Wilaiwan Sornpoon
Supervisor: Dr Hemantha P W Jayasuriya

Wear Characteristics of Thermally Sprayed Rotary Tiller Blades
by Satit Karoonboonyanan
Supervisor: Prof Vilas M Salokhe

**The Effect of the Form of Animal and Green
Manure and their Combination on Soil Fertility
and Yield of Leaf Mustard in the Midlands of
Vietnam**

by Thai Thi Minh

Supervisor: Dr S L Ranamukhaarachchi

Chapter 16: SERD – AQUACULTURE AND AQUATIC RESOURCES MANAGEMENT FIELD OF STUDY

16.1 Introduction

AARM promotes development through aquaculture and small-scale capture fisheries. The Field of Study has a wide spectrum of activities enabling it to address poverty, constraints facing the promotion of sustainable management and utilization of aquatic resources. The central theme is capacity building: the advancement of individuals and institutions creating indigenous capacity in education, research and development within the region.

16.2 Research Facilities and Laboratories

Aquaculture Laboratory serves the academic and research programs of aquaculture and aquatic resources management (AARM) field of study. It is equipped with modern equipment to analyze water quality, nutrients in food and feedstuffs, and soil classification and their problems identification. Some of its major laboratory equipment include a Distillation Unit; Extraction Unit; Incubator; UV/Vis Spectrophotometer; and a Flame Photometer

The SERD Computer Lab III in the Agricultural and Food Engineering Building has various kinds of software packages for system analysis and simulation, including DSSAT (Decision Support System for Agro-technology Transfer), ArcView etc. A Computer-Aided Design (CAD) workstation is also available for training the design of agricultural equipment. There is a machine workshop with facilities for fabricating various types of laboratory and experimental apparatus and models. Consultation and fabrication of different types of transducers can be provided. About 20 high-end PCs connected to the campus-wide Ethernet

and ATM network and a high quality laser printer, scanning and CD writing facilities are available for students' uses.

16.3 Faculty and Research Staff

Full-time Faculty

AMRIT BART, BA, Earlham College, USA; MA, MS, PhD, Auburn Univ, USA
Associate Professor (*Aquatic Resource Management; Cryopreservation; Reproductive Physiology; Seed Production*)

AMARARATNE YAKUPITIYAGE, BSc, Univ of Kelaniya, Sri Lanka; MSc, AIT, Thailand; PhD, Univ of Stirling, Scotland.
Associate Professor (*Aquaculture; Bio-energetics; Database Systems Development; Fish Nutrition*)
[Aquaculture: in particular Animal Feed Resources Development, Feed/Fish Processing Technology, Fish Nutrition and Energetics; Data-base Development; Curriculum Development - Research into Education Technology]

YANG YI, BSc, Sichuan Univ, PRC; MSc, DTechSc, AIT, Thailand.
Associate Professor (*Aquaculture; Integrated Systems; Modeling; Pond Dynamics; Water Quality*)
[Aquaculture Production Systems; Aquaculture Wastewater Treatment and Environmental Integration; Water Quality in Aquaculture; Fish Sex Control Modeling]

WENRESTI G GALLARDO, PhD, MSc, Nagasaki University, Japan; Master of Aquaculture, University of the Philippines in the Visayas; BSc, University of the Philippines, Diliman, Philippines.
Assistant Professor (Aquaculture; Aquatic Resources Management)
(Aquatic seed production; Coastal resources management; Farming systems and ecology; Marine protected areas; Stock enhancement]

KO IKEJIMA, BSc, Univ of Agriculture and Tech; MSc, PhD, Univ of Tokyo, Japan.
Assistant Professor (Coastal Aquaculture; Coastal Ecology and management; Fisheries Biology and Ecology; Molecular Phylogeny)
[Ecology of Aquatic organisms; Restoration of aquatic habitats; Integrated Coastal zone management; Coastal and Inland fisheries; Environmentally low impact aquaculture system]

16.4 Completed Grant and Sponsored Research

Collaboration on Building an Aquaculture Compendium

Project Description: The objectives of the project was to identify existing information in the two countries that fits end-user information needs, gaps in the known knowledge base and fill them by using materials generated by local experts; assess the suitability of the material that had been collected and modified it in response to feedback from end users; Disseminate project outcomes in the Aquaculture compendium.

Duration: 1 November 2003 to 31 July 2005

Investigator: Dr Amaratne Yakupitiyage

Collaborators: University of Stirling, UK
Aquaculture Centre in Asia-Pacific
World Fish Centre
World Aquaculture Society
Nha Trang University, Vietnam

Sponsor: CAB International, UK

Total Contracted Amount: Baht 856,266

Conservation of Giant Black Tiger Shrimp (*Penaeus Monodon*), Genetic Diversity through Cryogenic Preservation of Gametes

Project Description: Tiger shrimp genetic diversity is being lost due to overharvest and the mixing of stocks. This study proposes to cryopreserve gametes for a long-term storage in gene bank for future study, genetic improvement

and for production. Successful outcome benefits the industry, academics, research advances.

Duration: 1 February 2003 to 20 June 2005

Investigator: Dr Amrit Bart

Collaborators: Dr Verapong and Dr Subuntith Nimral, Burapha University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 931,000

Managing Agro-Chemicals in Multi-use Aquatic Systems

Project Description: Impact of land management and pesticide use on the fate and effects within target areas was monitored and compared to monitoring of fate and effect. Effects monitored following the development of low cost, ecologically relevant bioassays with local species, both in lab and in field deployments. Outputs from environmental activities used to prepare local risk assessments, and develop a decision support system to aid management of the ecosystem. A localized DSS established, with local researchers trained in environmental monitoring and risk assessment.

Duration: 1 November 2001 to 31 December 2005

Investigator: Dr Amaratne Yakupitiyage

Collaborators: Dr Harvey Demaine, AIT
University of Stirling, UK

Sponsor: European Commission

Total Contracted Amount: Baht 5,050,195

Managing Pesticides in Vegetable System in Southeast Asia: Combining Environment and Trade

Project Description: The project aims to reduce pesticide use in vegetable farming in Southeast Asia leading to the paired benefits of enhanced export possibilities, reduced health risks for local consumers and reduced environmental emissions. Beneficiaries are small scale vegetable farmers in peri-urban areas and local consumers in Vietnam, Thailand and China.

Duration: 1 November 2003 to 31 October 2005

Investigator: Dr Amaratne Yakupitiyage

Collaborator: University of Stirling, UK
Soil and Fertilizer Institute, China
Hanoi Agricultural University, Vietnam
Agricultural Economics Research Institute, Netherlands

Sponsor: Alterra B V, Netherlands

Sponsor: European Commission

Total Contracted Amount: Baht 2,345,850 (674,305)

Pond Live

Project Description: Impact analysis of aquaculture pond on the livelihoods of Asian farming households and enhance farms nutrient cycling; contribute to policies for enhancing the adoption of new aquaculture technologies that are based on the livelihoods context of farm households identified through participatory approaches and to develop modelling tool for nutrient cycling in pond-dike systems that can be used in technology development and policy making.

Duration: 1 November 2001 to 31 October 2005
Investigator: Dr Amaratne Yakupitiyage
Collaborators: Dr Yang Yi, AIT
 Wageningen University, Netherlands
Sponsor: European Commission
Total Contracted Amount: Baht 4,957,910

Shrimp Research Information Database

Project Description: The project provided and maintained a Thai-English web-enabled database named SHRINFO, dedicated to information on shrimp research conducted at various agencies and universities in Thailand. The database web site also provided general information about shrimp industry in Thailand, government and private agencies working on shrimp and other useful shrimp related links.

Duration: 1 January 2003 to 30 April 2005
Investigator: Dr Yang Yi
Sponsor: National Center for Genetic Engineering and Biotechnology, Thailand
Total Contracted Amount: Baht 374,000

16.5 Ongoing / In Progress Grant and Sponsored Research

Development of Marine and Coastal Resources Database of Thailand

Project Description: The objectives of this project is to support the Thai Department of Marine and Coastal Resources (DMCR) in developing the fundamental of GIS database for key components of marine and coastal resources of Thailand, which would eventually improve coastal resources conservation and management.

Duration: August 2005 to March 2006
Investigators: Dr Kou Ikejima
 Dr Nitin Tripathi
Sponsor: UNEP
Total Contracted Amount: 2,460,000 Baht

Development of release strategies for stock enhancement of the tropical abalone *Haliotis asinina*

Project Description: This research is aimed to determine the optimum abalone size, release season, habitat, and stocking density that would result in high survival, growth and reproduction of the commercially-important gastropod species *Haliotis asinina*. Experimental releases have been conducted in Sagay Marine Reserve in Negros Occidental, Philippines and the released stocks are being monitored to determine the optimum release strategies. This project has been started in October 2003 when the investigator was still working in the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC AQD) in Iloilo, Philippines.

Duration: 1 October 2005 to 31 December 2006
Investigator: Dr Wenresti G Gallardo
Sponsor: International Foundation for Science (IFS, Sweden)

Total Contracted Amount: Baht 239,663 (balance transferred from SEAFDEC AQD to AIT)

Improving Master's Degree level education in Aquaculture and Aquatic Resources Management in Cambodia, Nepal and Vietnam

Project Description: The aim of the project is to introduce innovative approaches to Master's degree level education in aquaculture and aquatic resources management in Cambodia, Nepal and Vietnam to accelerate the contribution of aquaculture to sustainable development. The immediate target groups are university teacher and researchers in four key institutions. Through improvement of access to knowledge and appropriate teaching materials, students and ultimately the millions of farm families deriving at least part of their livelihood from aquaculture will benefit. Activities will consist of inception workshop and curriculum development workshop at the Asian Institute of Technology (AIT). This will be followed by an in-service development phase with extensive support from AIT and European partners leading to integrated packages and a workshop for finalization, dissemination and promotion of materials / modules.

Duration: September 2005 to 31 August 2008
Investigator: Dr Amrit Bart
Collaborators: University of Stirling, UK
 University of Aveiro, Portugal
 Royal University of Agriculture, Cambodia
 Institute of Agriculture & Animal Science, Nepal
 RIA 1, Vietnam
 University of Agriculture & Forestry, HCM, Vietnam
Sponsor: European Union (EU)
Total Contract Amount: 14,425,150 Baht

Post-Tsunami Sustainable Coastal Livelihoods Program

Project Description: As part of the US government response to December 26, 2004 Tsunami disaster to define medium and long term rehabilitation programs. The program will implement a rehabilitation effort in 4 villages along the Andaman coast in the Suk Samran Sub-District of Ranong Province, as models for other communities and nations in the region. The components involved : 1. Facilitate consensus and create a unified vision for action, 2. Rebuild Sustainable livelihood, 3. Infrastructure rehabilitation, 4. Capacity building, 5. Knowledge management and communication. AIT is sub-contracted by the Coastal Resources Center/University of Rhode Island, (CRC/UK) in the program implementation, will also collaborate with the University of Hawaii at Hilo.

Duration: March 2005 to March 2008
Investigator: Dr Amrit Bart
Collaborator: University of Hawaii
Sponsor: USAID
Total Contracted Amount: 12,760,605 Baht

Production in Aquatic Peri-Urban Systems in Southeast Asia

Project Description: The project objective is to provide a detailed, holistic situation analysis of peri-urban aquatic food production at 4 sites in Southeast Asia (Vietnam, Cambodia, Thailand) followed by pilot studies in each that will test improved strategies and monitor impacts on the systems, producers, consumers and institutions involved. Knowledge generated will contribute to a better understanding of the value of Peri-urban Aquatic Food Production Systems to poor communities and permit balanced and rational urban planning and development, whilst enhanced management strategies will safeguard the benefits associated with the systems to stakeholders.

Duration: March 2003 to February 2006
Investigator: Dr Amararatne Yakupitiyage
Collaborators: Durham University, UK
RIA-1 & UAF, Vietnam
RUA, Cambodia
KU, Thailand
Sponsor: European Union (EU)
Total Contracted Amount: 4,720,800 Baht

Regional Studies of Aquaculture Systems and Impacts in South East Asia, and management considerations for non-traditional aquaculture systems in Vietnam

Project Description: To evaluate the regional differences in aquaculture, provide CRSP advice to developing aquaculture programs in other countries, and evaluate environmental impacts of wide spread shrimp culture systems in the region.

Duration: August 2001 to May 2006
Investigators: Dr Yang Yi
Dr Amrit Bart
Sponsor: CRSP
Total Contracted Amount: 25,866,100 Baht

Survey of Tilapia-Shrimp Polycultures in Vietnam and Thailand; Stock Density for Tilapia-Shrimp Polyculture in Thailand

Project Description: The objective is to document the existing tilapia-shrimp polyculture in Thailand and the apparent lack in Vietnam, determine the extent of current and potential applications and determine which techniques are most successful at this point. Producers in Vietnam and Thailand are desperate to supply the EU market, which require strict environmentally sensitive culture techniques be used. An important question will be why the Viet farmers have not adopted the polyculture. Another objective is to determine optimal conditions for stocking and rearing tilapia and shrimp in a polyculture system. At AIT, relatively extensive techniques will be tested. Most applicable to small farmers or community ponds with minimal inputs. Replicate to model conditions of areas impacted by salinization.

Duration: January 2002 to May 2006
Investigator: Dr Yang Yi

Sponsor: CRSP
Total Contracted Amount: 575,288 Baht

16.6 Publications

Refereed Journals

Chuanduangpui, P and Ikejima, K (2005), Evaluation of water requirement for, and enhancement of management of, a seawater irrigation system in Thailand, *Aquaculture Research* 36:725-729

Giap, D H, Yakupitiyage, A, Yi, Y, Demaine, H (2005), Socio-economic survey of shrimp farming in Haiphong of Vietnam, *Aquaculture Economics and Management* (In peer review process)

Giap, D H, Yi, Yang and Yakupitiyage, A (2005), GIS for land evaluation for shrimp farming in Haiphong of Vietnam, *Ocean & Coastal Management*, 48:51-63.

Giap, D H, Yi, Yang and Lin, C K (2005), Effects of different fertilization and feeding regimes on the production of integrated farming of rice and prawn *Macrobrachium rosenbergii* (De Man), *Aquaculture Research*, 36:292-299.

Giap, D H, Yi, Y, Yakupitiyage, A (2005), GIS for land evaluation for shrimp farming in Haiphong of Vietnam, *Ocean & Coastal Management*, 48, 51-63.

Hai, Tran Ngoc and Yakupitiyage, A (2005), The effects of the decomposition of mangrove leaf litter on water quality, growth and survival of black tiger shrimp (*Penaeus monodon* Fabricius, 1798), *Aquaculture* 250 (2005): 700 - 712

Holmer, M, Pedersen, O and Ikejima, K, Sulfur cycling and sulfide intrusion in mixed SE-Asian tropical seagrass meadows, *Botanica Marina*, in press

- Ikejima, K, Ronquillo, J D, Corre, J R V L, Dureza, V A, Fish assemblages in abandoned ponds and waterways surrounding brackish water aquaculture ponds in Panay Island, the Philippines, *Asian Fisheries Science*, submitted.
- Koeypudsa, W, Yakupitiyage, A, and Tangtrongpiros, J (2005), The fate of chlortetracycline residues in a simulated chicken-fish integrated farming systems, *Aquaculture Research*, 36: 570 – 577.
- Luong, V C, Yi, Yang, and Lin, C K (2005), Cove culture of marble goby (*Oxyeleotris marmorata* Bleeker) and carps in Tri An Reservoir of Vietnam, *Aquaculture*, 244:97-107.
- Pechsiri, J and Yakupitiyage, A (2005), A comparative study of growth and feed utilization efficiency of sex reversed diploid and triploid Nile tilapia, *Oreochromis niloticus* L, *Aquaculture Research*, 36: 45 – 51
- Pedersen, O, Andersen, T, Ikejima, K, Hossain, M Z and Andersen, F Ø, A multidisciplinary approach to understand recent and historical occurrence of *Littorella uniflora*, *Freshwater Biology*, submitted
- Rahman, Md Mizanur, Yakupitiyage, A and Ranamukhaarachchi, S L (2005), Fertilizer requirements of morning glory for its better production in the Asian region, Submitted for possible publication in the *Asia Pacific Journal of Rural Development*, In press
- Son, V N, Yi, Yang and Phuong, N T (2005), River pen culture of giant freshwater prawn *Macrobrachium rosenbergii* (De Man) in southern Vietnam, *Aquaculture Research*, 36: 284-291.
- Conference Proceedings**
- Ikejima, K, Wada, M, Yamamoto, T, Furubayashi, C, Azuma, N, Seasonal change of the light organ size in *Leiognathus rivulatus*: does the light have an ecological function in reproduction?, *7th Indo Pacific Fish Conference*, May 16-20, Taipei, Taiwan
- Kimura, R, Kimura, S, Ikejima, K, Taxonomic review of *Leiognathus gerreoides* complex (Leiognathidae), in Abstracts of the *38th Annual Meeting of the Ichthyological Society of Japan 2005*, 22-25 September, Tohoku University, Sendai, Japan.
- Rahman, Md Mizanur, Yakupitiyage, A and Ranamukhaarachchi, S L (2005), Agricultural value of tilapia pond sediment in terms of phosphorus fertilization and soil conditioner, Accepted for oral presentation in the *World Aquaculture Society Conference*, Bali, Indonesia, May 9-13, 2005.
- Wada, M, Kamiya, A, Kita-Tsukamoto, K, Ikejima, K, Nishida, M and Kogure, K (2005), RFLP analysis of the *luxA* genes of *Photobacterium leiognathi* isolates derived from the symbiotic light organ of Leiognathid fish, *Leiognathus rivulatus*, In: Tsuji, A, Matsumoto, M, Maeda, M, Kricka, L J, Stanley, P E (eds) *Bioluminescence and Chemiluminescence*, World Scientific Publishers, Singapore, pp103-106
- Other Publications**
- Ikejima Kou (2005), Introduction to education and research activities of fisheries science in Asian Institute of Technology, *Nippon Suisan Gakkaishi (Bulletin of the Japanese Society of Fisheries Science)* (in press, in Japanese).

16.7 Doctoral Students' Dissertation

Analysis of Sustainability of the Shrimp Farming Systems in Haiphong of Vietnam

by Dao Huy Giap

Supervisor: Dr Amaratne Yakupitiyage

Effects of Fish Ladder on Migratory Fish Species and Fisheries in Pak Mun Dam

by Pradit Sripraprasite

Supervisor: Dr Amaratne Yakupitiyage

Effects of Mangrove Leaf Litters on the Integrated Mangrove-Shrimp Farming Systems in Ca Mau Province, Vietnam

by Tran Ngoc Hai

Supervisor: Dr Amaratne Yakupitiyage

Growth and Energetic Efficiency of Diploid and Triploid Nile Tilapia (*Oreochromis niloticus* L.)

by Jamjun Pechsiri

Supervisor: Dr Amaratne Yakupitiyage

The Impact of Chlortetracycline Residue from Fresh Chicken Manure of Pond Ecosystem

by Weena Koeypudsa

*Supervisors: Dr Amaratne Yakupitiyage
Prof C Kwei-Lin*

16.8 Masters Students' Theses and Research Studies

Application of Integrated Coastal Management (ICM) Tools on Marina Development in Krabi Province, Thailand

by Jhozine Pachica Damaso

Supervisor: Dr Nitin K Tripathi

Application of Participatory Tools for the Analysis of Coastal Fisheries in the Moheshkhali Island, Bangladesh

by Mohammed Ashraf Azam Khan

Supervisor: Dr Amaratne Yakupitiyage

Comparison of Fish Communities between Natural and Reforested Mangrove Habitats in Cogtong Bay, Bohol, Philippines

by Bernice Buot Polohan

Supervisor: Dr Kou Ikejima

Cryopreservation of Silver Barb, *Barbodes gonionotus* Sperm Using Different Extracellular Cryoprotectants

by Naw Deborah

Supervisor: Dr Amrit N Bart

Difference in Willingness to Pay for Mangrove Conservation: A Case Study of Two Management Systems in Thailand

by Surakit Nakkaew

*Supervisors: Dr Kou Ikejima
Dr Ganesh P Shivakoti*

Fisheries in Pak Phanang Mangroves, Thailand: Species Composition, Abundance and Economic Values

by Md Sherazul Islam

Supervisor: Dr Kou Ikejima

Gender Relations and Alternative Livelihood Strategies: Effects of a Ban on Shrimp Fry Collection in the Southwest Coastal Region of Bangladesh

by Ratna Rani Sikder

*Supervisors: Dr Kyoko Kusakabe
Dr Somsak Boromthanasat*

Impacts of Aqua Outreach Project on Rural Household Livelihoods in Takeo Province, Cambodia

by Proum Kimhor

Supervisor: Dr Amaratne Yakupitiyage

Optimization of a Nitrogen Fertilization Regime in Fertilized Nile Tilapia (*Oreochromis niloticus*) Ponds with Supplemental Feed

by Luu Thi Thanh Truc

Supervisor: Dr Yang Yi

Socio-economic Analysis of a Small-Scale Coastal Fishery Toward Coastal Fishery Management: A Case Study in Chumphon Province, Thailand

by Rattanaporn Anantasuk

*Supervisors: Dr Ganesh P Shivakoti
Dr Kou Ikejima*

Socio-Economic and Ecological Considerations in the Management of Coastal Resources of Saint Martin Island, Bangladesh

by Mohd Abdur Rashid

Supervisor: Prof A T M Nurul Amin

The Roles of Tambon Administrative Organization (TAO) in Coastal Fishery Resource Management

by Narumol Thapthim

Supervisor: Dr Ganesh P Shivakoti

Ultrasonic Mediated Androgen Immersion Protocols to Masculinize Nile Tilapia (*Oreochromis niloticus*.L)

by Sarulatha Ramachandran

Supervisor: Dr Amrit Bart

**Using Reefcheck Monitoring Database to
Develop the Coral Reef Index of Biological
Integrity**

by Nguyen Thi Hai Yen
Supervisor: Dr Kou Ikejima

**Research Study: The Potential for
Development of Integrated Aquaculture
Systems in Luangprabang Province, Lao PDR**

by Oulaytham Lasasima
Supervisor: Dr Amaratne Yakupitiyage

Chapter 17: SERD – ENERGY FIELD OF STUDY

17.1 Introduction

The **Energy Field of Study** carries out teaching, research and outreach activities addressing issues related to the efficient use and management of energy and power systems, development and implementation of renewable energy resource based systems, formulation and analysis of policies/plans to manage energy and power systems in the deregulated market environment, analysis of energy policy options for sustainable development, and energy environment and climate change matters.

Electric Power System Management covers the emerging issues of evolving electric utility business environment, with its changing levels of uncertainty, regulation and competition.

Energy Economics and Planning looks at the fundamental techniques in energy planning at the national and sectoral (both resource wise and economic activity wise) levels, economic appraisal of energy project, energy and environmental policy analysis, electricity economics, oil and natural gas economics, coal economics and environmental considerations in energy planning. **Energy Technology** addresses topics related to renewable sources of energy and their technologies, rational use of energy, daylighting and cleaner production.

Gas-Fired Power Plant Technology (GFPT) aims to prepare graduates with knowledge and skill in operational management of modern gas-fired power plants. This area of specialization covers the technical aspects in designing, operation and maintenance, instrumentation and control of modern gas-fired power plants.

17.2 Research Facilities and Laboratories

Energy Laboratory serves as a facility for course experiments, research, testing and hands-on training in the Energy Field of Study. Laboratory functions are focused mainly on solar thermal energy, photovoltaics, biomass

energy, energy management, thermodynamics and heat transfer, and electrical measurement and analysis. The laboratory facilities include two indoor laboratories, an energy park and a meteorological station. The indoor laboratories are equipped with experiment setups, testing apparatus and measuring equipment for thermal and electrical management studies, thermodynamics, fluid mechanics and heat transfer, and electrical power supply management. Energy Park covers 3980-m² outdoor research and demonstration facility equipped with photovoltaic systems, solar thermal (air and water) systems, biomass research and daylighting setups. The meteorological station measures and records different solar radiation and other meteorological data. Energy laboratory continues to carry out testing services such as fuel quality tests, gas composition tests, tests for heating value of fuels, solar thermal collector performance tests, solar water heater system performance tests and stove efficiency tests.

Among its major equipment include a Gas Analyzer; Campbell data logger; Ultrasonic flow-meter; Bomb colorimeter; and a Gas chromatography.

The SERD Computer Lab IV in the Energy Building has a large number of computer modeling software for energy planning and policy analysis. These include Model for Analysis of Energy Demand and Environmental Impacts (MAED, MEDEE-S/ENV, LEAP), Electricity System Planning (WASP-III Plus, ENPEP, DECPAC), Energy-Environmental Flow Optimization Model (EFOM-ENV), Wood Energy Planning Models, Energy-Environmental Models for estimation of impacts of energy externalities, air pollution emission and dispersion and climate change (CO₂ DB, RAINS, TEMIC, ECOSSENS, ISC) and Energy-Environmental Database Management Software (DBA-VOID). An energy-environment database for Asia is maintained in this computer lab. About 20 high-end PCs connected to the campus-wide Ethernet and ATM network and a high

quality laser printer, scanning and CD writing facilities are available for students' uses.

17.3 Faculty and Research Staff

Full-time Faculty

SURAPONG CHIRARATTANANON, BEng, Univ of New South Wales; MEng, Monash Univ; PhD, Univ of Newcastle, Australia.

Professor (*Electrical Energy Management; Energy Conservation in Buildings*)

[Energy Conservation in Buildings; Efficient Lighting and Daylighting; Electrical Energy Management]

SIVANAPPAN KUMAR, BE, Univ of Madras, India; MEng, AIT, Thailand; PhD, Inst Natl Polytechnique, Toulouse, France.

Professor (*Cleaner Production; Rational Use of Energy; Solar Energy*)

[Solar Energy (Radiation, Thermal and Photovoltaics); Cleaner Production; Heat Pumps]

RAM M SHRESTHA, BE, Univ of Baroda; BLL, Tribhuvan Univ, Nepal; MEng, DEng, AIT, Thailand.

Professor (*Energy and Environmental Policy; Energy Economics*)

[Energy and Environmental Policy; Electricity Economics and Planning; Energy, Economic and Environmental Modelling; Environmental and Pricing Implications of Privatization in Power Sector]

WEERAKORN ONGSAKUL, BEng, Chulalongkorn Univ, Thailand; MS, PhD, Texas A&M Univ, USA.

Associate Professor (*Artificial Intelligence Applications to Power Systems; Parallel Processing*)

Applications: Power System Operation & Control; Power System Restructuring)

ANIMESH DUTTA, PhD, Dalhousie University, Canada; MEng, Asian Institute of Technology, Thailand; BSc(Eng), Bangladesh University of Engineering and Technology, Bangladesh.

Assistant Professor (*Biomass Energy Boiler Design; Emission Control*)

Technologies; Heat Transfer; Thermo/Fluids)

[Clean energy technology; Energy conservation, Gasification/combined cycle power generation, CO₂ management, Heat transfer augmentation and energy management]

MITHULANANTHAN NADARAJAH, BScEng, MEng, Univ of Peradeniya, Sri Lanka; PhD, Univ of Waterloo, Canada.

Assistant Professor (*Application of FACTS controllers; Controller Interactions; Power System Oscillation; Voltage Stability*)

17.4 Completed Grant and Sponsored Research

Application of FACTS Controllers in Thailand Power Systems

Duration: 1 May 2003 to 30 June 2005

Investigator: Dr N Mithulanathan

Collaborators: Dr P Sothdthipong, Chulalongkorn University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 900,000

Biomass Energy in Asia: Assessment and Strategy Formulation

Project Description: For biomass energy to play a critical role for greenhouse gas emission mitigation and for enhancing sustainability of energy supply, it would be necessary to harness the potential of biomass resources through deployment of modern and emerging biomass energy technologies. The project identified three most promising BETs to be deployed in the selected countries, i.e. China, India, Philippines, Sri Lanka and Thailand, and developed country specific strategies for removing barriers associated with the deployment of the BETs. The issues related to the biomass energy technology transfer also studied and policy measures to overcome these issues were suggested.

Duration: 1 January 2002 to 31 December 2005

Investigator: Prof S C Bhattacharya

Collaborators: Prof Sivanappan Kumar, AIT

Prof Ram M Shrestha, AIT
Indian Institute of Science, India
Department of Alternative Energy
Development, Thailand

Center for Renewable Energy Development,
China

University of Moratuwa, Sri Lanka
University of the Philippines Los Banos
Foundation, Inc., Philippines

Sponsor: Sida

Total Contracted Amount: Baht 9,649,393 (9,490,434)

Building Energy Management Project

Duration: 1 January 2005 to 31 December 2005
Investigator: Prof Surapong Chirattananon
Sponsor: National Energy Conservation Promotion Fund, Thailand

Total Contracted Amount: Baht 1,902,000

Capacity Development for the CDM - A Guide Book to Develop Baseline for Projects

Project Description: Clean Development Mechanism (CDM) is one of the key instruments to limiting greenhouse gas (GHG) emissions and promoting sustainable development. It is important to establish increased awareness and understanding of its various aspects. Building capacities in the baseline methodology and assessment of GHG emission reductions/sequestration benefits of CDM projects are keys to the successful development and implementation of CDM. This project was aimed to develop a guidebook to address these important issues and thus assist project developers in establishing baselines for CDM projects following guidelines based on relevant decisions of Conference of Parties (COP) and CDM Executive Board (CDM-EB).

Duration: 1 December 2003 to 30 June 2005

Investigator: Prof Ram Shrestha

Collaborators: Prof S C Bhattacharya, AIT
 Prof Sivanappan Kumar, AIT

Sponsor: UNEP Risoe Center, Denmark

Total Contracted Amount: Baht 795,400

Development of Concept and Method for Energy Service Operation

Duration: 3 February 1997 to 31 December 2005
Investigator: Prof Surapong Chirattananon
Sponsor: Electricity Generating Authority of Thailand
Total Contracted Amount: Baht 500,000

Dissemination and Policy Dialogue for GNESD

Project Description: The project aims at stimulating policy dialogue across regional/national stakeholders working on energy and development issues and effectively conducting knowledge networking and outreach activities in Asian countries.

Duration: 20 January 2004 to 31 August 2005

Investigator: Prof Ram Shrestha

Collaborator: Prof Sivanappan Kumar, AIT
Sponsor: Global Network on Energy for Sustainable Development (GNESD)

Total Contracted Amount: Baht 390,000

Energy Access II Theme Project

Project Description: The second phase of the energy access project built on the work carried out in the framework of the original energy access working group. This project aimed at compiling and collating data on energy access in selected countries and preparing an article for the international conference on renewable energies held in Bonn, Germany in June 2004.

Duration: 20 January 2004 to 31 August 2005

Investigator: Prof Ram Shrestha

Collaborator: Prof Sivanappan Kumar, AIT

Sponsor: Global Network on Energy for Sustainable Development (GNESD)

Total Contracted Amount: Baht 585,000 (602,913)

Energy and Environment Innovation Strategies and Database

Project Description: The objective of this project was to establish a database that would facilitate analysis of innovative counter measures (such as technological, institution, management etc.) through a modeling framework. The data on energy consumption by fuel and by sector, related economic environmental data were collected.

Duration: 25 February 2004 to 30 June 2005

Investigator: Prof Ram Shrestha

Sponsor: Fuji Research Institute Corporation, Japan

Total Contracted Amount: Baht 1,800,000

Energy and Environment Strategies and Database

Project Description: The objective of this project was to estimate future energy consumption, greenhouse gases and other local air pollutants emission in selected Asian countries through a modeling framework. The research study under this project assessed the potential of different counter-measures against the global warming, air pollution and other environmental problems.

Duration: 10 June 2004 to 10 June 2005

Investigator: Prof Ram Shrestha

Sponsor: Fuji Research Institute Corporation, Japan

Total Contracted Amount: Baht 1,700,000

Energy and Poverty: Knowledge and Analytical Support

Project Description: The project aimed at providing technical support to UNDP Sustainable Energy team in the field of productive uses of renewable energy. In this framework, a research on use of renewable energy technologies (RETs) in small, medium and micro enterprises in developing countries was carried out. This led to the preparation of a key note paper for a UNDP expert meeting on Productive Uses of Renewable Energy held in Bangkok in May 2005. AIT also provided technical assistance to UNDP for the organization of the three day meeting.

Duration: 30 November 2004 to 31 July 2005

Investigator: Prof Ram Shrestha

Sponsor: UNDP

Total Contracted Amount: Baht 1,000,025

Feasibility Study for A Rice Husk-Fired Cogeneration Project for Angkor Bio Cogen (Cambodia)

Project Description: The project determines the feasibility to implement a 1.5 MV cogeneration project utilizing rice husks as the primary fuel. The study also addresses the financial issues that will support the investment decision, engineering design and as information for loan application of the project.

Duration: 1 September 2004 to 31 December 2005
Investigator: Prof S C Bhattacharya
Collaborator: Mr Remigio Henson, AIT
Sponsor: Angkor Kasemkam Roongroueng Co., Ltd., Cambodia
Total Contracted Amount: Baht 1,029,500

Regional Programme III Coordination

Duration: 1 January 2002 to 31 December 2005
Investigator: Prof Sivannapan Kumar
Collaborator: Prof S C Bhattacharya, AIT
Sponsor: SIDA
Total Contracted Amount: Baht 18,236,972

Renewable Energy Technologies in Asia: Phase III

Project Description: Renewable Energy Technologies (RETs) have high potential in supplying basic energy services to the rural areas of Asian developing countries. However, there are barriers that hinder the widespread promotion of RETs in these countries. Major barriers are high initial cost of systems, lack of awareness, and insufficient capacity/expertise on the technology. This project was aimed to address these issues through carrying out adaptive research, dissemination and capacity building. This project involved thirteen National Research Institutes (NRIs) from six Asian countries: Bangladesh, Cambodia, Lao PDR, Nepal, Philippines and Vietnam. Three technologies/applications were identified for research, promotion and dissemination: solar photovoltaics, renewable energy based drying and biomass briquetting/briquette-fired stoves.

Duration: 1 January 2002 to 31 August 2005

Investigators: Prof S C Bhattacharya
Prof Sivanappan Kumar

Collaborators: Science, Technology & Environmental Agency, Lao PDR
Research Centre for Applied Science & Technology, Nepal
Tribhuvan University, Nepal
Royal Nepalese Academy of Science & Technology, Nepal
Center for Renewable Energy, Nepal
Institute of Energy, Vietnam
Solar Laboratory, Institute of Physics, Vietnam
Institute de Technologie du Cambodge, Cambodia
Ministry of Industry Mines and Energy, Cambodia
Grameen Shakti, Bangladesh
Centre for Mass Education in Science, Bangladesh
Khulna University of Engineering and Technology, Bangladesh
University of the Philippines Los Banos Foundation, Inc. / University of the Philippines Engineering & Research Development Foundation, Inc., Philippines
University of the Philippines, Diliman, Philippines

Sponsor: Sida

Total Contracted Amount: Baht 38,700,000

Renewable Energy Technologies, RETs Theme Project

Project Description: RETs theme project was the second thematic issue undertaken by GNESD centres of excellence. This project aimed at identifying the role RETs can play for poverty alleviation in Developing countries. AIT focused its work on productive uses of renewable energy in rural Thailand. It identified some promising applications of RETs for income generating activities as well as the potential for these technologies. It also presented the current policy framework for RETs and highlighted the available technical capacity for these technologies. Based on this initial assessment, AIT identified the main barriers to RETs development in Thailand and suggested some policy options to overcome them.

Duration: 20 January 2004 to 31 August 2005

Investigator: Prof Ram Shrestha

Collaborator: Prof Sivanappan Kumar, AIT

Sponsor: Global Network on Energy for Sustainable Development (GNESD)

Total Contracted Amount: Baht 975,000

Research on Innovative and Strategic Policy Options (RISPO) - Phase 3

Project Description: In this third phase, AIT will provide final inputs as appropriate to IGES on the overall research framework, the specific products of the research project and any other documents. The research products are the strategic policy options, background papers, good practices, and scenario analysis. AIT will organise an interactive workshop at national level to refine strategic policy options and background papers, as necessary. The final results and research products will be prepared taking into account the comments made at the 3rd RISPO Plenary Workshop.

Duration: 1 October 2004 to 31 March 2005

Investigator: Prof Sivanappan Kumar

Collaborator: Prof Ram Shrestha, AIT

Sponsor: Institute for Global Environmental Strategies, Japan

Total Contracted Amount: Baht 277,908

Rural Electrification Decentralized Energy Options

Project Description: The objective of the project is to develop for the ASEAN Region, a policy framework integrated with social and rural developmental perspectives for providing a least cost, financially and environmental sustainable electricity service for electrification of rural areas beyond the reach of the conventional grid, through the integration of decentralized (renewable) energy options.

Duration: 1 June 2003 to 01 July 2005

Investigator: Prof Sivanappan Kumar

Collaborators: Prof Ram Shrestha, AIT

Dr N Mithulananthan, AIT
Innovation Energy Development, France
CENERG, Ecole de Mines de Paris, France
Asian Center of Energy, Indonesia

Total Contracted Amount: Baht 2,902,250

Small and Medium Industries in Asia: Energy Environment and Climate Interrelationships

Duration: 1 January 2002 to 31 December 2005

Investigator: Prof Sivanappan Kumar

Collaborators: Indian Institute of Science, India
Department of Alternative Energy Development, Thailand
Center for Renewable Energy Development, China
University of Moratuwa, Sri Lanka
University of the Philippines Los Banos Foundation, Inc., Philippines

Sponsor: Sida

Total Contracted Amount: Baht 9,649,393

Small and Medium Industries in Asia: Energy Environment and Climate Interrelationships

Duration: 1 January 2002 to 31 December 2005

Investigator: Prof Sivannapan Kumar

Collaborator: Prof C Visvanathan, AIT

Sponsor: SIDA

Total Contracted Amount: Baht 10,174,913

Strategies for Promotion of Energy Efficient and Cleaner Technologies in the Power Sector

Project Description: The power sector is the largest contributor of CO₂ emissions in most of the developing countries in Asia. Total emissions from greenhouse gases (GHG) including CO₂ from the power sector are expected to rise in future unless corrective measures are undertaken. This project, under the framework of The Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC - Phase III) funded by Swedish International Development Cooperation Agency (Sida) and coordinated by Asian Institute of Technology (AIT), aimed to enhance capacity and preparedness on identification and assessment of technical and policy options for mitigating the environmental emissions produced in the power production process in selected Asian developing countries: China, India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam. The project comprised of two parallel studies: One analysed the implications of carbon and energy taxes as instruments to reduce GHG emission reduction while the other identified the barriers to the adoption of selected clean and energy efficient technologies and identified the measures to overcome the barriers.

Duration: 1 January 2002 to 31 December 2005

Investigator: Prof Ram Shrestha

Collaborator: Prof S C Bhattacharya, AIT

Sponsor: Sida

Total Contracted Amount: Baht 9,422,065

Strategies for Promotion of Energy Efficient and Cleaner Technologies in the Urban Transport Project

Project Description: Among the various environmental problems, air pollution is reported to cause the greatest damage to health and loss of welfare in Asian Countries. The air pollution

problem is expected to worsen over the coming years if no action is undertaken to improve the situation. This project was conducted under the Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC - Phase III) funded by Swedish International Development Cooperation Agency (Sida) and coordinated by Asian Institute of Technology (AIT). This phase of the project was comprised of two parallel studies. One study analysed potential policies and alternative measures to remove barriers to the implementation of energy efficient and cleaner technologies to mitigate urban transportation emissions. The other study analysed the impacts of these technologies on urban air quality and on human health. The cities considered in this study were: Beijing and Hangzhou (China), Delhi and Mumbai (India), Bandung and Jakarta (Indonesia), Manila in the Philippines and Ho Chi Minh City (HCMC) in Vietnam. These cities represent a wide range of variation in the urban characteristics related to transport such as, population, vehicle stock, travel demand, energy demand, and emissions levels.

Duration: 1 January 2002 to 31 December 2005

Investigator: Prof Ram Shrestha

Collaborators: Prof Nazrul Islam, AIT

Dr N T Kim Oanh, AIT

Prof S C Bhattacharya, AIT

Sponsor: Sida

Total Contracted Amount: Baht 11,531,541

Thailand Building Chiller Replacement Project

Duration: 1 June 2002 to 30 June 2005

Investigator: Mr Remigio Henson

Sponsor: World Bank / Industrial Finance Corporation of Thailand

Total Contracted Amount: Baht 1,250,000

17.5 Publications

Refereed Journals

Abdul Salam, P, Bhattacharya, S C, A

comparative hydrodynamic study of two type of spouted bed reactor designs, *Chemical Engineering Science* 61 (2006) 1946-1957 December (2005).

Arthit, Sode-Yome and Mithulanathan, N,

Maximizing Static Voltage Stability Margin in Power Systems using a New Generation Pattern, *Australian Journal of Electrical and Electronic Engineering*, ISSN: 1448-83-7-x, Vol.2, No. 3, page 255-261, (2005).

Do Nam, Trung and Kumar, S, Resource use and waste generation in the Vietnam hotel industry, *Journal of Cleaner Production*, Vol.13, pp 109-106, (2005).

Dutta, A and Basu, P, Experimental investigation into Cavity-type Inertial Separator; A novel Technique for Development of Sub-compact Circulating Fluidized Bed Boilers *International Journal of Energy Research*, accepted for publication on January (2005).

Janarthanan, B, Chandrasekaran, J and Kumar, S, Evaporative heat loss and heat transfer for open-and closed-cycle systems of a floating tilted wick solar still, accepted for publication, *Desalination*, pp.1-15, January (2005).

Janarthanan, B, Chandrasekaran, J and Kumar, S, Monthly Mean Daily Utilizability of South India, *International Energy Journal*, Vol. 5, No. 1, pp. 33-40, June (2005).

Naresh, Acharya, Pukar, Mahat and Mithulananthan, N, An Analytical approach for DG Allocation in Primary Distribution Network, *International Journal of Electrical Power and Energy Systems*, Elsevier, accepted December 15, (2005).

Sat, Samy, Kumar, S, Anisuzzaman, M and Bhattacharya, S C, A solar start PV in Cambodia, *Renewable Energy World*, Vol.8, No. 2, pp.82-87, March – April (2005).

Refereed Books/Chapters

Kumar, S, Visvanathan, C, Peng, Sizhen, Rudramoorthy, R, Herrera, A B, Senanayake, G and Son, L D, Barriers to Promoting Energy Efficient and Environmentally Sound Technologies to SMEs in Asia, Asian Institute of Technology (2005).

Kumar, S, Visvanathan, C, Sizhen, Peng, Rudramoorthy, R, Herrera, Alice B, Senanayake, Gamini and Son, Ly Dinh, Greenhouse Gas Mitigation in Small

and Medium Scale Industries of Asia, ISBN: 974 8208 59 1, (2005).

Shrestha, Ram M, Sharma, Sudhir, Timilsina, Govinda R, Kumar, S, Baseline Methodologies for Clean Development Mechanism Projects, UNEP Riso Center Denmark. November, (2005).

Conference Proceedings

Arthit, Sode-Yome and Mithulananthan, N, Generation Directions Based on Optimization Techniques for Power System Static Voltage Stability, *Australasian Universities Power Engineering Conference (AUPEC)*, 25-28 September, Hobart, Tasmania, Australia. (2005)

Arthit, Sode-Yome, Mithulananthan, N and Lee Kwang, Y, Static Voltage Stability Margin Enhancement using STATCOM, TCSC and SSSC, *IEEE/PES T&D, Asian Pacific, Dalian, China August 14-18, (2005)*.

Arthit, Sode-Yome, Mithulananthan, N and Lee Kwang, Y, Effect of Realistic Load Direction in Static Voltage Study, *IEEE/PES T&D 2005, Asian Pacific, Dalian, China August 14-18, (2005)*.

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches a comparative study in Asia, *ARRPEEC, AIT, Bangkok, Thailand, ISBN: 974-8257-09-6, (2005)*.

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches, India, *ARRPEEC, AIT, Bangkok, Thailand, ISBN: 974-8257-02-9, (2005)*.

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches, Indonesia, *ARRPEEC, AIT,*

Bangkok, Thailand, ISBN: 974-8257-03-7, (2005).

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches Sri Lanka, *ARRPEEC*, AIT, Bangkok, Thailand, ISBN: 974-8257-05-3, (2005).

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches Thailand, *ARRPEEC*, AIT, Bangkok, Thailand, ISBN: 974-8257-06-1, (2005).

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches Vietnam, *ARRPEEC*, AIT, Bangkok, Thailand, ISBN: 974-8257-08-8, (2005).

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches Philippines, *ARRPEEC*, AIT, Bangkok, Thailand, ISBN: 974-8257-04-5, (2005).

Bhattacharya, S C, Kumar, S, Shrestha, Ram M and Abdul Salam, P, Technologies for Mitigation of Greenhouse Gas Emissions: Barriers and Promotional Approaches China, *ARRPEEC*, AIT, Bangkok, Thailand, ISBN: 974-8257-00-2, (2005).

Bhattacharya, S C, Kumar, S, Ali Moral Nawsher, M D, Shakya, Gyani Ratna and Toan, Pham Khanh, Technology Packages: Screw-press briquetting machines and briquette-fired stove, *Regional Energy Resources Information center*, ISBN: 974-8202-976, (2005).

Boonchiam, P, Mithulananthan, N and Arthit, Sode-Yome, Introduction to Custom Power: Concepts and Definitions, *The joint seminar on advances in engineering between Thai and*

Japanese Universities 6-7 December, Kao Yai, Thailand, pp.8 (2005).

Kumar, S and Bhattacharya, S C, Renewable Energy Development in South and Southeast Asia through a Regional Research and Dissemination Programme, *World Renewable Energy Regional Conference*, Jakarta, Indonesia 18-21 April (2005).

Kumar, S, Bhattacharya, S C, Elepano, Arnold R, Del Mundo, Rowaldo R, Mohan, Bikram Gewali, and Phoeung, Sackona, Technology Packages: Solar, Biomass and Hybrid Dryers, *Renewable energy technology in Asia: A Regional Research and Dissemination program*, ISBN: 974-8202-968, (2005).

Kumar, S, Anisuzzaman, M and Bhattacharya, S C, Lessons Learned from Monitoring and Evaluation of PV Systems in Asia, *World Renewable Energy Regional Conference*, Jakarta, Indonesia, 18-21 April (2005)

Kumar, S, Barua Dipal, C, Dung Trinh, Q, Ibrahim, Muhammad, Samy, Sat, Sayalath, Phouvong and Sharma, Dinesh, Demonstration and Monitoring of PV Systems: LESSONS LEARNED, *A Renewable Energy Technologies in Asia: A Regional Research and Dissemination program*, ISBN: 974-8208-62-1, (2005).

Kumar, S, Barua Dipal, C, Dung Trinh, Q, Ibrahim, Muhammad, Samy, Sat, Sayalath, Phouvong and Sharma, Dinesh, PV System components: TECHNOLOGY FACT SHEETS, *Renewable energy technology in Asia: A Regional Research and Dissemination program*, ISBN: 974-8208-64-8, (2005).

Kumar, S, Bhattacharya, S C, Barua Dipal, C, Dung Trinh, Q, Elepano, Arnold R, Gewali Mohan, B, Ibrahim, Muhammad, Ali Moral Nawsher, M D, Sharma, Dinesh, Toan Pham, K, PV System components: TECHNOLOGY FACT SHEETS, *Renewable energy technology in Asia: A Regional*

Research and Dissemination program, ISBN: 974-8208-64-8, (2005).

Kumar, S, Barua Dipal, C, Dung Trinh, Q, Ibrahim, Muhammad, Samy, Sat, Sayalath, Phouvong and Sharma, Dinesh, Technology Packages: Low-cost PV system components, *Renewable energy technology in Asia: A Regional Research and Dissemination program*, ISBN: 974-8202-984, (2005).

Naresh, Acharya, Arthit, Sode-Yome and Mithulananthan, N, Facts about Flexible AC Transmission Systems (FACTS) Controllers: Practical Installations and Benefits, *Australasian Universities Power Engineering Conference (AUPEC)*, Hobart, Tasmania, Australia. 25-28 September, (2005).

Shrestha, R M, Kumar, S and Martin, S, Proceedings of the *Asian Regional Workshop on Electricity and Development*, 28-29 April 2005, AIT/GNESD, Thailand, ISBN: 974-93753-6-X, (2005).

Visvanathan, C, Kumar, S and Rudramoorthy, R, SMI Cluster Action Plan: A Holistic Approach Towards Sustainable Development, *International Conference on Environmental Management of Urban and Industrial Infrastructure in Asia*, Ho Chi Minh City, 11-12 November, (2005).

17.6 Doctoral Students' Dissertation

A Comparative Study of Hydrodynamics and Gasification Performance of Two Types Spouted Bed Reactor Designs
by Pakkeerthamby Abdul-Salam
Supervisors: Prof Sivanappan Kumar
Prof Sribas C Bhattacharya

Influence of FACTS Controllers, Generation and Load Directions on Static Voltage Stability Margin
by Arthit Sode-Yome
Supervisor: Dr Mithulananthan Nadarajah

Radiant Cooling for Thermal Comfort in Tropical Climate

by Prapapong Vangtook
Supervisor: Prof Surapong Chirarattananon

17.7 Masters Students' Theses and Research Studies

Application of FACTS Devices for Congestion Management in the Deregulated Electricity Market

by Naresh Acharya
Supervisor: Dr Mithulananthan Nadarajah

A Renewable Energy Based Water Purification System

by Prakash Das
Supervisor: Prof Sivanappan Kumar

Assessment Renewable Energy Hybrid System for Decentralized Rural Electrification Using GIS

by Tania P Urmee
Supervisor: Prof Sivanappan Kumar

Assessment of Renewable Energy Resources and Its Application in the Kingdom of Bhutan

by Norbu Tshering
Supervisor: Prof Sivanappan Kumar

A Study on Ceria Coating Effect on the MCFC Anode's Wettability and H₂S Tolerance

by Hary Devianto
Supervisors: Prof Tae-Hoon Lim
Prof Sivanappan Kumar

Cleaner Production in the Seafood Processing Industry: A Case Study in Vietnam

by Nguyen Thi My Trang
Supervisor: Prof Sivanappan Kumar

Energy-Environmental Analysis of Alternative Transport Scenarios: The Case of the Greater Bangkok Region

by Damrongsak Rinchumpoo
Supervisor: Prof Ram M Shrestha

Development of a Rating Scheme for Energy - Star House

by Yosawee Sanohdontree
Supervisor: Prof Surapong Chirarattananon

Field Assessment of Thermal Comfort in Common Spaces in Asian Institute of Technology

by Nyi Nyi Naing Myo Tun
Supervisor: Prof Surapong Chirarattananon

Investigations on a Rock-bed Thermal Storage System for Air Heating and Drying Applications

by Chrystalyn Ivie Sunpongco Ramos
Supervisor: Prof Sivanappan Kumar

Least Cost Vehicular Mix Analysis of Hanoi Passenger Road Transportation Development and External Costs

by Nguyen Thi Thanh Hue
Supervisor: Prof Ram M Shrestha

Optimal Distributed Generation Placement in the LMP Based Electricity Market

by Durga Gautam
Supervisor: Dr Mithulananthan Nadarajah

Optimal Placement of Distributed Generation in a Distribution System

by Pukar Mahat
Supervisor: Dr Weerakorn Ongsakul

Optimal Power Flow with FACTS Devices Using Parallel Improved Evolutionary Programming

by Peerapol Tanapongporn
Supervisor: Dr Weerakorn Ongsakul

Overcurrent, Overvoltage Protection and Reliability Improvement in the Distribution Network of Binh Duong Province, Vietnam

by Le Anh Dung
Supervisor: Dr Weerakorn Ongsakul

Power Flow and Transient Stability Analyses for 500kv Transmission Plan of Southern Vietnam

by Ho Thanh Dieu
Supervisor: Dr Mithulananthan Nadarajah

Renewable Energy Resources Assessment and Its Application in the Kingdom of Cambodia

by Sok Nattha
Supervisor: Prof Sivanappan Kumar

Study On Air Movement And Natural Ventilation Model for Energy Simulation of Residential Houses

by U Aye Chan
Supervisor: Prof Surapong Chirarattananon

Thermal Comfort Assessment and Application of Radiant Cooling at Mehran University, Pakistan

by Rizwan Ahmed Memon
Supervisor: Prof Surapong Chirarattananon

Voltage Profile Improvement in Electric Power Systems: A Case Study of Central Area PEA Power System, Thailand

by Vipa Udomwongpaiboon
Supervisor: Dr Mithulananthan Nadarajah

Voltage Stability Assessment and Enhancement in a Deregulated Electricity Market Environment

by Sarina Adhikari
Supervisor: Dr Mithulananthan Nadarajah

Research Study: Greenhouse Gas Emission and Environmental Impact Assessment of the Pha Lai Thermal Power Plant

by Nguyen Chi Hieu
Supervisor: Dr Mithulananthan Nadarajah

Chapter 18: SERD – ENVIRONMENTAL ENGINEERING AND MANAGEMENT FIELD OF STUDY

18.1 Introduction

Environmental Engineering at AIT began in 1964 with the need for sanitary engineering to address the problems of providing adequate water supplies and sanitation facilities. This pioneering environmental engineering program has grown into a range of fields needed to tackle the environmental issues facing Asia today.

Environmental Engineering and Management Field of Study is part of the School of Environment, Resources and Development. The overall program looks for solutions to environmental problems, water supply and sanitation, wastewater treatment and disposal systems, air pollution, solid and hazardous wastes, waste minimization, and life cycle assessment, environmental impact assessment and management and environmental toxicology. The three major focal areas are Environmental Technology and Management, Environmental Toxicology, Technology and Management, and Water and Wastewater Engineering.

18.2 Research Facilities and Laboratories

The Environmental Engineering (EE) Laboratory is housed with facilities to handle a wide range of knowledge and skills in problem solving for industrial needs and analytical works for physical, chemical, microbiological, and environmental parameters such as water and wastewater quality, solid waste, air pollutants and noise level. For teaching, training and research purposes, the EE laboratory is categorized into four sub-laboratories namely, research, ambient, environmental research station and a mobile laboratory. The research laboratory is equipped with many sophisticated instruments such as GC-IRD-MSD, UV-Vis

spectrophotometers, an atomic absorption analyzer with flame, graphite and cold vapor operations, and gas and liquid chromatographs. For lab and pilot scale testing purposes, the ambient laboratory has furnished with facility to conduct experiments for treating sludge, sewage and industrial wastes. It is also housed with advanced water and wastewater treatment units such different membrane bioreactors, and high rate anaerobic treatment processes with methane gas recovery. The Environmental research station consists of pilot scale aerobic and anaerobic biological wastewater treatment units, constructed wetlands, waste stabilization ponds and a hazardous wastewater treatment plant. In addition, a flexible mobile laboratory is developed with facilities to accommodate all kinds of portable laboratory equipment necessary for on-site water and wastewater sampling and analysis.

Among its major equipment include a Gas Chromatograph; High Performance Liquid Chromatograph; Atomic Absorption Spectrometer; Total Organic Carbon Analyzer; UV Spectrophotometer; Supercritical Fluid Extractor; Microwave Digestion System ; Primus Thermal Cyclers ; Universal Mutation Detection System; Microscope; Microbalance; Microcentrifuge; Turbidimeter; and for pH & Conductivity.

18.3 Faculty and Research Staff

Full-time Faculty

AJIT P ANNACHHATRE, BTech, PhD, Indian Inst of Tech, Kanpur, India.

Professor (*Anaerobic Wastewater Treatment; Biofilm Processes; Environmental Biotechnology; Environmental Impact Assessment; Mathematical Modeling*)

[Anaerobic and Aerobic Wastewater Treatment; Biofilm Processes for waste water treatment; Environmental Impact Assessment]

CHONGRAK POLPRASERT, BEng, Chulalongkorn Univ, Thailand; MEng, AIT, Thailand; PhD, Univ of Washington, USA.

Professor (*Hazardous Waste Engineering; Resources Recovery; Sanitation*)

[Sanitation; Waste Recycling; Hazardous Wastes]

CHETTIYAPPAN VISVANATHAN, BTech, IIT, Madras, India; MEng, AIT, Thailand; DEng, Inst Natl Polytech, Toulouse, France.

Professor (*Cleaner production; Industrial Environment Management; Membrane Technology; Solid/Liquid Separation; Water and Wastewater Treatment*)

[Waste Minimization and Waste Auditing/Clean Technologies; Solid - liquid Separation Technologies for Water and Wastewater Treatment; Desalination and Membrane Technology; Wastewater Reuse; Operation and Management of Water and Wastewater Treatment Plants; Industrial and Hazardous Waste Management; Industrial Pollution Control; Solid Waste Management (Landfill and Methane oxidation)]

NGUYEN THI KIM OANH, DipEng, Odessa Hydrometeorology Inst, Ukraine; MEng, DEng, AIT, Thailand.

Associate Professor (*Air pollution; Environmental monitoring and modeling; Exposure assessment; Industrial environment management*)

[Particulate matter: ambient levels, source emission (composition, source apportionment and climate forcing properties); Modeling secondary particle formation in tropical urban areas; Development of integrated management strategies for open agrosidue burning; Rural air pollution: levels, sources, local effects and atmospheric/global effects; Air pollution meteorology; Toxic air pollutants in the environment and health effects; Industrial environment management: cleaner combustion, clean production auditing]

PREEDA PARKPIAN, BSc, Kasetsart Univ, Thailand; MSc, Mississippi State Univ; PhD, Texas A&M Univ, USA.

Associate Professor (*Ecotoxicology; Heavy Metals; Micronutrient Chemistry*)

[Micronutrient Chemistry; Heavy Metals; Ecotoxicology; Plant Nutrition; Environmental Pollution; Nutrient Recycling; Chemistry of Toxic Metals and Toxic Organics in Soils, Sediments, and Plants]

OLEG V SHIPIN, MSc, Univ of Saratov; DSc, Inst of Biochemistry and Physiology, Russia.

Associate Professor (*Anaerobic and Aerobic Wastewater Treatment; Environmental Impact Assessment (Biophysical Environment); Microbial biotechnology (production of commercially important metabolites and marketing); Microbial aspects of Environmental Engineering*)

[Natural systems (ponds and wetlands) as Wastewater treatment systems; Microbial aspects of Environmental Engineering; Environmental Impact Assessment in the developing countries; Molecular Microbiology]

THAMMARAT KOOTATEP, BEng, Chiangmai Univ; MEng, DEng, AIT, Thailand.

Assistant Professor (*Decentralized Waste and Wastewater Treatment Systems; Eco-engineering Technology for Waste and Wastewater Treatment and Management; Environmental Health and Sanitation*)

[strategic environmental sanitation; natural treatment systems; ecological systems for waste management,

decentralized waste/ wastewater management, and resource recovery]

Visiting Faculty

NGUYEN CONG THANH, BSc, DSc, Laval Univ, Canada.

Visiting Professor (*Environmental impact assessment; Industrial pollution control; Wastewater management; Water supply*)
[water supply, wastewater management, industrial pollution control, environmental impact assessment]

TOSHIYA ARAMAKI, BS, ME, DEng, University of Tokyo, Japan.

Visiting Associate Professor
[Evaluation of water management measures in a city and catchment scale, Life cycle impact assessment of solid waste and sewage management, Evaluation of appropriate sanitation systems, Analysis and forecast of future domestic water use, Utilization of unused energy and heat sources in urban area, Investigation of optimum urban structure for reduction of CO₂ emission, Analysis and mitigation of urban heat island problem]

RANJNA JINDAL, MSc, Meerut Univ, India; MSc, DTechSc, AIT, Thailand.

Visiting Assistant Professor

18.4 Completed Grant and Sponsored Research

AIT-DTU Twinning Phase-II: Industrial Wastewater Treatment for Reuse

Investigators: Prof Ajit P Annachhatre and Prof Chongrak Polprasert

Sponsor: DANIDA

Total Contracted Amount: 2,999,846 Baht (DKK 600,000)

Application of Constructed Wetlands for Septage Treatment

Project Description: Field research is conducted to examine the design and operational guidelines of vertical-flow constructed wetlands for septage treatment and to investigate the associated problems in the field applications. Results will be

disseminated to the municipalities and local authorities in Thailand.

Duration: 1 March 2003 to 30 June 2005

Investigator: Dr Thammarat Kootatep

Sponsor: Pollution Control Department, Ministry of Natural Resources and Environment, Thailand

Total Contracted Amount: Baht 3,559,597

Application of Constructed Wetlands for Treatment Wastewater from Smoked Rubber Sheet Plants

Project Description: The study investigates the wastewater characteristics and associated pollution problems of the smoked sheet rubber plants of the Rubber Plantation Aid Fund Cooperatives in Songkla Province, Thailand. Pilot-scale experiments of constructed wetland units and determining optimal hydraulic retention time, organic loading rate and mode of wastewater feeding are conducted.

Duration: 1 April 2003 to 31 August 2005

Investigator: Dr Thammarat Kootatep

Collaborator: Dr Udomphon Puetpaiboon, Prince of Songkla University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 925,000

Development of Databases for Greenhouse Gases with Reference to Methane in Thailand

Duration: 1 June 1999 to 31 December 2005

Investigator: Dr Apisit Eiumnoh

Collaborator: Dr Preeda Parkpian

Sponsor: Thailand Research Fund

Total Contracted Amount: Baht 5,863,150

Development of Innovative Technology for High-Strength Low-Degradable Wastewater Treatment: BECP, RCO and MBR

Duration: 7 January 2001 to 15 July 2005

Investigator: Dr Oleg Shipin

Sponsors: Korea Institute of Science and Technology Environmental Vision 21 Company, Ltd., Korea

Total Contracted Amount: Baht 5,958,378 (5,872,699)

Development of Onsite Sanitation Systems for Small-Scale Communities

Project Description: Domestic wastewater treatment systems, typically used in small-scale communities, include individual or on-site treatment processes, while the centralized wastewater system is used in urban areas having dense settlements or large communities. It is apparent that for small communities, centralized systems are inappropriate due to high investment and operation costs. The decentralized management and treatment systems is developed and experimented and modifications or upgrade are based on the available processes such as anaerobic filter, sand filtration, constructed wetlands, etc.

Duration: 1 April 2003 to 30 June 2005

Investigator: Dr Thammarat Kootatep

Sponsor: Pollution Control Department, Ministry of Natural Resources and Environment, Thailand

Total Contracted Amount: Baht 1,799,242

Development of Toxic Industrial Wastewater Technology based on Advanced Oxidation Processes and Membrane Bio-reactor

Project Description: Toxic substances are highly refractory to nature purification or even by simple treatment processes. Hence there is an urgent need for advanced treatment alternatives that are not only feasible but also affordable. The project determines the possibility of removing pentachlorobenzene and hexachlorobenzene contaminated wastewater by a combination of advanced oxidation processes and membrane bioreactor process.

Duration: 1 April 2003 to 30 June 2005

Investigator: Prof C Visvanathan

Collaborator: Dr Jin Anotai, King Mongkut's Institute of Technology, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 850,000

Development of Water Renovation Technology Using Bio-Eco Engineering System in Thailand

Duration: 1 September 1997 to 31 December 2005

Investigator: Dr Preeda Parkpian

Sponsor: National Institute of Environmental Studies, Japan

Total Contracted Amount: Baht 3,913,483

Enhancement of Natural Attenuation of Soil and Groundwater Polluted by Trichoroethylene (TCE)

Duration: 1 September 2004 to 31 December 2005

Investigator: Dr Preeda Parkpian

Collaborator: Dr Patana Anurakpongsatorn, Kasetsart University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 1,000,000

Modeling for Environmental Impact Assessment of Odor Pollution from Wastewater Treatment Plant

Investigator: Dr Nguyen Thi Kim Oanh

Sponsor: Earthtech, Thailand

Total Contracted Amount: 120,000 Baht

Modeling Tool in Air Quality Management

Investigator: Dr Nguyen Thi Kim Oanh

Sponsor: DANIDA

Total Contracted Amount: 249,980 Baht (US\$ 50,000)

Molecular Microbiological Approach to the Anaerobic and Anoxic Groups of Bacteria

Investigator: Dr Oleg Shipin

Sponsor: AIT Research Initiation Grant

Total Contracted Amount: 50,000 Baht

Pilot-Scale Experimental Study for Piggery Wastewater and Waste Reclamation at Chachengsao Province, Thailand

Project Description: Several series of pilot scale experiment is conducted for the treatment of piggery wastewater and for the reclamation of treated sludge. Newly developed treatment unit processes such as repetitive chemical oxidation, bio-ceramic sequencing batch reactor and actzyme are going to be combined for the effective and economical treatments of the piggery wastewater.

Duration: 1 April 2002 to 30 April 2005

Investigator: Dr Oleg Shipin

Sponsors: Royal Thai Government

Environmental Vision 21 Company, Ltd., Korea

Total Contracted Amount: Baht 2,420,000 (1,998,511)

Relationship between Traffic and Ambient Air Quality in Bangkok

Project Description: The project seeks to contribute to society and the region through investigation of traffic and air pollution, and raise environmental awareness among people. The specific objectives are to investigate the level of pollutants in the ambient air such as SPM, PM₁₀, NO_x, SO_x, CO, HC, O₃ and benzene, to study the relationship between traffic flow and ambient air quality, to verify the impact of climate on the levels of pollutants and to recommend abatement and pollution reduction measures.

Duration: 1 January 2000 to 31 December 2005

Investigator: Dr Preeda Parkpian

Collaborator: Dr Pranee Pichitwattana

Sponsor: Honda Motors Co. Ltd.

Total Contracted Amount: Baht 8,532,500

Small and Medium Scale Industries in Asia: Energy, Environment and Climate Interrelations

Investigators: Prof C Visvanathan

Prof S Kumar

Sponsor: Sida, Sweden

Total Contracted Amount: 18,122,400 Baht (US\$ 432,412)

Technical Workshop on Sustainable Wastewater Treatment in Developing Countries

Investigator: Dr Thammarat Koottatep

Sponsor: Chia Nan University of Pharmacy & Science, Taiwan

Total Contracted Amount: 200,000 Baht

The Third Symposium on Southeast Asian Water Environment

Investigator: Dr Toshiya Aramaki

Sponsor: The University of Tokyo, Japan

Total Contracted Amount: 735,600 Baht

18.5 Ongoing / In Progress Grant and Sponsored Research

Application of Upflow Filter Technology for Piggery Wastewater Treatment and Resource Recovery under Tropical Conditions (UAFF-FISH)

Investigator: Oleg Shipin
Sponsor: Kumoh National Institute of Technology, Korea

Total Contracted Amount: 427,081 Baht

Asian Regional Research Programme on Environmental Technology Phase II (ARRPET Phase II)

Project Description: Asian Regional Research Programme on Environmental Technology (ARRPET) was initiated to conduct research on environmental issues relevant to Asia. ARRPET is a network of institutions, which is dedicated to undertake research on environmental issues relevant to Asia for achieving the goal of sustainable development in the region. ARRPET Phase II is a natural continuation of ARRPET Phase I. Coordinated by AIT and funded by Swedish International Development Cooperation Agency (Sida), ARRPET Phase II involved 18 National Research Institutions (NRIs) from 8 Asian countries. Countries involved were China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, and Vietnam. Research themes under ARRPET include Industrial and Hazardous Waste Treatment and Management; Sustainable Solid Waste Landfill Management in Asia; Improving Air Quality in Asian Developing Countries; and Wastewater Treatment and Management. The major objectives of ARRPET Phase II include: 1) Good quality research relevant to Asian region with focus on hard science and technology; 2) Mobilise and strengthen the competence and capacity in National Research Institutions (NRIs) participating in the Programme for conducting research into national and regional initiatives for policy plans, controlling urban and environmental pollution; and 3) Disseminate the results of the Programme among policy makers with a view to have an impact on policy plans.

Duration: 1 January 2004 to 31 December 2007

Projects under ARRPET II: ARRPET programme is composed of the following sub-projects:

Annual Review Workshops under ARRPET II

Project Description: The progress of the programme is assessed through Annual Review Workshops which is held every year and attended by all NRIs, Swedish Resource Persons as well as Sida officials. AIT is responsible for the organization of these workshops.

Investigator: Prof Ajit P Annachatre
Total Contracted Amount: SEK 1,765,445

ARRPET Coordination under ARRPET II

Project Description: AIT coordinates all the activities of 18 National Research Institutions under ARRPET. AIT prepares research reports as well as financial reports for submission to Sida.

Coordinator: Prof Ajit P Annachatre
Total Contracted Amount: SEK 1,799,947

Improving Air Quality in Asian Developing Countries project

Project Description: AIRPET, an air pollution research network coordinated by AIT, involves research institutions (NRIs) from 6 countries, namely: China, India, Indonesia, Philippines, Thailand and Vietnam. The research is focused on pressing air pollution issues relevant to the Asian developing countries with the goal to improve the air quality in the region. Of the research works undergoing in several air pollution issues, contribution of paddy field burning to the potential air pollution problems is the one being conducted by AIT team.

Investigators: Dr Nguyen Thi Kim Oanh
Prof Chongrak Polprasert

Collaborating Institutes: Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, University of Science and Technology of China, Beijing, China
Indian Institute of Technology, Madras, India
Institute of Technology of Bandung, Indonesia
Manila Observatory, Philippines
Hanoi University of Sciences, Vietnam

Total Contracted Amount: SEK 7,589,944

Industrial and Hazardous Waste Treatment and Management project

Project Description: IHWTM project is engaged in research on industrial and hazardous waste-related issues relevant to Asia based on a concept of networking. A network of National Research Institutions (NRIs) from 5 Asian countries from India, Indonesia, Malaysia, Philippines and Sri Lanka has been established so that industrial and hazardous waste-related issues could be tackled in a regional perspective. Issues dealt under this project include removal of toxic and hazardous compounds from industrial discharges. The research particularly focuses on removal of AOX from pulp and paper industries, removal of heavy metals from industrial wastewaters and removal of PCBs. Besides carrying out quality research on industrial and hazardous waste issues relevant to Asia, IHWTM also aimed at mobilizing and strengthening the competence of NRIs with a view to develop policy guidelines for management of industrial and hazardous wastes. Research on IHWTM also aims at

application of research results at pilot scale.

Investigator: **Prof Ajit P Annachatre**
Collaborating Institutes: **Indian Institute of Technology, Kanpur, India**
Indian Institute of Technology, Bombay, India
Center for Environmental Technology and Management, Vanlang University, Vietnam
King Mongkut University of Technology Thonburi, Bangkok, Thailand
Total Contracted Amount: **SEK 7,764,006**

Sustainable Solid Waste Landfill Management in Asia project

Project Description: The research on "Sustainable Solid Waste Landfill (SWLF) Management in Asia" has been carried out in four (China, India, Thailand and Sri Lanka) National Research Institutes under the ARRPET network, which mainly focuses on enhancing solid waste disposal practices and landfill technology for efficient and effective solid waste management in the region. The key technical issues is being addressed and closely related to real condition's application: pretreatment of solid waste prior to landfilling by aerobic and/or anaerobic processes as well as the management of pretreated waste; implementation and testing of a bioreactor landfill concept with biological cover soil; intensified in-situ degradation comprising an integrated leachate recirculation concept; optimization of leachate treatment from young and old landfills using either single stage or the combination of various wastewater treatment processes, lysimeter studies on various wastes among others mined waste from dumpsites to gather auxiliary information on leachate and gas generation under ambient conditions; enhancement of methane oxidation in the cover soil reducing the greenhouse gas potential of final disposal sites.

Investigator: **Prof C Visvanathan**
Collaborating Institutes: **Anna University, Chennai, India**
Kasetsart University, Thailand
University of Peradeniya, Sri Lanka
Tongji University, China
Total Contracted Amount: **SEK 5, 751, 479**

Swedish Resource Persons under ARRPET II

Project Description: The research progress of the entire programme is monitored by the Swedish Resource Persons of each project. The Swedish Resource Persons' involvement in ARRPET includes participation in the annual review workshops held at AIT.

Investigator: **Prof Ajit P Annachatre**
Total Contracted Amount: **SEK 681,000**

Wastewater Treatment and Management project

Project Description: WWTM project has been engaged in research on wastewater-related issues relevant to Asia. The research under WWTM is being conducted on a concept of networking involving networks at regional as well as national level. The WWTM network includes NRIs from India, Malaysia, Thailand and Vietnam. The issues dealt under this project include treatment and management of domestic and agro-based industrial wastewaters. Besides carrying out quality research on wastewater issues relevant to Asia, the project also aimed at mobilizing and strengthening the competence of National Research Institutions (NRIs) with a view to develop policy guidelines for management of domestic and agro-based industrial wastewaters. Research on WWTM also aims at application of research results at pilot scale.

Investigator: **Prof Ajit P Annachatre**
Collaborating Institutes: **Agharkar Research Institute, India**
Center for Pulp and Paper, Indonesia
Universiti Kebangsaan Malaysia, Malaysia
De la Salle University, Manila, Philippines
University of Moratuwa, Sri Lanka
Total Contracted Amount: **SEK 6,648,179**

Biowaste Reuse in Southeast Asian Cities, VN/Asia-Pro Eco/006 (104872), the European Commission, in collaboration with the Wageningen Universiteit

Duration: **October 2005 to November 2006**
Investigator: **Dr Thammarat Koottatep**
Sponsor: **EU Asia Pro Eco**
Total Contracted Amount: **1,650,000 Baht**

Development of an International Long Distance Internet-Based Master Course on Environmental Technology and Management

Duration: **October 2003 to September 2006**
Investigator: **Prof C Visvanathan**
Sponsor: **Asia-Link; European Commission**
Total Contracted Amount: **2,621,843 Baht**

Development of Microbial Characterization Techniques for Biological Wastewater Treatment in Developing Countries" under Center for Sustainable Urban Regeneration (cSUR) project

Project Description: The research conducted by AIT, focuses on the investigation of microbial groups in wastewater treatment process to find out their diversity and community profile and to develop the microbial characterization techniques for biological wastewater treatment in developing countries.

Duration: **1 January 2006 to 31 December 2006**

Investigators: Prof Ajit P Annachhatre
Dr Toshiya Aramaki, UT
Sponsor: Center for Sustainable Urban Regeneration
(cSUR), The University of Tokyo (UT)
Total Contracted Amount: THB 90,000

Development of Teaching and Training Modules for Higher Education in the Waste Management Sector (TETRAWAMA)

Duration: April 2003 to September 2006
Investigator: Prof C Visvanathan
Sponsor: Asia-Link; European Commission
Total Contracted Amount: 1,374,912 Baht

Development of Toxic Industrial wastewater Treatment Technology Based on Advanced Oxidation Processes & Membrane Bioreactor

Duration: November 2005 to November 2006
Investigator: Prof C Visvanathan
Sponsor: Royal Thai Government
Total Contracted Amount: 1,000,000 Baht

Dissolved Oxygen Control System for Upgrading Conventional Activated Sludge Process for Seafood Industrial Wastewater

Project Description: This study will investigate the possibility of using the oxidation-reduction potential (ORP) value as the parameter for aeration control system in the simultaneous nitrification-denitrification system. The ORP is strongly correlated with the aeration flow rate and nitrogen transformation, as does the DO concentration. The result from this study will lead to an innovative aeration control system for operators and engineers.

Duration: September 1, 2004 to May 31, 2006
Investigators: Prof Ajit P Annachhatre
Dr Panalee Chevakidagarn, PSU
Collaborator: Prince of Songkhla University (PSU)
Sponsor: Royal Thai Government
Total Contracted Amount: THB 975,000

Feasibility Study of Eco-Industrial Clusters Located in Urban-Fringe Areas as a Strategic Approach for Integrated Environmental and Economic Planning

Duration: January 2006 to March 2007
Investigator: Prof C Visvanathan
Sponsor: IGES, Japan
Total Contracted Amount: 242,497 Baht

Feasibility Study on Refuse Derived Fuel Potentials in Municipal Solid Waste in Thailand for Co-Processing in Cement Kilns

Duration: November 2005 to September 2006
Investigator: Prof C Visvanathan
Sponsor: Blackwood Ventures (Thailand) Co., Ltd.
Total Contracted Amount: 350,000 Baht

Health Effect of Traffic Air Pollution in Hanoi

Duration: 1 April 2006 – 31 March 2007
Investigator: Dr Nguyen Thi Kim Oanh
Sponsor: CIDA-AIT-SEA-UEMA
Total Contracted Amount: 345,150 Baht

IWA Special Conference on Waste Stabilization Ponds

Duration: 1 November 2005 to 30 November 2006
Investigator: Dr Thammarat Koottatep
Sponsor: IWA, United Kingdom
Total Contracted Amount: 2,700,000 Baht

National Center of Competence in Research North-South: WP3: Health and Environmental Sanitation

Duration: 1 September 2002 – 30 June 2007
Investigator: Dr Thammarat Koottatep
Sponsor: EAWAG, Switzerland
Total Contracted Amount: 13,450,440 Baht

Quality Assurance for the Curriculum and Course Materials Development for the Major Courses of Undergraduate Environmental Science Program at the Royal University of Phnom Penh (RUPP)

Duration: 1 April 2003 to 30 December 2006
Investigator: Dr Thammarat Koottatep
Sponsor: Danida
Total Contracted Amount: 2,297,400 Baht

Rehabilitation of Sai Noi Dumpsite (Thailand) and Its Potential for Refuse Derived Fuel Recovery

Duration: January 2006 to March 2007
Investigator: Prof C Visvanathan
Sponsor: CIDA-AIT-SEA-UEMA
Total Contracted Amount: 395,650 Baht

Septage Treatment in Constructed Wetlands and Attached-Growth Waste Stabilisation Ponds

Duration: 1 September 1996 to 30 December 2008
Investigator: Dr Thammarat Koottatep
Sponsor: EAWAG, Switzerland
Total Contracted Amount: 7,092,107 Baht

18.6 Publications

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- Nguyen, P H L, Kuruparan, P and Visvanathan, C**, Anaerobic Digestion of Municipal Solid Waste as a Treatment Prior to Landfill, Accepted for publication in *Journal of Bioresource Technology*.
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18.7 Doctoral Students' Dissertation

**Paraquat Adsorption and Distribution in Soils
in Yom River Basin**
by Wapakorn Amondham
Supervisor: Dr Preeda Parkpian

18.8 Masters Students' Theses and Research Studies

**Aerobic Granulation Coupled Membrane
Bioreactor**
by Bui Xuan Thanh
Supervisor: Prof Chettiyappan Visvanathan

**Analysis and Forecast of Domestic Water
End-Uses in Khon Kaen, Thailand**
by Lada Mathurasa
Supervisor: Dr Toshiya Aramaki

**Application of Biomarkers for Exposure
Assessment of Plastics Factory Workers to
Petrochemicals**
by Udomratana Vattanasit
Supervisors: Dr Panida Navasumrit
Dr Preeda Parkpian

**Appraisals of Environmental Sustainability
Indicators on the Conventional Sewerage
and Domestic Wastewater Treatment Systems
in Thailand: A Case Study in Bangkok City**
by Thitirat Chaosakul
Supervisor: Dr Thammarat Koottatep

**Arsenic Contamination by Groundwater and
Its Mitigation in the Province of Punja,
Pakistan**
by Muhammad Irshad
Supervisor: Dr Oleg V Shipin

**Assessment of Ozone Effects on Selected
Crops in Asia: Case Study with Selected
Crops in the Northern Vietnam**
by Dinh Thi Hai Van
Supervisors: Dr Nguyen Thi Kim Oanh
Dr Preeda Parkpian

**Assessment of the VOC Levels from Motor
Vehicle Exhaust and Potential Health Effects
in Hanoi, Vietnam**
by Vo Thi Quynh Truc
Supervisor: Dr Nguyen Thi Kim Oanh

**Biological Sulfide Oxidation in an Airlift
Bioreactor**
by Jenyuk Lohwacharin
Supervisor: Prof Ajit P Annachhatre

**Characterization of Microbial Community in
Different Wastewater Treatment Ecosystems**
by Bakhodir Bakhtiyorovich Uralov
Supervisor: Dr Oleg V Shipin

**Comparative Health Impact Assessment of
Fecal Sludge Management Practices: A
Case Study of Klong Luang Municipality,
Thailand**
by Aya Yajima
Supervisor: Dr Thammarat Koottatep

**Comparison in Membrane Permeability and
Trouling Reduction by Ozonation-
Microfiltration System**
by Wan Hanna Melini Wan Mohtar
Supervisors: Dr Yong Su Choi
Prof Chettiyappan Visvanathan

**Determination of Mono to
Octachlorobiphenyls in Fish Oil using Florisil
Adsorption Followed by Headspace Solid-
phase Microextraction and Gas
Chromatography with Time of flight Mass
Spectrometric Detection**
by Mary Rose Reyes Agustin
Supervisors: Dr Kang-Bong Lee
Dr Preeda Parkpian

**Development of an Aerobic Membrane
Bioreactor for Small Scale Domestic
Wastewater Treatment in Tropical Regions**
by S M S M K Samarakoon
Supervisor: Prof Chettiyappan Visvanathan

**Effects of Cadmium on DNA Damage and
Expression of Repair Gene**
by Tuvshinjargal Gotovdorj
Supervisors: Dr Panida Nawasumrit
Dr Preeda Parkpian

**Estimated Sulfur Budget in an Urban Area: A
Case Study of Bangkok, Thailand**
by Rattanavijit Kosumsuriya
Supervisor: Dr Nguyen Thi Kim Oanh

Evaluation of Biological Ecological Water Environment Renovation Technology and Phytoremediation of Cadmium from Polluted Water

by Aung Zaw Niang Lin
Supervisor: Dr Preeda Parkpian

Evaluation of the Disposal Systems of Human Excreta in Rural Area: Case Study in Roi-et Province, Thailand

by Thanchanok Kangwankraiphaisan
Supervisor: Dr Toshiya Aramaki

Forecasting Future Domestic Water Consumption and Strategies to Manage Future Water Demand in Trincomalee, Sri Lanka

by Sithamparanathan Sivakumaran
Supervisor: Dr Toshiya Aramaki

Impact of Pollution on Water Quality of the Coastal Ecosystems in Samut Prakan Province (Thailand) with a Focus on Inorganic Pollution at the Bang Pu Nature Reserve

by Aung Naing Myo
Supervisor: Dr Oleg V Shipin

Impact of Pollution on Water Quality of the Coastal Samut Prakarn Province (Thailand) with a Focus on the Bang Pu Nature Reserve

by Zuhaib Siddiqui
Supervisor: Dr Oleg V Shipin

Investigation on Toxicity and Hazardous Nature of a Municipal Solid Waste Dumpsite

by Romchat Rattanaoudom
Supervisors: Dr Preeda Parkpian
Prof Chettiyappan Visvanathan

Landfill Leachate Treatment Using a Thermophilic Membrane Bioreactor

by Mukesh Kumar Choudhary
Supervisor: Prof Chettiyappan Visvanathan

Major Exposure Pathway of Mercury in Children due to Gold Mining Activity: A Case Study of Small-scale Gold Mining in Phanom Pha, Phichit Province, Thailand

by Batdelger Shinen
Supervisor: Dr Preeda Parkpian

Modeling and Assessment of Water Quality in Kelani River, Sri Lanka

by Gajahin Gamage Tushara Chaminda
Supervisor: Dr Toshiya Aramaki

Modeling Potential of Climate Changes on Local Air Quality: A Case Study of Photochemical Smog Pollution in Bangkok Metropolitan Region

by Nilpatra Wongpen
Supervisor: Dr Nguyen Thi Kim Oanh

Nitrogen Removal from Digested Piggery Waste Based on Nitrification-Denitrification Process and Related Microbial Community Analysis

by Gopal Chandra Ghosh
Supervisors: Dr Oleg V Shipin
Dr Lee Seung Hwan

Occurrence and Fate of Waterborne Pathogens in a Wastewater Treatment Plant

by Buyan Chuluun
Supervisor: Dr Oleg V Shipin

Optimizing Dry Anaerobic Digestion of Organic Fraction in Municipal Solid Waste

by Jeanger P Juanga
Supervisor: Prof Chettiyappan Visvanathan

Photochemical Smog Modeling for Air Quality Management in the Hanoi Metropolitan Region, Vietnam

by Dam Duy An
Supervisor: Dr Nguyen Thi Kim Oanh

Practical Household Use of the Aquatabs Disinfectant for Drinking Water Treatment in the Low-Income Urban Communities of Dhaka, Bangladesh

by Neelima Afroz Molla
Supervisor: Dr Oleg V Shipin

Reuse and Recycle of Bio-residue (Percolate) from Constructed Wetland Treating Septage

by Sukon Hadsoi
Supervisor: Dr Thammarat Koottatep

Role of Hydroxylamine and Hydrazine in Anaerobic Ammonium Oxidation (Anammox) Process

by Le Tuyet Minh
Supervisor: Prof Ajit P Annachhatre

Start-up and Operation of the Anammox Process in a Gas-Lift Reactor

by Kawin Ruamsuke
Supervisor: Prof Ajit P Annachhatre

Study Possibility of Long-Range Transport of Asian Dust to Thailand Using Modeling and Satellite Data

by Thinawat Sathavarodom
Supervisor: Dr Nguyen Thi Kim Oanh

**Sulfide Production in Sulfate Reduction
Process Operated as Upflow Anaerobic
Packed Bed Biofilm Reactor**

by Salata Pradhan

Supervisor: Prof Ajit P Annachatre

**The Fate of Paraquat in an Irrigated Sweet
Corn Plot in Thailand**

by Anuttara Hongtong

Supervisor: Dr Preeda Parkpian

**THM Formation Modeling in Treated Water
Using the Rapid Organic Characterization
Technique**

by Sujithra Kaushaliya Weragoda

Supervisor: Prof Chettyappan Visvanathan

**VC and TCE Contaminated Groundwater
Around Plastic Manufactures of GMBR and
Clean up TCE by Using MESOCOSM
Technique**

by Kaewta Pungcha-um

Supervisor: Dr Preeda Parkpian

**Research Study: Health Effects of Rural
Drinking Water Supply Contaminated with
Arsenic and Pathogens in Kandal Province,
Cambodia**

by Yim Mongtoeun

Supervisor: Dr Toshiya Aramaki

**Research Study: Investigation of an Anarobic
Baffled Septic Tank (ABR) for Domestic
Wastewater Treatment**

by Tran Thi Mai Hoa

Supervisor: Dr Thammarat Koottatep

**Research Study: Pollution Survey in Water,
Sediment and Biota of Ha Long Coastal
Marine Area with Focus on Mercury**

by Nguyen Xuan Tuyen

Supervisor: Dr Toshiya Aramaki

Chapter 19: SERD – FOOD ENGINEERING AND BIOPROCESS TECHNOLOGY FIELD OF STUDY

19.1 Introduction

This field of study is focused on the application of bioconversion in various sectors of industry and agriculture. These include food processing, aquaculture, environmental engineering, paper and textile manufacturing, cosmetics and health care. BPT focuses on the application of microorganism and enzymes to meet the demands of the developing countries of the region. FE focuses on the systems for handling, processing and storage of both durable and perishable food products in developing of small- scale food processing technologies. Emphasis is also placed on the determination of material properties; design and development of new processes and related equipment; and computer modeling and simulation of postharvest and food processing operations.

19.2 Research Facilities and Laboratories

Food Processing Laboratory deals with both durable and perishable food products and the development of small-scale food processing technologies. It emphasizes on the determination of material properties; design and development of new processes and related equipment; computer modeling of food processing operations; thermal processing; biotechnology for added-value processing; and employing emerging technologies, namely, image processing, electronic-nose applications, and acoustic testing for food quality evaluations. The laboratory is equipped with instruments such as food texture analyzer, color meter, whiteness meter, viscometer and a variety of other instrument including drying equipment, temperature and relative humidity sensors and computer assisted data logging systems. Equipments are also available for grain and

starch processing, fruits and vegetables handling and storage technology, juice processing and oil extraction. The laboratory is open to cater industry needs for food quality evaluation and testing. The performance evaluation of commercial processing equipment may be undertaken along with development of food processing equipment as well as small-scale food processing technologies. Among its major equipment include a Food Texture Analyzer; UV-VIS spectrophotometer; Rota Vapor; Electronic Nose; and a Climatic chamber

Bioprocess Technology (BPT) Laboratory is well equipped to provide services to a broad spectrum of modern biotechnologies, namely, the analysis of biological components, application of bacteria and fungi, systems for bioprocessing and bioconversion, application of unit operations and bioreactor operation. It is also capable of conducting studies on the growth, application and analysis of microorganism and enzymes and their products. It has many state of the art equipment, such as high pressure liquid chromatography, gas liquid chromatography, UV-vis computerized spectrophotometer, rapid visco-analyzer, microprocessor controlled bioreactors, solid state fermentation unit, refrigerated centrifuges, vacuum dryer, cyclic incubators, electrophoresis apparatus, gel filtration unit, PCR machine, pilot facilities for biowaste treatment and chitin/chitosan production. Among its major include a PCR work station; Rapid Viscosity Analyzer (RVA); High Performance Liquid Chromatography; Gas Chromatograph; Freeze Drying System; and a Refrigerated Incubator Shaker.

19.3 Faculty and Research Staff

Full-time Faculty

VINOD KUMAR JINDAL, BSc, Pantnagar, India;
MS, Univ of Nebraska; PhD,
Pennsylvania State Univ, U.S.A.
Professor

ATHAPOL NOOMHORM, BSc, Kasetsart Univ,
Thailand; MEng, Lamar Univ, Texas; PhD,
Louisiana State Univ, USA.
**Professor (Agro-Industrial Development
Food Process Technology
Post Harvest Technology)**
[Postharvest of Cereals; Postharvest of
Fruits and Vegetable; Food Process
Engineering; Food Bioprocess
Technology; Agro-Industry System
Development]

SUDIP KUMAR RAKSHIT, BSc, Loyola College;
BTech, Jadavpur Univ, India; MTech,
PhD, Indian Inst of Tech, India.
**Professor (Biochemical Engineering
and Biotechnology; Biopolymers and
Lipid Biotechnology; Fermentation and
Enzyme Technology; Food
Biotechnology; Functional Foods)**
[Production of Useful Chemicals by
Bioroutes: use of byproducts; Food
safety and rapid detection methods :
including PCR based methods;
Functional foods and nutraceuticals :
Pre- and Probiotics, PUFA, antioxidants,
antimicrobials, etc.; Food
Biotechnology : Enzyme applications,
thermostable enzymes; Bioreactor
Design and Analysis :Optimal Control
of Bioreactors]

19.4 Completed Grant and Sponsored Research

Alley Farming: An Organic Farming for Poverty Alleviation and Environmental Preservation

Project Description: To support poverty alleviation policy
of Royal Thai Government, alley farming, a
sustainable technology of sorghum and
corn with *Leucaena leucocephala* (Kathin)
production was introduced.

Duration: 1 April 2003 to 30 June 2005
Investigator: Prof Athapol Noomhorm
Collaborators: Dr Isara Sooksathan

Dr Ed Sarabol, Ministry of Agriculture,
Thailand

Sponsor: Royal Thai Government
Total Contracted Amount: Baht 835,000 (1,085,500)

Characterization of chitosan membranes

Duration: 2003 to 2005
Investigator: Prof S K Rakshit
Sponsor: SE Asian Center for Water Env't Technology
(SACWET), Bangkok, Thailand
Total Contracted Amount: Baht 100,000

Rice Bran Nutrients

Duration: September 2002 to December 2005
Investigator: Prof S K Rakshit
Sponsor: RTG
Total Contracted Amount: Baht 1,000,000

Strengthening Competitive Competency of Thai Organic Food in EU Market

Project Description: Information on organic production of
rice and fruits and vegetables in Thailand
was gathered. The competitive
competency of Thai organic food in EU
market was evaluated and the
recommendation was given to strengthen
its production and sales.

Duration: 1 March 2003 to 30 August 2005
Investigator: Prof Athapol Noomhorm
Collaborator: Department of Agricultural & Resource
Economics Kasetsart University, Thailand
Sponsor: Ministry of Agriculture, Thailand
Total Contracted Amount: Baht 1,420,000

19.5 Ongoing / In Progress Grant and Sponsored Research

Development of Integrated Process for Urokinase production

Duration: January 2005 to January 2008
Investigator: Prof S K Rakshit
Sponsor: SIDA Research
Total Contracted Amount: Baht 450,000

Development of Standard Methods for Evaluating Thai Rice Quality by Near Infrared Spectroscopy

Project Description: Factors affecting to the eating quality
of final cooked rice was investigated to
develop effective predictor in evaluating
rice quality. Near Infrared spectroscopy
technique was adopted to replace
conventional method.

Duration: 1 September 2004 to 30 April 2006
Investigators: Prof Vinod K Jindal
Prof Athapol Noomhorm
Collaborator: Dr Anupun Terdwongworakul, Kasetsart
University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 950,000 (855,000)

Quality and safety of fish

Duration: January 2005 to December 2006
Investigator: Prof S K Rakshit
Sponsor: L'organisation internationale de la Francophonie (AUF)
Total Contracted Amount: 25,000 EUR

Rapid Detection of Food Pathogen

Duration: November 2005 to November 2006
Investigator: Prof S K Rakshit
Sponsor: RTG
Total Contracted Amount: Baht 830,000

19.6 Publications

Refereed Journals

Ahmad, Imran and Jindal, V K, 2005, An automated procedure for rapid on line estimation of raw milk quality, *LWT – Food Science and Technology*. In press.

Gilbert, Olivier and Rakshit, S K, Cassava starch snack formulation using functional shell fish by-products: Mechanical, sorption, and geometric properties, *Journal of the Science of Food and Agriculture*, 85: 11, 1938-1946, 2005.

Haki, Gulelat D and Rakshit, S K, Developments in industrially important thermostable enzymes: a review, *Bioresources Technology*, Vol. 89, No. 1, pp.17-34 (2005)

Hossain, H M Zakir, Haki, G D and Rakshit, S K, Purification and characterization of thermostable α -amylase from newly isolated *Bacillus stereothermophilus* GRE1, *Developments in Chemical Engineering and Mineral Processing*, (*The Australian Research Journal*), Special theme Issue: Bioprocess and Environmental Biotechnology Research, 13 (5/6), pp.519-530, 2005.

Pranoto, Y, Rakshit, S K and Salokhe, V M, Enhancing antimicrobial activity of chitosan films by incorporating garlic oil, potassium sorbate and nisin, *Food Science and Technology/ Lebensmittel-Wissenschaft und -Technologie LWT (Elsevier)*, Vol 38/8 pp 859-865, (2005)

Pranoto, Yudi, Rakshit, Sudip Kumar and Salokhe, Vilas Mahadeo, Mechanical, Physical and Antimicrobial Characterization of Edible Films Based on Alginate and Chitosan Containing Garlic Oil by Yudi Pranoto, *Developments in Chemical Engineering and Mineral Processing (The Australian Research Journal)*, Special theme Issue : Bioprocess and Environmental Biotechnology Research, 13 (5/6), pp. 617-626, 2005. (ISSN 0969-1855)

Pranoto, Yudi, Salokhe, V M and Rakshit, S K, Physical and antibacterial properties of alginate-based edible films incorporated with garlic oil, *Food Research International* (Elsevier Press), Volume 38, Issue 3, April 2005, Pages 267-272.

Rakshit, S K, Antimicrobial edible films based on alginate and chitosan containing garlic oil to inhibit *Staphylococcus aureus* and *Listeria monocytogenes*, *Journal of Food Processing and Preservation*, (accepted for publication, October 2005), Blackwell Publishing.

Rangsardthong, V and Noomhorm, A (2005) Production of 2-acetyl-1-pyrroline by microbial cultures, *Flavour and Fragrance Journal* 2005; 20:710-714

Shimelis, E A and Rakshit, S K, Antinutritional factors and in vitro digestibility of improved haricot bean (*Phaseolus vulgaris* L.) varieties grown in Ethiopia, *International Journal of Food Science and Nutrition*, manuscript communicated December 24, 2004. Accepted September 2005 (asked to reduce length) (Publisher Reference number #1368-05)

Shimelis, E A and Rakshit, S K, Effect of microwave heating on solubility and digestibility of proteins and reduction of antinutrients of selected common bean (*Phaseolus vulgaris* L.) varieties grown in Ethiopia, *Italian Journal of Food Science*, Accepted 15 March, 2005.

Shimelis, Emire Admassu and Rakshit, S K, Proximate Composition and Physicochemical Properties of Improved Dry Bean (*Phaseolus vulgaris L.*) Varieties Grown in Ethiopia, *Food Science and Technology/ Lebensmittel-Wissenschaft und – Technologie LWT*, Volume 38, Issue 4, June 2005, Pages 331-338.

Solomon, W K and Jindal, V K, 2005, Modeling textural changes in potatoes during storage under constant and variable conditions, *LWT – Food Science and Technology*. In press.

Conference Proceedings

Gebriel, Solomon Abera Habte and Rakshit, Sudip K, Starch extracted from dry cassava chips: yield and functional characteristics, Paper presented at the *Starch conference of Bio-Thailand 2005 – Challenges in the 21st Century*, 2-5 November, 2005, Queen Sirikit Convention Center, Bangkok Thailand.

Karki, Bishnu and Rakshit, S K, Detection and quantification of GM soyabean in fermented tempe using RT-PCR, *CHEMCOM 2005*, IIT, Delhi India. 14th to 17th December, 2005, Biochemical Engineering V Session, Vol 2, pp. 52.

Noomhorm, A, Pungsawat, K, Sirisoontarak, P and Vongasawasdi, P, Use of Irradiation to Improve the Safety and Quality of Chilled Pad Thai (Stir Fry Rice Noodle with Dried Shrimp) Proceeding of *International Symposium on New Frontiers for Irradiated Food and Non-Food products*, Organized by King Mongkut's University of Technology Thonburi, September 22-23, 2005, pp. 2

Pranoto, Yudi and Rakshit, S K, Antimicrobial and antioxidant activity of edible films incorporated with garlic oil, Presented at the *38th Australian Institute of Food Science and Technology Convention*, 10-13th July, 2005, Sydney Convention and Exhibition Center, Sydney, Australia.

Rakshit, S K, Food Safety Networks, *Southeast Asian Ministers of Education Organization (SEAMEO) Workshop on Emerging Issues and Policy Responses on Food Safety*, 27th October, 2005, Century Park Hotel, Bangkok, Thailand.

Rakshit, S K, Influence of processing on oligosaccharides, anti-nutrients and in vitro protein digestibility of kidney bean (*Phaseolus vulgaris L.*) varieties grown in Ethiopia, *Bean/Cowpea CRSP Conference* Dakar, Senegal, September 12-14, 2005. Accepted for presentation July 2005.

Rakshit, S K, Research Needs in Functional foods and nutraceuticals, Plenary Lecture, *2nd International Conference on innovations in Food Processing Technology and Engineering*, 11-13 January, 2005, AIT, Bangkok, Thailand.

Rakshit, S K, Research needs in functional foods and nutraceuticals, Invited lecture at *seminar for senior alumni (CEO's) of Food processing units*, Korea University, Seoul, Korea, lecture, 7th June, 2005.

Rakshit, S K, Variability in physical characteristics, nutrient composition, protein digestibility and antinutritional factors of different haricot bean (*Phaseolus vulgaris L.*) varieties grown in central rift valley of Ethiopia, *Bean/Cowpea CRSP Conference* Dakar, Senegal, September 12-14, 2005. Accepted for presentation July 2005.

Rakshit, S K, Rapid testing methods of food pathogens using biotechnology methods, *Agro Food Processing Workshop to Promote Sustainable Development*, International expert at Workshop sponsored by COMSAT, held at National Research Center, Cairo, Egypt, December 3-7, 2005

Rakshit, S K, Functional foods and nutraceuticals, *Agro Food Processing Workshop to Promote Sustainable Development*, International expert at Workshop sponsored by COMSAT, held

at National Research Center, Cairo, Egypt, December 3-7, 2005.

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Sharma, Vivek and Jindal, V K, 2005, Evaluation of color-based classification of milled rice, *ASAE Annual International Meeting Paper No. 036170*, American Society of Agricultural Engineers, St. Joseph, Michigan, USA, 12p.

Noomhorm A, (2005) Extrusion "Principle, Process and Applications; paper presentation seminar organized by Charpa Tech. Center Co., Ltd Bangkok Thailand 18th February, 2005.

Shimelis, E A and Rakshit, S K, Impact on microwave heating on the invitro protein digestibility, reduction of antinutritional factors of common bean (*Phaseolus vulgaris L.*) varieties grown in Ethiopia, *2nd International Conference on innovations in Food Processing Technology and Engineering*, 11-13 January, 2005, AIT, Bangkok, Thailand.

Noomhorm A, (2005) Post harvest Technology for fruit export, Paper presentation at seminar fruit packaging for export, Thai packaging center, Thailand Institution of Research and Development, Maruai Hotel, Bangkok, 18th January 2005

Subedi, Parang Kush and Rakshit, S K, Multiplex PCR for the detection of pathogenic species of *Vibrio* in shrimp and crab, *CHEMCOM 2005*, IIT, Delhi India. 14th to 17th December, 2005, Biochemical Engineering V Session, Vol 2, pp. 330.

Noomhorm A, Sirisoontarak, P, Uraichoen, C and Ahmad, I, Control of insect infestation in milled rice using low pressure carbon dioxide (2005), Paper presented at poster session at *2nd International Conference on Innovations in Food Processing Technology and Engineering*, AIT, Bangkok, Abstract Book pp 27. 11-13 January 2005

Subedi, Parang Kush, Barnette, Praparsiri and Rakshit, Sudip K, Rapid detection of three pathogenic *Vibrio* species in Shrimp and Crab using Multiplex PCR, Poster paper, *BioThailand 2005- Challenges in the 21st Century*, 2- 5 November, 2005, Queen Sirikit National Convention Center, Bangkok, Thailand.

Noomhorm A, Pungsawat, K, Sirisoontarak, P and Vongsawasdi, P, Use of Irradiation to Improve the Safety and Quality of Chilled Pad Thai (Stir Fry Rice Noodle with Dried Shrimp) Proceeding of *International Symposium on New Frontiers for Irradiated Food and Non-Food products*

Yeasmin, Rezwana and Rakshit, Sudip Kumar, Antioxidant and antimicrobial activity of black cumin (*Nigella sativa L.*) oil with its inhibitory action on DNA cleavage, *2nd International Conference on innovations in Food Processing Technology and Engineering*, 11-13 January, 2005, AIT, Bangkok, Thailand.

Noomhorm, A, Ogunlana, E, Sooksathan, I and Sarobol, E, (2005), Alley Farming: An Organic Farming for poverty Alleviation and Environmental Preservation; paper presented at Seminar on RTG Joint Research Projects, Asian Institute of Technology, 8th August 2005.

Other Publications

Noomhorm A, (2005) Engineering properties of food material, "Principle, Applications and measurements; paper presentation organized by Charpa Tech. Center Co.,

Noomhorm, A, Vongsawasdi, P and Inprasit, C (2005), Improvement of Production and Post Harvest Practices for Thai Rice Quality; paper presented at Seminar on RTG Joint Research Projects, Asian Institute of Technology, 8th August 2005. Organized by King Mongkut's University of Technology Thonburi, September 22-23, 2005, pp. 2

19.7 Doctoral Students' Dissertation

Influence of Processing on Antinutrients, Raffinose Family Oligosaccharides and In-Vitro Protein Digestibility of Improved Dry Bean (*Phaseolus vulgaris* L.) Varieties Grown in Ethiopia

by Shimelis Admassu Emire

Supervisor: Prof Sudip Kumar Rakshit

Improvement of Pineapple Puree Quality by Deaeration and Irradiation Treatment

by Benjar Chutintrasri

Supervisor: Prof Athapol Noomhorm

Shelf Life of Milled Rice Packaged with Fumigation and Irradiation Treatment

by Porntip Sirisoontarak

Supervisor: Prof Athapol Noomhorm

19.8 Masters Students' Theses and Research Studies

Application of Chitosan and Clove Oil Mixtures as Edible Films and Coatings

by Sudeshna Kanungo

Supervisor: Prof Sudip K Rakshit

Application of Trichoderma Harzianum BCC5828 and N-Acetylglucosaminidase Enzyme as Biocontrol Agents

by Than Than Sein

Supervisor: Prof Sudip K Rakshit

Detection and Quantification of Genetically Modified Soybean Fermented Food Tempe Using Real Time PCR

by Bishnu Karki

Supervisor: Prof Sudip K Rakshit

Development of Composite Film Rice Starch for Hard Capsule Production

by Rasina Na-Ranong

Supervisor: Prof Athapol Noomhorm

DNase Treated DNA Multiplex Polymerase Chain Reaction Assay for Rapid Detection of Viable Food Borne Pathogens

by L M N Sigera Nadugala

Supervisor: Prof Sudip K Rakshit

Effects of Handling Methods on Quality Changes of Pacific White Shrimp (*Penaeus vannamei*)

by Ratchada Phiromrak

Supervisor: Prof Athapol Noomhorm

Enzyme Assisted Starch Extraction from Cassava Roots

by Kyawt Kay Kay Khine

Supervisor: Prof Athapol Noomhorm

Evaluation of Multistrain Probiotic Fruit and Vegetable Juice

by Nguyen Thi Nhu Mai

Supervisor: Prof Sudip K Rakshit

Extending the Shelf Life of Thai Sacred Basil (*Ocimum Sanctum* Linn.) in Fresh and Dried Forms

by Anocha Towanabut

Supervisor: Prof Athapol Noomhorm

Factors Affecting Beeswax Emulsion Properties and Stability

by Yada Lekdumrongsak

Supervisor: Prof Athapol Noomhorm

Fed Batch Cultivation of Heterotrophic *Nitzschia Alba* for the Enhanced Production of Biomass

by Chandrasekaran Uthra

Supervisor: Prof Sudip K Rakshit

Mechanical Tests for Evaluating the Crispness of Breakfast Cereals

by Chutanuch Hansaworakun

Supervisor: Prof Vinod K Jindal

Monitoring Textural Changes in Raw and Cooked Potatoes by Near-Infrared Spectroscopy

by Nguyen Thai Loc

Supervisor: Prof Vinod K Jindal

Monitoring the Properties of the Heat-treated Cassava Starch by Near Infrared Spectroscopy

by Pansa Liplap

Supervisor: Prof Vinod K Jindal

Multiplex PCR for the Detection of Three Pathogenic Species on *Vibrio* in Shrimp and Crab

by Parang Kush Subedi

Supervisor: Prof Sudip K Rakshit

PCR-DGGE Profiles of Microflora of Fish Viscera and Gills as a Tool for Traceability

by Mary Rosary T Caspillo

Supervisor: Prof Sudip K Rakshit

Production of Monoclonal Antibodies Against Pathogenic *Staphylococcus Aureus* by Phage Display

by Ma Khin Ma Ma Htwe

Supervisor: Prof Sudip K Rakshit

**Purification, Characterization and Application
of Lectin from Abrus Precatorius Seeds**

by Pham Huong Lien

Supervisor: Prof Sudip K Rakshit

**Shelf Life Evaluation of Frozen and Irradiated
Chilled Stored Fried Noodle with Shrimp and
Spicy Sauce**

by Kanittha Pungsawat

Supervisor: Prof Athapol Noomhorm

**Study of FAS Pre-Association and Screening
of Chemical Compounds that can Affect FAS
Pre-Association**

by Nguyen Thi Minh Huyen

Supervisor: Dr Key-Sun Kim

Prof Sudip K Rakshit

**Study of Quality Deterioration of Shrimp by
Chemical, Microbial and Electronic Nose
Analysis**

by Deepti Arvind Salvi

Supervisor: Prof Vinod K Jindal

**Thermal Process Effect on Quality of Cooked
Brown and Parboiled Rice Packaged in Retort
Pouch**

by Arunothai Puangmanee

Supervisor: Prof Athapol Noomhorm

**Viability of Lactobacillus Casei after Spray
Drying, Subsequent Rehydration and Storage**

by Wichitra Supangkaratana

Supervisor: Prof Athapol Noomhorm

Chapter 20: SERD – GENDER AND DEVELOPMENT STUDIES FIELD OF STUDY

20.1 Introduction

A small project, Women in Development was initiated in the Human Settlements Development Division at AIT in the late 1980s. This grew into the Gender and Development Studies unit in 1991, with financial support from CIDA, NORAD, the Dutch Development Cooperation and the Japanese Government.

Gender and Development Studies (GDS) is a center for graduate studies, research and outreach in the School of Environment, Resources and Development. Within the overall gender specific framework, GDS highlights both the need for specialized academic degree awarding studies in gender and development, and the integration of gender analysis and a gender relations perspectives in AIT's other fields of study.

20.2 Faculty and Research Staff

Full-time Faculty

KYOKO KUSAKABE, BA, Sophia University, Tokyo, Japan; MSc, PhD, AIT, Thailand.
Associate Professor (*Women's employment under macro-economic changes; Gender issues in trade and migration; Women and micro-vendors/informal sector; Borderland studies, Gender issues in organizations, Gender and development policy and planning; Gender issues in fisheries/aquaculture.*)
[Impact of economic globalization on gender relations especially focusing on women's work; Gender issues in aquaculture and fisheries; Women's access to technology, women's role in trade chain, and the relationship with women's mobility; Informal economy and social security; Border, market and state: ways women in the borderlands

negotiate with markets and states; Gender analysis of organizations and gender mainstreaming]

BARBARA EARTH, BA, MS, University of Cincinnati; MA, PhD, Ohio University, USA.

Assistant Professor (*Environmental/occupational health; Gender and health social science; Gender and human rights; Gender and Water; HIV/AIDS; Qualitative research; Social aspects of technology change.*)
[Gender and health development, especially sexual and reproductive health; Health issues arising from globalization; Education for social transformation.]

BERNADETTE RESURRECCION, BSc, Assumption Coll, Philippines; MA, PhD, Inst of Social Studies, The Hague, The Netherlands.

Assistant Professor (*Gender, environment and natural resource management; Discourses and practices of gender mainstreaming; Participation and governance in natural resource management; Gender and migration in Asia; Policy processes in environment and development*)
[Gender relations, livelihoods and environmental change; Discourses and practices of gender mainstreaming, participation and governance in natural resource management; Gender and migration in Asia; Policy processes in environment and development]

Visiting Faculty

MARI OSAWA, BA, MA, PhD, University of Tokyo, JAPAN
Professor, Institute of Social Science, University of Tokyo, Japan and co-editor of the international refereed journal *Gender, Technology and*

Development. (economic development, social policies and gender relations)

[gender, policy and the economic crisis, gender mainstreaming in policy making, gender analysis of social policy, and feminization of the labor market]

CECILIA NG CHOON SIM, BA, Pennsylvania, USA, Ed.M, Massachusettes, USA, PhD, University of Malaya, Malaysia
Director, Women's Development Collective, Malaysia; and co-editor of the international refereed journal *Gender, Technology and Development (new technologies, teleworking, computerization, globalization and development)*

YAYOI SUGIHASHI, BA, MA, Hosie University Graduate School, PhD University of Manchester, Uk
Lecturer, Ochanomizu University, Japan (*Gender and economic development; Gender statistics; and Gender issues in employment*)

Research Staff

JULAIKHA BENTE HOSSAIN, Msc in University of Dhaka, Bangladesh; MSc. in Asian Institute of Technology, Thailand; PhD Candidate, Asian Institute of Technology, Thailand
Project Researcher, Gender and Development Studies, AIT, Thailand (*Gender issues in Employment; Gender analysis of organizations; Migration*)
[Gender and development policy and planning, gender budget, gender analysis in labor market, and gender mainstreaming in policy making]

20.3 Completed Grant and Sponsored Research

Asia Link: Gender, Development and Public Policy Studies in the Asian Context

Duration: 10 September 2002 to 23 December 2005
Investigators: Dr Bernadette Resurreccion
Dr Kyoko Kusakabe
Sponsor: European Commission
Total Contracted Amount: THB 14,393,760 (8,433,553)

Economic Transition and Technology Change in Silk Production, Northeast Thailand: Effects on Gender Relations, Environment and Health

Project Description: The study focuses on the transition of silk production in the Northeast of Thailand and its influences on the way of life of the people in rural communities where sericulture and silk weaving have been part of the traditional life. More specifically, the research investigates the dynamics of gender relations as a result of silk production, changing from traditional to commercial ways, in the areas of economic, socio-cultural, ecological and health. It aims to gain a holistic understanding of silk production and provides recommendations on silk production promotion in Thailand.

Duration: 1 April 2003 to 30 June 2005
Investigator: Dr Barbara Earth
Collaborator: Dr Patcharin Lapanun, Khon Kaen University, Thailand
Sponsor: Royal Thai Government
Total Contracted Amount: Baht 895,000 (687,200)

Gender and Governance: Capacity-building of Local Women Executives in the Philippines

Duration: 2004 to 2005
Investigator: Dr Bernadette Resurreccion
Sponsor: UN Habitat/UMP & UNESCAP
Total Contracted Amount: THB 780,000

Gender and Mobility in Vietnam

Duration: 2004 to 2005
Investigator: Dr Bernadette Resurreccion
Sponsor: UMP - AIT
Total Contracted Amount: Baht 175,500

Gender Responsive City Planning and Management

Duration: 26 September 2000 to 31 December 2005
Investigators: Dr Bernadette Resurreccion, GDS
Dr Willi Zimmermann, UEM/SOM
Dr Walter Jamieson, UEM
Collaborator: Urban Environmental Management, AIT
Sponsor: United Nations Human Settlements Programme (UN HABITAT)
Total Contracted Amount: Baht 9,374,102

Women's Oral History Project in Northern Karen State

Duration: 1 May 2004 to 31 May 2005
Investigator: Dr Kyoko Kusakabe
Sponsor: OSI Development Foundation, Switzerland
Total Contracted Amount: Baht 705,051

Women's oral history project in Northern Sayaboury Province, Lao PDR

Duration: 2004 to 2005
Investigator: Dr Kyoko Kusakabe
Sponsor: OSI Development Foundation, Switzerland
Total Contracted Amount: Baht 312,000

20.4 Ongoing / In Progress Grant and Sponsored Research

An edited volume on Gender, Environment and Natural Resource Management

Duration: 2005 to 2007
Investigator: Dr Bernadette Resurreccion
Sponsor: IDRC, Canada
Total Contracted Amount: THB 495,000

Gender Mainstreaming Programme in Lao PDR

Duration: 2004 to 2007
Investigator: Dr Kyoko Kusakabe
Sponsor: IFAD Asia Division
Total Contracted Amount: THB 3,510,000

Participatory Urban Infrastructure Project, Vientiane, Lao PDR

Duration: 2004 to 2006
Investigator: Dr Bernadette Resurreccion
Sponsor: UN Habitat/ UMP & ADB
Total Contracted Amount: THB 3,120,000

Post-Graduate Education: Gender and Social Analysis in Environment & Development

Duration: 2005 to 2008
Investigator: Dr Bernadette Resurreccion
Sponsor: IDRC, Canada
Total Contracted Amount: THB 8,778,000

Strengthening Gender Mainstreaming Capabilities in IFAD Projects in Cambodia & Vietnam

Duration: 2004 to 2006
Investigators: Dr Bernadette Resurreccion
 Dr Kyoko Kusakabe
Sponsor: IFAD/UNIFEM
Total Contracted Amount: THB 3,705,000

The Impact of State Power in Ethnic Conflict Areas

Duration: 2005 to 2006
Investigator: Dr Kyoko Kusakabe
Sponsor: OSI Development Foundation, Switzerland
Total Contracted Amount: THB 989,625

Understanding Policy Processes in Biotechnology & Bio-safety Measures in Thailand and China

Duration: 2005 to 2006
Investigator: Dr Bernadette Resurreccion
Sponsor: IDRC, Canada
Total Contracted Amount: THB 5,007,583

20.5 Publications

Refereed Journals

Earth, Barbara, Globalization and Human Rights as Gendered Ideologies: Case of Phoenix Pulp Mill, N.E. Thailand with a Strategy for Visibilizing Gender, *Gender, Technology and Development* 9(1). Jan.-April (2005).

Kusakabe, Kyoko, Crisis of masculinities?: A case of retrenched male workers in Bangladesh (co-authored with **Md Mozammel Haque**), *Gender, Technology and Development*, Vol. 9, No.2, August 2005, pp.185-208.

Kusakabe, Kyoko, Gender Mainstreaming in Government Offices in Thailand, Cambodia and Laos: Perspectives from Below, *Gender and Development*, OXFAM Journal, Vol.13, No.2, July 2005.

Kusakabe, Kyoko, Sex segregation in construction organizations in Bangladesh and Thailand (co-authored with **Julaikha Bente Hossain**), *Construction management and economics*, Vol23, No.6, July 2005, pp.609-619.

Resurreccion, Bernadette Rules, Roles and Rights: Gender, Participation and Community Fisheries Management in Cambodia's Tonle Sap Region, *International Journal of Water Resources Development* Vol 21 No 4. (2005).

Resurreccion, Bernadette, Women in-between. Transnational and Rural-urban Migration in the Mekong Region, *Gender, Technology & Development, Sage Publications*. Vol 9 No 1. pp. 7 – 30, (2005).

Refereed Books/Chapters

Earth, Barbara and **Tran Tuan Anh** (2005), Gender and Participation in a Water Supply and Sanitation Project: Mekong Delta, Vietnam In **Kuntala Lahiri-Dutt**

(ed.) *Fluid bonds: Views on gender and water*, National Institute for Environment, Australian National University and Stree. 23 pp.

Conference Proceedings

Earth, Barbara (2005), Clarifying Sub-Populations in Municipal HIV/AIDS Prevention and Care Programs, *World Mayors' Conference*, 2-4 April, Cochin, Kerala, India.

Earth, Barbara (2005), Development of a Gender-Sensitive HIV/AIDS City Action Plan: Phnom Penh, Cambodia presented at the *International Forum for Social Sciences and Health World Congress: Health Challenges of the Third Millennium*, August 2005, Istanbul.

Earth, Barbara (2005), Gender, Health and Human Rights: New Configurations around a Pulp Mill in Northeast Thailand presented at the *10th International Women and Health Meeting (IWHM)*, 21-26 September, Delhi.

Earth, Barbara (2005). New Technologies, Gender and Socio-Cultural Change in Village-Based Silk Production, Northeast Thailand presented at the *AIT Seminar on RTG Joint Research Projects*, 8 August 2005.

Kusakabe, Kyoko (2005) Proceedings of the *workshop for junior practitioners and scholars – Place of development from gender perspectives for collaboration*. Ochanomizu University, Tokyo, Japan, 29-30 January 2005. Ochanomizu University The 21st Century COE Program, Frontiers of Gender Studies, F-GENS Publication Series 10

Kusakabe, Kyoko, Gender situation in Urban Environmental Management in the sub-region, Presented at the *Sub-regional dissemination meeting on gender equality in UEM*, 6 December 2005, Surabaya, East Java, Indonesia.

Kusakabe, Kyoko, Gendered effect of financial crisis on employment in Thailand, presented at the *9th International Interdisciplinary Congress on Women*, Seoul, Korea, June 19-24, 2005

Kusakabe, Kyoko, Operationalizing gender at the field level, Presented at The *10th AWID International Forum on Women's Rights and Development* "How does change happen?" in panel "Changes from inside: Rethinking contradictions in gender mainstreaming strategies", 27-30 October 2005, Bangkok, Thailand

Kusakabe, Kyoko, Women in fish border trade: Case of fish trade between Cambodia and Thailand with **Prak Sereyvath, Ubolratana Suntonratana, Napaporn Sriputinibondh**, presented at the *Conference on Transborder Issues in Greater Mekong Sub-region*, Ubon Ratchathani, Thailand. 30 June – 2 July 2005

Resurreccion, Bernadette and **Ha Thi Van Khanh** (2005), Able to Come and Go. Rural-urban Migration of Women in Nam Dinh Province, The Red River Delta. *Conference on Migration and Those Left Behind, Organized by the Asian MetaCentre, National University of Singapore* in Hanoi, 10-11 March.

Other Publications

Earth, Barbara with **Chea Fung** (2005), Gender and HIV/AIDS in Phnom Penh, Cambodia: Situation Analysis and Action Plan, UMP-Asia Occasional Paper No. 64. Urban Management Programme for Asia and the Pacific. UNHABITAT/UMP; June 2005, 61pp.

Kusakabe, Kyoko, Retrenched women workers and their marginalisation in the labour market: A study on the post-economic crisis in Thailand, Co-authored with **Jyotsna Maskay**, UMP-Asia Occasional Paper No.66, December 2005

Resurreccion, Bernadette (2005) Gender in Planning and Implementation, Training Program on Project Management, 30 November 2005, Asian Institute of Technology Extension.

Resurreccion, Bernadette (2005) Gender, Social Exclusion and Globalization, Diploma Program of Graduate Institute of Development Studies (IUED), Geneva – AIT Vietnam, Hanoi, 29 - 30 August 2005.

Resurreccion, Bernadette (2005) Social Inclusion and Good Governance, Training Program on “Planning and Administering Good Governance”, 7 September, Asian Institute of Technology Extension.

Resurreccion, Bernadette (2005) Co-organized AWID Panel: Climbing down the ivory tower: Activist-academic dialogue, 29 October, Shangrila Hotel, Association of Women’s Rights in Development

Resurreccion, Bernadette (2005) Gender Concepts in Project Monitoring and Evaluation, “Project Monitoring and Evaluation” AIT Extension, 30 May – 24 June 2005.

Resurreccion, Bernadette and Manorom Kanokwan (2005) Gender Myths in Water Resources Management, A Survey of Participatory Discourses in the Mekong Region, Mekong Water Governance Network.

Resurreccion, Bernadette, Gender and Natural Resource Management, Andalas University, Sumatra, Indonesia. Ford Foundation Project, 28 February – 1 March 2005.

20.6 Masters Students’ Theses and Research Studies

Career Development of Female High-ranking Government Officials in Vietnam: A Case Study of Vietnam Academy of Social Sciences

by **Vu Phuong Ly**
Supervisor: Dr Kyoko Kusakabe

Changes in Lue Women Weavers’ Identities: Oral History of Women Weavers in Northern Sayaboury Province, Lao PDR

by **Phanlany Khamphoui**
Supervisor: Dr Kyoko Kusakabe

Ethnic Conflict and Changing Gender Ideals of Tamil Women in North East of Sri Lanka

by **Jenida Ponnuthurai**
Supervisor: Dr Barbara Earth

Ethnic Integrity or Women’s Equality? Kachin Women’s Dilemma

by **U Gyi Je Ra**
Supervisor: Dr Barbara Earth

Gender and Governance: Representative Participation of Women Parliamentarians, their Constrains and Enablements in Parliamentary Process in Pakistan

by **Aisha Maqsood Ahmed**
Supervisor: Dr Barbara Earth

Gender and Home Based Care: People Living with HIV/AIDS in Phnom Penh Municipality, Cambodia

by **Chea Fung**
Supervisor: Dr Barbara Earth

Gender and the Socio-Cultural Dimension of ‘Arsenicosis’ in Rural Bangladesh

by **Lina Ferdous**
Supervisor: Dr Barbara Earth

Gender Issues in a Fishing Community of Kampong Chhnang Province, Cambodia: A Case Study of Kanleng Phe Village

by **Heng Samay**
Supervisor: Dr Bernadette P Resurreccion

Gender Perspectives in Irrigation Water Resource Management Practices: A Study of a Village in Rajshahi District, Bangladesh

by **K M Rabiul Karim**
Supervisor: Dr Bernadette Resurreccion

**Leavers and the 'Left-Behind': A Case Study
on Female Rural-Urban Migration in the Red
River Delta, Vietnam**

by Ha Thi Van Khanh

Supervisor: Dr Bernadette Resurreccion

**Mainstreaming Gender into Governance and
Public Administration Organizations: A Case
Study of Governance and Public
Administration Reform Luang Prabang
Provincial Pilot Project, Lao, PDR**

by Theonakhet Saphakdy

Supervisor: Dr Kyoko Kusakabe

**Mainstreaming Gender Issues in Agricultural
Extension: Analysis of Policy and
Implementation in Nepal**

by Saroj Kanta Adhikari

Supervisor: Dr Kyoko Kusakabe

**Representation of Women in the Movie
Industry : The Case of Myanmar**

by Nang Phyu Phyu Lin

Supervisor: Dr Bernadette Resurreccion

**Reshaping Agrarian Reform and Gender
Relations in a Commercial Banana Plantation
in Davao Province, Philippines**

by Mary Luz Menguita-Feranil

Supervisor: Dr Bernadette P Resurreccion

Chapter 21: SERD – NATURAL RESOURCES MANAGEMENT FIELD OF STUDY

21.1 Introduction

This field of study emphasizes natural resources, including land, forest and wild animal, and environmental conservation concerns. It addresses the problems of deforestation, land and coastal ecosystem degradation, biodiversity depletion, diminishing water supply, and other environmental pressures and threats on local, national, regional and global ecosystems.

21.2 Faculty and Research Staff

Full-time Faculty

DIETRICH SCHMIDT-VOGT, BSc, Freiburg University, Germany; MSc, University of Saskatoon, Canada; PhD, Heidelberg University, Germany.
Associate Professor (*Agroforestry; Forest Ecology and Forest Management; Landscape Ecology; Mountain Environments; Tropical Environments; Vegetation Geography*)
[Determinants and Impacts of Land Use Change; Community-Based Natural Resources Management; Integrated Land Use Systems; Vegetation Dynamics; Secondary Forests: Ecology and Management; Upland Development; Environmental Degradation]

GANESH P SHIVAKOTI, BS, MS, Udaipur Univ, India; PhD, Michigan State Univ, USA.
Associate Professor

EDWARD L WEBB, BA, Occidental College, Los Angeles; PhD, Univ of Miami, USA.
Associate Professor
[Tropical and subtropical vegetation ecology and conservation; Community-based natural resources management and conservation; Integration of remote sensing and GIS

in ecosystem management and conservation decision making]

RAJENDRA SHRESTHA, BSc, Haryana Agricultural Univ, India; MSc, DTechSc, AIT, Thailand.
Assistant Professor (*GIS and remote sensing application in land resource studies; Land degradation and conservation; Land Evaluation; Land use/cover, change; Sustainable Land Management*)
[Land Use Planning and Sustainable Land Management; Natural Resources Degradation and Environmental indicators; Poverty alleviation and Natural Resources Management; GIS/RS applications and Geoinformation in Decision making]

Visiting Faculty

AMBIKA PRASAD GAUTAM
Visiting Lecturer

21.3 Completed Grant and Sponsored Research

Asian Irrigation Institution Systems in Transition: Sustainability and Implications

Duration: 1 March 2001 to 31 December 2005
Investigator: Dr Ganesh Shivakoti
Collaborators: International Water Management Association, Sri Lanka
Sage Publications, India
Sponsor: The Ford Foundation
Total Contracted Amount: Baht 2,105,306 (2,166,465)

Dynamics of Farm-Forest Linkages in the Context of Changing Land-Use Policies in South and Southeast Asia

Project Description: The grant was given for the development of a full proposal for SANREM-CRSP on the above project. It was used for travel and workshops to identify study areas, establish partnerships and develop the concept.
Duration: 1 April 2005 to 31 December 2005
Investigator: Dr Edward Webb
Collaborator: Dr Dietrich Schmidt-Vogt, AIT

Michigan State University, USA
Virginia Tech University, USA

Sponsor: USDA SANREM/CRSP, USA
Total Contracted Amount: Baht 1,151,496 (1,800,664)

21.4 Ongoing / In Progress Grant and Sponsored Research

Asian Irrigation Institutions and Systems (AIIS) Dynamics study and Database Management

Duration: September 2003 to December 2006

Investigators: Wai Fung Lam
Dr Ganesh Shivakoti

Sponsor: Government of Hong Kong Grant to University of Hong Kong

Total Contracted Amount: US \$ 110,000

Collaboration in Integrated Natural Resource Management in Indonesia: Decentralization, Local people and Resources

Duration: February 2005 to December 2008

Investigator: Dr Ganesh Shivakoti

Sponsor: Ford Foundation Grant

Total Contracted Amount: US \$ 225,000 (\$ 100,000 to AIT and 125,000 to Andalas University, Indonesia; a sub-contract of US \$ 100,000 to AIT for five doctoral training program of Andalas faculty and three best Masters graduates in INRM from Andalas)

Development, land use change and forest conservation in central Vietnam

Duration: June 2003 to December 2006

Investigators: Dr Edward Webb

Dr Ganesh Shivakoti

Sponsor: MacArthur Foundation

Total Contracted Amount: \$230,000

Monitoring and conserving forest diversity in Nam Dong district, Thua Thien, Hue province, Vietnam

Duration: From mid-2006 to March 2009

Investigator: Dr Edward Webb

Sponsor: MacArthur Foundation

Total Contracted Amount: \$326,000

Professional enhancement and curriculum development to strengthen its new Master's degree program in integrated natural resources management and development

Duration: August 2003 to December 2006

Investigator: Dr Ganesh Shivakoti

Sponsor: Ford Foundation Grant to Andalas University, Indonesia

Total Contracted Amount: US \$ 180,000 (a sub-contract of US \$ 50,000 to AIT for doctoral training program of Andalas faculty and support for AIT faculty to teach graduate level courses at Andalas)

21.5 Publications

Refereed Journals

Dendi, Astia, Shivakoti, G P, Dale, R and Ranamukhaarachchi, S L, 2005, Evolution of the Minangkabau's Shifting Cultivation in the West Sumatra Highland of Indonesia & Its Strategic Implications for Dynamic Farming Systems, *Land Degradation & Development*. 16(1):13-26.

Dorji, L, Webb, E L and Shivakoti, G, In press, Property rights, incentives and forest management in Bhutan, *Environmental Conservation*.

Gautam, A and Shivakoti, G, 2005, Conditions for successful local collective action in forestry: Some evidences from the hills of Nepal, *Society and Natural Resources*. 18(2):153-171.

Kabir, Md E and Webb, E L, 2005, Suitability and productivity analysis of community forestry woodlot species in Dhaka Forest Division, Bangladesh, *Forest Ecology and Management* 212: 243-252.

Muangkaew, Tatsanee and Shivakoti, Ganesh P, 2005 (in press), Effect of Livelihood Assets on Rice Productivity: Case Study of Rice-based Farming in Southern Thailand, *ISSAAS Journal*. 11(2).

Shivakoti, Ganesh and Shrestha, S, 2005, Analysis of Livelihood Asset Pentagon to Assess the Performance of an Irrigation System - Part 2: Application of Analytical Framework, Part 1, *Water International*. 30(3):363-371.

Shivakoti, Ganesh and Shrestha, S, 2005, Analysis of Livelihood Asset Pentagon to Assess the Performance of an Irrigation System - Part 1: Analytical Framework, *Water International*. 30(3):356-362.

Shivakoti, Ganesh and Thapa, S B, 2005, Farmers' Perceptions of Institutional Participation and Effectiveness in Management of Mid-hill Watersheds in

Nepal, *Environmental and Development Economics*. Volume 10(5):665-688.

Shivakoti, Ganesh, Ghale, Yamuna and Upreti, Bishnu, 2005, The Ecological Dynamics of Low-External-Input Agriculture: A Case Study of Hill Farming in Developing Country Setting, *The International Journal of Sustainable Development and World Ecology*. 12(4):385-397.

Webb, E L, Hossain, S M Y, 2005, Dalbergia sissou (Roxb.) mortality in Bangladesh plantations: correlations with environmental and management parameters, *Forest Ecology and Management* 206: 61-69.

Webb, E L, Bult, M van de, Chutipong, W, Kabir, Md E, In press, Composition and structure of lowland rainforest tree communities on Ta'u, American Samoa, *Pacific Science*.

Refereed Books/Chapters

Shivakoti, Ganesh P, Vermillion, Douglas L, Lam, Wai-Fung, Ostrom, Elinor, Pradhan, Ujjwal and Yoder, Robert, Asian Irrigation in Transition: Responding to Challenges, Sage Publication, New Delhi, Thousand Oaks, London, 528 Pages, (2005)

Shivakoti, Ganesh, Vermillion, Douglas, Lam, Wai Fung, Ostrom, Elinor, Pradhan, Ujjwal and Yoder, Robert, 2005, *Asian Irrigation in Transition-Responding to Challenges*. Sage Publications - New Delhi/Thousand Oaks/London jointly published with AIT/IWMI/ Indiana University. 520 pages. (Out of Total 20 chapters: Two Chapters; one as first author and another second author); a) Shivakoti, Ganesh, W.F.Lam and Ujjwal Pradhan (Chapter1). "Asian Irrigation Problems and Prospects."; b) Bhandari, Hum N. and Ganesh P. Shivakoti. (Chapter 5) "Groundwater Irrigation in South Asia: A Micro Level Study from Nepal."

Other Publications

Bastakoti, R C, Shivakoti, Ganesh P and Lam, W F, 2005, Institutional Dynamism and Political Economy of Irrigation Governance in Thailand, Paper prepared for presentation at the *XII World Water Congress of International Water Resources Association*, New Delhi, November 22-26, 2005.

Shivakoti, Ganesh P and Shrestha, S G, 2005, Socio-economic Participation for Irrigation Development and Improvement in Agricultural Performance in Nepal, Paper prepared for presentation at *XII World Water Congress of International Water Resources Association*, New Delhi, November 22-26, 2005.

Shivakoti, Ganesh P, Bastakoti, R C and Lam, W F, 2005, Agricultural diversification, irrigation development and political economy of irrigation governance in Thailand, Report submitted to Research Grants Council of Hong Kong (Grant Number: HKU7233/03H) made to the University of Hong Kong on the project "Asian Irrigation Institutions and Systems (AII) Dynamics study and Database Management"

Shivakoti, Ganesh, 2005, Land Expropriation Policy Suitable for Timor-Leste: Economic Considerations, USAID/Dili, East Timor.

Shivakoti, Ganesh, 2005, Land Valuation and Taxation Policy for Timor-Leste, USAID/ Dili, East Timor.

Viswanathan, P K and Shivakoti, Ganesh P, 2005, Promotion of Rubber Agro Forestry Systems in India: Institutional Constraints and Development Potential, Paper Prepared for presentation at the Appraisal Meeting on "Improving the Productivity of Rubber Smallholdings through Rubber Agroforestry Systems", 5-7 September 2005, Prince of Songkla University, Thailand, Organised by World Agroforestry Centre (ICRAF), SE Asia.

Webb, E L, Dorji, L, in press, Efficiency and low costs under non-limiting supply conditions in Bhutan. In: Mukhopadhyay, P et al. (Eds.) Promise, Trust and Evolution. Oxford University Press.

21.6 Doctoral Students' Dissertation

A Simulation Study of the Fate of Radiocesium-137 in Soil Plant Systems Around Ongkarak Nuclear Research Center, Nakhon Nayok, Thailand
by Jantanee Jamsangtong
Supervisor: Dr Preeda Parkpian

21.7 Masters Students' Theses and Research Studies

Application of GIS in Monitoring the Soil Erosion in Sloping Agricultural Lands: A Case Study in Uma Oya Watershed, Sri Lanka
by Sathiyavaani Kokularamanan
Supervisor: Dr Rajendra P Shrestha

Assessment of Rural Water Supply with Emphasis on People's Participation and Benefits: A Case Study of Rural Water Supply in Limutichhu Watershed, Western Bhutan
by Karma Dupchu
Supervisor: Dr Ganesh P Shivakoti

A Study on the National Policies and Local Practices of Swidden Cultivation in Bhutan: A Case Study from Chhukha District
by Medon Yaganagi
Supervisor: Dr Dietrich Schmidt-Vogt

Community-Based Fisheries Management: A Case Study in Kampong Chhnang Province, Cambodia
by Leng Sy Vann
Supervisor: Dr Dietrich Schmidt-Vogt

GIS Aided Land Evaluation for Sustainable Agricultural Development in Tri Ton, An Giang, Vietnam
by Nguyen Thanh Son
Supervisor: Dr Rajendra Prasad Shrestha

GIS-Aided Spatial and Temporal Mapping of Reservoir Water Quality in an Agricultural Watershed: A Case Study of Mae Thang Reservoir, Northern Thailand
by Warinya Thothong
Supervisor: Dr Rajendra Prasad Shrestha

Indigenous Agroforestry System: A Case Study of Bawm Indigenous Community in Bandarban District, Chittagong Hill Tracts, Bangladesh
by Abu Sadat Moniruzzaman Khan
Supervisor: Dr Edward L Webb

Non-Timber Forest Product Utilization for Livelihood of People: A Case from Baitadi District, Nepal
by Sagun Bista
Supervisor: Dr Edward L Webb

Prospects for Domestication and Marketing of Selected Non-Timber Forest Products in the Mid-Hills of Nepal: A Case Study of Ghatte Khola Sub-Watershed, Dolakha District
by Arun Dhakal
Supervisor: Dr Edward L Webb

Study on Problems and Remedies in Participatory Forest Management of Kanneliya-Deliyagala-Nakiyadeniya Forest in Galle District, Sri Lanka
by Pushpa Nayana Kanthie Malalasekera
Supervisor: Dr Dietrich Schmidt-Vogt

The Contribution of Agroforestry in Mountainous Areas of Vietnam to Farm Household's Income: The Case Study of Agroforestry Projects in Quan Hoa District, Thanh Hoa Province
by Nguyen Dang Nhat
Supervisor: Dr Dietrich Schmidt-Vogt

Utilization and Marketing of Wood Products Under Community Forestry Program in Terai Region of Nepal: A Case Study in Kanchanpur District
by Krishna Datta Bhatta
Supervisor: Dr Ganesh P Shivakoti

Chapter 22: SERD – PULP AND PAPER TECHNOLOGY FIELD OF STUDY

22.1 Introduction

This field of study strives for finding basic solutions for the immediate technical problems facing the local pulp and paper industry. Research activities in PPT are focused on optimising pulping, bleaching and papermaking processes with emphasis on the reduction of their negative impact on environment. The quality of the product is also emphasized to maintain competitive edge of local pulp and paper industry in the global market. Modification of existing processes to suit local raw material is another challenging area of research.

22.2 Research Facilities and Laboratories

The Pulp and Paper Laboratory was established to provide the need for research and high level education for this specific field. The laboratory is equipped with all basic facilities for teaching and research purposes in the field of pulp and paper technology. Several sophisticated equipment have been constantly furnished to extend the services for advance research and special studies likewise. The facilities are provided for activities in pulping, paper testing, printing and coating, as well as for wood component analysis. The equipment is standardized according to ISO, TAPPI, and Scandinavian Standards. The programmable six-vessel autoclave digester makes cooking study in research level possible in the most convenient setting. Other major equipment in Pulp and Paper Laboratory include the single batch digester, bleaching reactor, sheet formers, fiber length analyzer, formation tester, de-inking flotation cell, and spectrophotometer with ERIC option. In addition to provide assistance and research facilities needs for students, faculty, the laboratory also provides professional services for pulp and paper industry internationally. Among its major equipment include a 6-

bomb autoclaved digester, CRS Engineering; Bleaching reactor; PFI mill; Fiber length analyzer FS-200, Kajaani; Spectrophotometer with ERIC option, Technidyne; and a Beta formation tester, Ambetec.

22.3 Faculty and Research Staff

Full-time Faculty

RAIMO O MALINEN, MSc, LicTech, DTech, Helsinki Univ. of Tech., Finland.

Associate Professor

[Wood and Fibre Chemistry in general; Pulping Technology; Fibre Technology; the use of different fibre raw materials in pulping papermaking; Environmental Technology; Project Management, Basic Engineering and Feasibility Studies]

MOUSA M NAZHAD, BSc, Univ of Tehran, Iran; MSc, Univ of Concordia, Montreal; PhD, Univ of British Columbia, Vancouver, Canada.

Associate Professor (*Fiber structure; Stock preparation; Papermaking; Pulp processing; Recycling*)

[Formation or fines influence on paper properties; Upgrading of secondary fibers; Refining compared with surface treatment of fibers; Papermaking quality of frayed fibers]

HEIKKI E K KOLEHMAINEN, MSc, Helsinki Univ of Tech, Finland.

Instructor

Visiting Faculty

ESA KALEVI LEHTINEN, MSc, Lic Sc, Helsinki Univ of Technology, Finland

Visiting Lecturer

AKI VILPPONEN

Visiting Lecturer

22.4 Completed Grant and Sponsored Research

Optimizing Deinking of Local Old Newspaper (LONP)

Project Description: Local recycled fibers are heavily suffering from its inferior de-inked quality. The project aims to develop a de-inking procedure which is specific to local old newspaper and could eliminate some of the environmental load in Thailand. It could also motivate the Thai community to seek better and efficient way of using, collecting and recycling of waste fibrous materials as well as create a new source of income.

Duration: 1 May 2003 to 30 June 2005

Investigator: Dr Mousa Nazhad

Collaborator: Ms Somporn Chaiarekij, Chulalongkorn University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 734,000 (742,000)

Potential of Acacia Wood Species

Project Description: Eucalyptus camaldulensis is used as raw material in wood-based pulp industry in Thailand. It has serious drawbacks including very low yield in pulping. Acacia species can be a good alternative as it is known to have very good pulping and paper properties. Unlike Eucalyptus, Acacia also improves soil fertility through fixing nitrogen. The project studies Acacia mangium and A. crassicaarpa of different ages, for their different properties. Techno-economic comparison with Eucalyptus camaldulensis is also made.

Duration: 1 April 2003 to 30 June 2005

Investigator: Dr Raimo Malinen

Collaborator: Dr Sawitree Pisuttipiched, Kasetsart University, Thailand

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 920,000

22.5 Publications

Refereed Journals

Nazhad, M M, Recycled fiber quality - A review, *Journal of industrial and engineering chemistry*, Korean Journal, 11(3): 314 (2005).

Nazhad, M M, Sridach, W, Retulainen, E, Kuusipalo, J and Parkpian, P, Biodegradation of some barrier coated boards at different soil environment, *Journal Appl poly Sc*, in press (2006).

Ramezani, O and Nazhad, M M, The effect of refining on paper formation, *Tappsa J*, (2005).

Sridach, W, Retulainen, E, Nazhad, M M, Kuusipalo, J and Parkpian, P, Biodegradable barrier coating on paperboard; Effects on biodegradation, recycling and incineration, *Paperi Ja Puu - paper and Timber* 88(1): 1 (2006).

Conference Proceedings

Malinen, R, Beneficial Effects of Fungal Treatment before Pulping and Bleaching of E Camaldulensis and Acacia Mangium, International Wood, Pulping and Fiber Chemistry Symposium, May 16-19, Auckland.

Malinen, R, Challenges of Asian Paper Industry, Seminar 'Fibrous Raw Materials for Pulp production in Thailand', June 3, 2005, Kasetsart University.

Malinen, R, Potential of Acacia as Pulpwood in Thailand, Seminar 'Fibrous Raw Materials for Pulp production in Thailand', June 3, 2005, Kasetsart University.

Malinen, R and Zhao, Hua-Ping, Evaluation of Bleachability of Eucalyptus Camaldulensis Kraft Pulp, *International Pulp Bleaching Conference*, June 14-16, 2005, Stockholm.

Malinen, R, Pisuttipiched, S, Kolehmainen, H, Kusuma, F, Potential of Acacia Species as Pulpwood in Thailand, *APPITA 2005*, May 16-19, 2005, Auckland, NZ.

Navae-Ardeh and Nazhad, M M, A model to predict the influence of basis weight variation or hardwood share on some strength and optical properties of paper, *59th Appita Conference*, Auckland, New Zealand, (May 2005).

Navae-Ardeh and Nazhad, M M, Optimizing of symmetric three-ply paper and board properties, *Canadian Chem Eng Conf*, Toronto, October (2005).

Other Publications

Nazhad, M M and Somporn, C, Deinkability and papermaking potential of local old newspaper (ONP), First AIT-RTG joint research public seminar, AIT conference center, Pathumthani, Thailand, August 8, Published by RTG Coordination Office, 67(2005).

Kinetics of Formation and Degradation of Hexenuronic Acid During Kraft Cooking

by Ananda Mohon Saha
Supervisor: Dr Raimo O Malinen

Ozone Application in Bleaching Mill-cooked Eucalyptus Camaldulensis Kraft Pulp

by Qian Jianjiang
Supervisor: Dr Raimo O Malinen

Possibilities of Enhancing the Compression Strength of Testliner by Improving Board Structure

by Nguyen Thi Thanh Ha
Supervisor: Dr Mousa M Nazhad

Separate or Mixed Refining for Acacia in Fine Paper

by Yan Li
Supervisor: Dr Mousa M Nazhad

The Effect of Component Mixing Order and Proportion of Pigments on the Properties of Coating Color and Coating Layer

by Vu Huu Hieu
Supervisor: Dr Esa K Lehtinen

22.6 Doctoral Students' Dissertation

Recycling and Biodegradation of Barrier Coated Boards

by Waranyou Sridach
Supervisors: Dr Mousa M Nazhad
Dr Elias Retulainen

22.7 Masters Students' Theses and Research Studies

A Model to Predict the Optical and Strength Properties of Co-refined Pulps

by Shahram Navaee-Ardeh
Supervisor: Dr Mousa M Nazhad

Characterization of Some Asian OCC Pulp

by Gao Yuan
Supervisor: Dr Mousa M Nazhad

Comparison of Bamboo and Scandinavian Softwood as Reinforcement Pulp Using Response Surface Method

by Seto Ambara
Supervisor: Dr Esa K Lehtinen

Effect of Kraft Cooking Methods on Bleachability of Eucalyptus Camaldulensis Pulp

by Pedram Fatehi
Supervisor: Dr Raimo O Malinen

Effects of Insolubilizers on Coating Color and Paper Surface Properties

by Huang Jiancheng
Supervisor: Dr Esa K Lehtinen

Influence of Bleaching Sequences and Conditions on Eucalyptus Camaldulensis Kraft Pulp Properties

by Dang Thi Thanh Nhan
Supervisor: Dr Raimo O Malinen

Chapter 23: SERD – REGIONAL AND RURAL DEVELOPMENT PLANNING FIELD OF STUDY

23.1 Introduction

This field of study focuses on rural poverty, improvement of the quality of life, and social and economic development of rural areas. Practice oriented rural-regional planning is carried out regularly at district and sub-district levels following a participatory and integrated approach, and attention is paid to management of development Institutions, infrastructure and physical resources. Sectoral and spatial planning is equally emphasized along with the management of rural development programs and local development projects to strengthen rural communities for sustainable development.

23.2 Faculty and Research Staff

Full-time Faculty

JAYANT K ROUTRAY, BSc(Hons), MSc, PhD, Utkal Univ; MRP, Indian Inst of Tech, India.
Professor (*Community Forestry; District Planning Methods and Techniques; Geographic Information Systems; Rural Transport Development; Rural-Regional Development; Social Impact Assessment*)
[Rural Regional Development Planning Methodology and Techniques; Decentralized Planning; Evaluation and Impact Study of Rural Development Programs; Rural Urban Relations; Geographic Information Systems; Environmental Planning and Social Impact Assessment; Market Centers and Rural Development; Rural Transport Development and Community Forestry]

GOPAL B THAPA, BSc, Tribhuvan Univ, Nepal; MSc, DTechSc, AIT, Thailand.
Professor (*Natural Resources Management; Sustainable Agricultural*

Development and Planning; Watershed Management)
[Watershed Management; Natural Resources Management; Sustainable Agriculture]

SOPARTH PONGQUAN, BSc, Chiang Mai Univ; MSc, AIT, Thailand; DSc, Univ of Wageningen, The Netherlands.
Associate Professor (*Capacity Building; Community Development and Monitoring and Evaluation of Development Projects; Decentralized Local Government; People's and Community Participation; Rural Development*)
[Decentralization; Capacity and Institutional Building; Local Governance; Community Participation and Local-level Planning]

MOKBUL MORSHED AHMAD, BSc, MSc, Dhaka Univ, Bangladesh; MSc, AIT, Thailand; PhD, Univ of Durham, UK.
Assistant Professor
[Economic geography; regional and rural development planning; community development; Non-Governmental Organizations (NGOs); civil society; globalization etc]

23.3 Publications

Refereed Journals

Ahmad, M M (2005), New Threat to Development? The NGO (Non-Governmental Organisations) - Fundamental Conflict in Bangladesh, *Journal of Rural Development*, Vol 24, No 1, pp 71-88 (India).

Pasaribu, Sahat M and Routray, Jayant K, Assessing Performance of Irrigation Water Users' Associations in Indonesia through Farmers' Perception, *Journal of the International Society for*

Southeast Asian Agricultural Sciences (ISSAAS), Vol. 11 (1), 52-68, 2005.

Pasaribu, Sahat M and Routray, Jayant K, The Performance of Farmer-Managed Irrigation Systems for Rice Production in East Java Province, Indonesia, *International Journal of Water Resources Development*, Vol. 21 (3) 473-491, 2005.

Zhen, Lin, Routray, Jayant K, Zoebisch, Michael A, Chen, Guibao, Xie, Gaodi and Cheng, Shengkui, Three Dimensions of Sustainability of Farming Practices in the North China Plain: A Case Study from Ningjin County of Shandong Province, P. R. China, *Agriculture, Ecosystems and Environment*, Vol 105 (3) 507-522, 2005.

Conference Proceedings

Thapa, Gopal B, and Wahid, Shahriar M, University support to environmental planning and management, *the second regional workshop Royal University of Phnom Penh, Cambodia*, March 2-4, (2005)

23.4 Doctoral Students' Dissertation

Citrus Marketing System in the Mountains of Nepal: A Study Based on Market Structure, Conduct and Performance Analyses

by Deepak Mani Pokhrel
Supervisor: Prof Gopal B Thapa

Enhancing the Performance of Farmer-Managed Irrigation Systems in Brantas River Basin of Indonesia

by Sahat M Pasaribu
Supervisor: Prof Jayant K Routray

Impacts of Land Fragmentation on Resource Utilization and Production Efficiency, and the Alternative Options for Land Consolidation in the Mountain of Nepal

by Gajendra Sen Niroula
Supervisor: Prof Gopal B Thapa

23.5 Masters Students' Theses and Research Studies

An Assessment of Rural Poor Women's Group Activities for Self Reliance and Sustainable Development in Myanmar

by Thin Khaing
Supervisor: Prof Jayant K Routray

An Assessment of Social Mobilisation Programs in Myanmar: A Case Study of a UNDP Project

by Myat Myat Swe
Supervisor: Dr Mokbul Morshed Ahmad

Effectiveness of the Farmer Field School (FFS) Approach to Integrated Production and Pest and Management (IPPM) Technologies for the Promotion of Grain Legume Production in Myanmar

by Lwin Lwin Aung
Supervisor: Dr Soparth Pongquan

Effects of Land Reform Policy on Agricultural Development in Vietnam: A Case Study in Anh Son District, Nghe An Province

by Le Trong Hai
Supervisor: Dr Soparth Pongquan

Flood Proneness and Human Response in Bangladesh: A Case Study

by Shitangsu Kumar Paul
Supervisor: Prof Jayant K Routray

Impacts of Watershed Development Interventions: A Case Study of Kuledera Nallah Watershed in Kendujhar District of Orissa State, India

by Anil Rautray
Supervisor: Prof Jayant K Routray

Institutional Capability Assessment of Local Organizations for Watershed Management in Nepal

by Keshav Kumar Acharya
Supervisor: Prof Jayant K Routray

Livelihood Security of Women in the Village Economy of Orissa

by Banishree Das
Supervisor: Prof Jayant K Routray

Making and Shaping of Japanese ODA Policy: The Case of Tsunami 2004

by Emi Kurita
Supervisor: Prof Jayant K Routray

**People's Participation in Rural Water Supply:
A Case Study of a Watershed Area in the
North of Vietnam**

by Phan Thi Phuong Huyen

Supervisor: Dr Soparth Pongquan

**Performance Assessment of Agricultural of
the Agricultural Land Reform Cooperative
Activities in Thailand: A Case Study in
Nakhon Pathom Province**

by Songkran Tanon

Supervisor: Dr Soparth Pongquan

**Promotion of Small Livestock Development of
the Rural Poor in Vietnam: A Case Study in
Dong Kinh Commune, Dong Hung District,
Thai Binh Province**

by Pham Bich Ngoc

Supervisor: Dr Soparth Pongquan

**Socio-Economic and Environmental Impacts
of Brick Industries Around Rajshahi: A Case
Study on Parila Union of Rajshahi, Bangladesh**

by Farhana Khan Lima

Supervisor: Prof Jayant K Routray

Chapter 24: SERD – URBAN ENVIRONMENTAL MANAGEMENT FIELD OF STUDY

24.1 Introduction

Urban Environmental Management (UEM) is an area of academic discourse and professional practice in which urban planning and urban management issues are studied and practiced from an environmental management perspective.

As an academic field, UEM provides opportunities of graduate level education and research at master (MSc) and doctoral (PhD) level. It draws on and integrates theories and perspectives in established disciplines of urban planning, urban and regional development and urban policy and management studies into a distinctive framework of problems, issues and questions concerning the urban environment. It enables students to identify problems; apply appropriate analytic methodologies; design, plan and implement programs and projects; and monitor impacts and challenges within the context of sustainable development in developing societies.

The Field of Study prepares students for professional careers in the public and private sector as well as international development agencies and civil society organizations engaged in urban and environmental management.

24.2 Research Facilities and Laboratories

The FoS has a workshop room which can accommodate about 24 students in four clusters at a time. Each cluster is equipped with a desk top computer with internet facilities. The workshop room also has audio-visual facilities for presentations.

24.3 Faculty and Research Staff

Full-time Faculty

A T M NURUL AMIN, BA (Hons), MA, Univ of Dhaka, Bangladesh; MA, PhD, Univ of Manitoba, Canada.
Professor

NOWARAT COOWANITWONG, BS, Mahidol Univ, Thailand; MS, Long Island Univ; MS, PhD, Univ of Florida, USA.
Assistant Professor

VILAS NITIVATTANANON, BEng, Chulalongkorn Univ; MA, Thammasat Univ; MEng, AIT, Thailand; PhD, Univ of Pittsburgh, USA.
Assistant Professor

RANJITH PERERA, BSc, MSc, Univ of Moratuwa, Sri Lanka; MSc, PhD, AIT, Thailand.
Assistant Professor

EDSEL SAJOR, BSc, Univ of the Philippines; MA, PhD, ISS, The Hague, The Netherlands.
Assistant Professor

Visiting Faculty

JONATHAN RICHMOND, BSc, London School of Econ and Pol Sc; MSc, PhD, Massachusetts Inst of Tech, USA.
Visiting Fellow

PETER ROBINSON, BA, MA, PhD, Uni of Kwazulu-Natal, South Africa
Visiting Professor

JOHN SINCLAIR, BA, MA, Carleton Univ, Canada, PhD, Uni of Waterloo, Canada
Visiting Fellow

Project Staff

(South-East Asia Urban Environmental Management Applications Project)

PRITAM KRISHNA SHRESTHA, **Project Manager**

MARITESS I CABRERA, **Network Coordinator**

Project Associates

BIMALENDU MOHANTY
FARHAT JAHAN CHOWDHURY
MD MOZAMMEL HAQUE
RUTMANEE ONGSAKUL
RAJANI A RAJBHANDARI
LEKHA RATNAYAKE
PRAJAPATI SHAPKOTA

CONCORDIA P POGOY, **Program Assistant**

PANUWAT BOONYANAN, **Project Technician**

24.4 Completed Grant and Sponsored Research

Research project on "Rental Housing of the Low-income Groups in Bangkok Metropolitan Area (BMA)

Project Description: The research project is aimed to help understand the housing market in terms of rental housing availability on low income housing. The issues and needs in rental housing from the perspective of both the renter and the owner are identified. The typology and environmental conditions of rental housing in the urban poor is also examined.

Duration: 27 October 2004 to 31 December 2005

Investigator: Dr L A S Ranjith Perera

Sponsor: National Housing Authority, Thailand

Total Contracted Amount: Baht 2,495,500

UEM - GENDEV Collaboration

Duration: 26 September 2000 to 31 December 2005

Investigator: Prof Nurul Amin
Dr Barbara Earth
Dr Kyoko Kusakabe
Dr Ranjith Perera
Dr Bernadette Resurreccion
Dr Edsel Sajor

Sponsor: United Nations Human Settlements Programme (UN HABITAT)

Total Contracted Amount: Baht 9,374,102 (9,316,726)

UMP (Urban Management Programme)-AIT Partnership

Duration: 15 September 2002 to 31 December 2005

Investigators: Prof Nurul Amin
Dr Barbara Earth

Dr Kyoko Kusakabe
Dr Ranjith Perera
Dr Bernadette Resurreccion
Dr Edsel Sajor
Dr Nowarat Coowanitwong
Dr Vilas Nitivattananon

Sponsor: United Nations Human Settlements Programme (UN HABITAT)

Total Contracted Amount: Baht 10,911,198 (11,241,645)

UEMP-Asia project (Economic & financial Considerations in urban Environment Management

Duration: one month

Investigator: Prof A T M Nurul Amin

Sponsor: UNCHS, Nairobi

Total Contracted Amount: Baht 165,000.00

24.5 Ongoing / In Progress Grant and Sponsored Research

SEA-UEMA Project (Southeast Asia Urban Environmental Management Applications

Project Description: The Canadian International Development Agency (CIDA) and the Asian Institute of Technology (AIT) have entered into a contribution agreement on urban environmental management. This is in the form of Southeast Asia Urban Environmental Management Applications (SEA-UEMA) Project, which aims to improve the Urban Environmental Management (UEM) policies and good practices in the region. CIDA has allocated a total CAN\$9.5 million over 5 years (2003-2008) for developing, managing and implementing this project by AIT. The goal of the project is to contribute to the improvement of urban environmental conditions in Southeast Asia (SEA) region. It seeks to attain improved implementation and sharing of sound urban environmental management policies and practices in the three key urban environmental sub-sectors (water and sanitation, solid waste, and air pollution) in Southeast Asian region with environment and gender equality as the two crosscutting themes. For emphasizing both UEM education and its application, the project has adopted a two-prong funding approach.

Duration: November 2003 to November 2008

Investigators: Dr Ranjith Perera (Project Director)
Prof A T M Nurul Amin
Dr Nowarat Coowanitwong
Dr Kyoko Kusakabe
Dr Vilas Nitivattananon
Dr Edsel Sajor

Sponsor: Canadian International Development Agency (CIDA)

Total Contracted Amount: CAN\$ 9,479,839

Toyo-AIT Workshops

Project Description: The FoS organizes and conducts a summer workshop for undergraduate students of several Japanese Universities. The workshop participations generally come from six universities where there are former faculty of HSD and UEM. The workshop program includes lectures and field visits to some selected communities, NGO's and governmental organizations in Thailand. The workshop explores the urban development and environmental management issues of Bangkok.

Duration: On going from 2001, once a year

Investigator: Dr Ranjith Perera

Sponsor: Tokyo University

Total Contacted Amount: about Baht 600,000 per year

24.6 Publications**Refereed Journals**

Amin, A T M N (2005), The Informal sector's Role in Urban Environmental Management, *International Review for Environmental Strategies*. Vol.5, No.2, pp. 511-529.

Atsanavong, L, Perera, R and Koottatep, T (2005), Decentralised Sanitation Systems: Reaching an Under-served Urban Community, *Juth Pakai*, Vol.1, No.4, pp.6-17

Charuvichaiyont, Chanisada and Sajor, Edsel (accepted 2005, forthcoming) Promoting Waste Separation for Recycling and Local Governance in Thailand, *Habitat International*

Coowanitwong, N, Wu, C Y, Cai, M, and Watano, S, Removal of Nitrogen Oxides using Nanosized Catalysts prepared by Dry Mechanical Coating Technique, 2006, submitted to *Journal of Environmental Engineering Science*.

Indarto, A, Choi, J W, Lee, H, Song, H K, and Coowantiwong, N, Discharge Characteristics of a Gliding-Arc Plasma in Chlorinated Methane Diluted in Atmospheric Air, *Plasma Devices and Operation*, 14(1), 2006, pp.15-26.

Pornchockchai, S and Perera, R (2005), Housing Speculation in Bangkok: Lessons for Emerging Economies, *Habitat International* Vol 29, pp.439-452

Sajor, Edsel (2005) Professionalization or Hybridization? Real Estate Brokers in Metro Cebu, Philippines during the Boom of the 90s, *Urban Studies* Vol. 42, No. 8, pp. 1-23 (Routledge, Taylor and Francis Group).

Sajor, Edsel (2005), Book Review "Enhancing Urban Management in East Asia" by **Mila Friere and Belinda Yuen** (Eds). *Urban Studies*. Vol. 42, No. 13, pp. 2532-34 (Routledge, Taylor and Francis Group).

Shrestha, G and Perera, R (2005), Giving Women a Voice in Urban Governance: Experiences from UMP-Asia, *Habitat Debate*, Vo.11, No4, pp.13

Refereed Books/Chapters

Sinha, A H M M and Amin, A T M N (2005). Dhaka's Waste Recycling Economy: Focus on Informal sector Labour Groups and Industrial Districts in **Amin, S M N and Baqee, A** (edited), *Waste Management Studies in Bangladesh* (Dhaka: UDOA), pp. 182-202.

Coowanitwong, N, Shapkota, P, and Aquino, P A (Eds): In Abstracts of the Papers *International conference on Integrated Solid Waste Management in Southeast Asian Cities*, 2005, pp. 1-49.

Conference Proceedings

Perera, Ranjith and Pradhan, Pravakar, Prospects of Multi-Habitation approach for poverty reduction in Asian cities, *Asian Institute of Technology / Center for Sustainable development studies*, ISBN: 974-8257-126 August (2005).

Shapkota, P, Coowanitwong, N, Visvanathan, C, and Traenkler, J, Potentials of Recycling Municipal Solid Waste in Asia vis-à-vis a Case Study of Recycle Industry in Thailand, Abstracts of the Papers of the *International Conference on Integrated Solid Waste Management in southeast Asia Cities*,

Siem Reap, Cambodia, July 5-7, 2005, p.35.

Suttibak, S and **Nitivattananon, V**, Enhancing Capacity of Local Government in Solid Waste Management – Review of Current Status in Thailand, *International Conference on Integrated Solid Waste Management in Southeast Asia cities*, Siem Reap, Cambodia, 5-7 July 2005.

Thanaprayochsk W, Amin, A T M N and **Nitivattananon, V**, Application of Economic Instruments to Influence People's Decision in Choice of Transportation Mode for Reducing Growth Rate of Vehicles in Bangkok, *Asian Planning Schools Association Conference (APSA) 2005*, Penang, Malaysia 15-19 September 2005

Vin, Spoann, Nitivattananon, V and **Amin, A T M N**, Assessment of Solid Waste Collection Contracted Service in Siem Reap, Cambodia, *International Conference on Integrated Solid Waste Management in Southeast Asia Cities*, Siem Reap, Cambodia, 5-7 July 2005.

Other Publications

Amin, A T M N (2005), Theory and Practice of Using Economic Instruments for Environmental Protection and Management, paper presented to *Regional Training Workshop on Economic Instrument for Environmental Management in Asia*, Intergraded Research and Action for Development (IRADe), 27-29 April, New Delhi, India, p.41.

24.7 Doctoral Students' Dissertation

Local Governance and Public Participation in Sustainable Solid Waste Management in Hatyai Municipality, Thailand
by Chanisada Charuvichaipong
Supervisor: Dr Edsel Sajor

24.8 Masters Students' Theses and Research Studies

An Assessment of Inadvertent Outcomes on SWM privatization and MFR Centers on the Informal Sector in the Philippines
by Beverly Cayaga Santos
Supervisor: Dr Edsel E Sajor

Application Economic Instruments to Influence People's Decision on Choice of Transportation Mode Towards Reducing Car Use in Bangkok
by Worawan Thanaprayochsak
Supervisors: Prof A T M Nurul Amin
Dr Vilas Nitivattananon

Assessment of Contracted Waste Collection Services: Case Study in Siem Reap Town, Cambodia
by Spoann Vin
Supervisors: Dr Vilas Nitivattananon
Prof A T M Nurul Amin

Chemical Reactions using Gliding Arc Plasma
by Indarto Antonius
Supervisors: Dr Hyung Keun Song
Dr Nowarat Coowanitwong

Community-Driven Regulation (CDR) Model in Industrial Pollution Regulation in Hanoi: Interaction Between Community, State, Firm and Extra-Local Actors
by Hoang Ngoc Ha
Supervisor: Dr Edsel E Sajor

Cost Comparisons of Composting Options by Using Material Flux Analysis (MFA) in Solid Waste Management for Dhaka, Bangladesh.
by Md Asaduzzaman
Supervisors: Dr Thammarat Koottatep
Dr Vilas Nitivattananon

Effectiveness of Infrastructure Development Projects Implemented for Sanitation Improvement at Public Schools in Vientiane, Lao PDR
by Bannaseng Syphoxay
Supervisor: Dr L A S Ranjith Perera

Environmental Impacts of Urban Sprawl on Land Use Changes and Air Quality: A Case Study of Latkrabang District, Bangkok, Thailand
by Tanaphoom Wongbumru
Supervisor: Dr Nowarat Coowanitwong

Environmental Management Measures for Controlling Vehicular Air Pollution: Case Study of Hanoi, Vietnam

by Trinh Thi Bich Thuy
Supervisor: Prof A T M Nurul Amin

Environmental Management System in Local Government Bodies: A Comparative Study of Hita City, Japan and Lampang, Thailand

by Yoshiaki Totoki
Supervisor: Dr L A S Ranjith Perera

Haphazard Land Use Conversion and Impact on Living Environment in Fringe Areas of Phuly (Vietnam): challenge of Decentralization and Public Participation in Transitional Economy.

by Hoang Duc Vuong
Supervisor: Dr Edsel E Sajor

Impacts of Existing Land Use Pattern on Urban Physical Mobility and Air Quality in Bandung City, Indonesia

by Ariva Sugandi Permana
Supervisor: Dr L A S Ranjith Perera

Implementation of Land Use Plan with Emphasis on the Impact on Living Environment: A Case Study in Vientiane Municipality, Lao PDR

by Chanthasack Bottaphaniith
Supervisor: Dr Edsel E Sajor

Implications of Haphazard Urbanization and Industrialization in Samut Sakhon Province on the Tha Chin River in Thailand

by Malavika R. Tripathi
Supervisor: Dr L A S Ranjith Perera

Improving Basic Service Delivery to Urban Poor by Local Environmental Management: A Study of a Poor Community (Thoria Sahi) in Cuttack City, Orissa, India

by Choudhury Mihir Charan Mohanty
Supervisor: Prof A T M Nurul Amin

Integrated Policy Approach to Environmental Management in the Construction Industry: An Exploratory Study in Ahmedabad, India

by Neeraj Singh Rana
Supervisor: Dr L A S Ranjith Perera

Local Policy and Participatory Approaches in Regulating Carbon Monoxide Emissions from Transportation: A Case Study of Puerto Princesa City, Philippines

by Peachie Ann Asuncion Aquino
Supervisor: Dr Nowarat Coowanitwong

Modeling Solid Waste Generation in South Jakarta Municipality Based on the Dynamics of Urban Growth

by Mohammad Noor Andi Kusumah
Supervisors: Dr L A S Ranjith Perera
Dr Vilas Nitivattananon

New Policy for Slum Upgrading: A Case Study of Dey Krohom Community in Phnom Penh, Cambodia

by Ros Meng
Supervisors: Dr Edsel Sajor
Dr Nowarat Coowanitwong

Point of Use Drinking Water Treatment Techniques: A Study of Potentials and Constrains in Urban Area of Kathmandu, Nepal

by Arinita Maskey
Supervisors: Prof A T M Nurul Amin
Dr Nowarat Coowanitwong

Poverty and Local Environment Nexus: Evidences from Two Slum Communities in Rajshahi City, Bangladesh

by Md Jahan Boksh Moral
Supervisor: Prof A T M Nurul Amin

Public Administration Reform Process and Improvement of Water Supply Delivery Systems in Municipalities of Cambodia

by Chea Bunseang
Supervisor: Dr Edsel E Sajor

Public-Private Partnership for Improving Water Supply Based on Willingness and Affordability to Pay: A Case Study of Yangon, Myanmar

by Sein Htike Thu
Supervisor: Prof A T M Nurul Amin

Resident Associations as New Governance Institutions for Effective Managing Neighborhood Public Spaces and Living Environment: Case Study of Three Housing Projects in Bangkok Metropolitan Region.

by Sronkanok Tangjaijit
Supervisor: Dr Edsel E Sajor

Urban Vulnerability Assessment for Disaster Mitigation Planning: Application of the Radius Tool in Ahmedabad City, India

by Jasleen Kaur Bhinder
Supervisor: Dr L A S Ranjith Perera

Chapter 25: SCHOOL OF MANAGEMENT

25.1 Introduction

The School of Management is Asia's pioneer institution for management development programs in International Business and Management of Technology.

The School was established in October 1987 to meet the growing need for managerial expertise in the Asia - Pacific region. The School strongly believes in the intensive development of corporate leaders for the present and future.

As the world undergoes revolutionary changes on the social, economic, political and technological fronts, various programs of the School offer unique competitive advantage to managers and enterprises by sharing expertise in international business and management of technology.

Perhaps the most important feature of the School of Management is that it offers an amazing cross-cultural experience with:

An international student body. Students from 30 countries participate in our various program. They work and live together in a 160-hectare campus north of Bangkok.

A multinational faculty. A highly qualified and experienced faculty from 15 countries facilitates the participant learning and provides a real multi-cultural touch to management education.

An international approach to management education. Courses are designed to prepare program participants to become effective international managers in an increasingly global business environment. The participants are encouraged to take part in international exchange programs with US, European and Asian universities.

25.2 Mission

The School of Management derives its mandate from AIT Mission to produce highly qualified and committed professionals, who can play a leading role in the sustainable development of the region.

As such the mission is to share and jointly create new knowledge in the field of management, to enable our program participants to build upon their experience to move on to highly respected positions in management profession and public life.

25.3 School Governance

Dean of School

INDRA M PANDEY, MComm, PhD, Univ of Delhi, India.
Professor

Associate Dean

ROY KOUWENBERG, MSc, PhD, Erasmus Univ of Rotterdam, The Netherlands.
Assistant Professor

25.4 Center and Research

The School of Management is involved in training and extension activities through the Management Development Programs.

Corporate Relations and Executive Development Services (**CREDS**) function is established as an integral part of the School of Management (SOM). It is the research, consultancy, and executive development arm of the School. SOM's non-degree academic activities and programs are organized in project format under CREDS, which complement SOM's degree programs and other related activities of SOM. It facilitates the linkage between SOM, AIT and

the business community and public sector in Asia.

The objectives of CREDS:

To establish closer links between the business community/public sector and SOM through executive education programs and consulting in the areas of Management of Technology, International Business, Service Marketing and Technology, and International Public Management.

To facilitate the development of research projects which are both of high practical value to the business community/public sector and academically rigorous.

To facilitate research and consulting activities among SOM faculty members.

CREDS activities include:

- Corporate relationship management
- Executive development programs
- Organizing executive forums, workshops, seminars, and conferences
- Other activities contributing to CREDS and SOM's objectives

Finally AIT, SOM faculty and students are actively involved in research and publication activities necessary to create new knowledge in management and related fields.

25.5 Research Facilities and Laboratories

The School of Management has its own computer laboratories to support management education. For instructional purposes, there is a network of over 60 computers for student's use. As an SOM student, you can log into SOM LAN and access all its facilities.

There are two computer laboratories which are located on the 2nd floor of the SOM building, Rooms 206 and 208. They are open 24 hours daily.

Laboratory consultants are available during office hours to assist with computer related problems that may arise in the lab. The consultants will provide help by answering general questions relating to the lab e.g., how to obtain a computer account, questions related to the PC Proficiency (i.e., class and test schedules and administering tests by appointment), questions about software applications, e-mail, printing etc.

The School of Management has 5 state-of-the-art multimedia classrooms including a large amphitheater for academic use. Each classroom is equipped with a multimedia podium that consists of LCD projectors, audio cassette recorder, VHS player/recorder, slide projectors or visualizer, built-in desktop PC, laptop and wireless internet connection.

The staff can assist the students in setting up the computer projection, orient them on how to use the multimedia equipment and will help in any problems with any equipment in the classroom.

25.6 Faculty and Research Staff

Full-time Faculty

NAZRUL ISLAM, BScEng, BUET, Bangladesh; MEng, DEng, AIT, Thailand.

Professor (*Management of Technology; Technology and Development; Technology Policy; Technology Transfer*)

LALIT M JOHRI, BSc(Hons), MSc, MBA, PhD, Univ of Delhi, India.

Professor (*International Business; International Joint Ventures; Marketing; Negotiations; Strategic Management*) [International Competitiveness of Industries ; International Competitiveness of Firms ; Entry and Expansion strategies for Asian Markets; Launching and Managing East West Joint Ventures and Alliances; Management of subsidiaries; International Supply Chains Design and Management]

INDRA M PANDEY, MComm, PhD, Univ of Delhi, India.

Professor

HIMANGSHU PAUL, BE, Univ of Gauhati, India; MEng, PhD, AIT, Thailand.

Professor (*Manufacturing Supply & Logistics; Manufacturing Strategy; Manufacturing Technology Management; Operations Management; TQM*)

[Project Management; Purchasing and logistics management; Total quality management; Operations management; Manufacturing technology strategy; Manufacturing strategy; Benchmarking]

JOHN C S TANG, BS, MS, PhD, Univ of Florida, USA.

Professor (*Engineering Economy; International Economics; International Operating Environment of Business; Managerial Economics*)

[Managerial Economics; International Economics; Economic Appraisal of Projects]

BARBARA IGEL, BA, MA, Technical Univ, Berlin; PhD, Freie Univ, Berlin, Germany.

Associate Professor (*High-tech Entrepreneurship; Industrial Economics; Knowledge Management; Management of Innovation*)

[Knowledge Management; Management of Innovation; High-tech Business Start-up; Science and Technology Parks]

DO BA KHANG, MSc, Eotvos Lorand Univ, Hungary; MSc, DTechSc, AIT, Thailand.

Associate Professor (*Management Science; Operations Management; Project Management; Service Management; Small and medium enterprises (SME) support and management*)

[Project Management in Asia: theory and practice; Monitoring and evaluating not-for-profit development projects; Service quality and service productivity: modeling and applications; Small and medium enterprises in ASEAN countries]

TRUONG QUANG, BSc, MSc, Natl Inst of Administration, Vietnam; MPA, Inst of Social Studies, The Hague; PhD, Free Univ, The Netherlands.

Associate Professor (*Brand Management; Human Resources Management; International Business; Organizational Behavior; Public Policy*)

[Administrative reform in the public sector; Human resource management/development; Organizational change and transformation; Business entry strategy in emerging economies]

SUNUNTA SIENGTHAI, BA, Chulalongkorn Univ, Thailand; MA, PhD, Univ of Illinois, USA.

Associate Professor

[Strategic Human Resource Management; The New Economy, eWork and Employment Practices; HRM and Organizational Learning for Productivity Improvement; International HRM; Career Management and Organizational Performance; Labor Relations, Productivity and Enterprise Competitiveness; Developing and Nurturing HRD Systems in the K-Economy]

FREDRIC W SWIERCZEK, BA, Temple Univ, USA; MA, PhD, Univ of Pittsburgh, Pennsylvania, USA.

Associate Professor (*Behavioral Science; Organizational Development*)

[Behavioral Science; Organizational Development]

WILLI ZIMMERMANN, PhD, Munich Univ, Germany.

Associate Professor

NICHOLAS J DIMMITT, BA, MA, San Francisco State Univ; PhD, Univ of Southern California, USA.

Assistant Professor (*Action Research; Business Communication; Business Ethics; Curriculum Development; Educational Policy and Administration; Facilitation of Professional Development & Training; Language Policy and Language Planning; Research Facilitation*)

[Business Communication; Business Ethics; Language Policy and Language

Planning; Professional Development and Training]

ROY KOUWENBERG, MSc, PhD, Erasmus Univ of Rotterdam, The Netherlands.

Assistant Professor (*Finance; Portfolio Management*)

[Investment; asset liability management; financial engineering; option pricing; continuous-time finance; hedge funds; financial econometrics / empirical finance]

DONYAPRUETH KRAIRIT, BS, Thammasat Univ, Thailand; MS, Univ of Colorado at Boulder; PhD, Massachusetts Inst of Tech, Cambridge, USA.

Assistant Professor

Alternative Dispute Resolution (ADR); International Business Law; International Private Law; Legal and Judicial Reforms / Good Governance; Regional Integration Legal and Institutional Framework; Technology related legal issues
[International Arbitration and Alternative Dispute Resolutions (ADR); Information and Communication Technology Law; Legal and Judicial Reforms / Good Governance; Technology related legal issues; Regional Integration Legal and Institutional Framework; E-governance]

Visiting Faculty

TAE-HONG JIE, BS, Korean Naval Academy; MA, Seoul Natl Univ, Korea; MS, US Naval PG School, USA; PhD, Brunel Univ, UK.

Visiting Professor

ILKKA KAURANEN, MS Engg, Lic Tech, DTech, Helsinki University of Technology, Finland.

Visiting Professor (*Development and Management in Industry*)

[Technology-based Companies, Commercializing Technological Inventions, Research & Development Management, Entrepreneurship, and Regional Development]

SUNDAR VENKATESH, BSc, BL, Univ of Calcutta; PhD, Indian Inst of Management, India.

Visiting Associate Professor (*Finance; Financial Accounting*)

[Corporate Governance and Disclosure practices; Financial Restructuring of firms in distress; Use of financial information in management control]

ROLAND AMOUSSOU-GUENOU, LLB, National Univ of Benin, South Africa; LLM, Univ of Toulouse, France; PhD, Univ of Paris II, France.

Visiting Lecturer (*Information and Communication Technology Law; International Arbitration and*

25.7 Completed Grant and Sponsored Research

Asian Emergence

Project Description: The research was carried out during a period when there was a sharp escalation both in public awareness and in public concern about global outsourcing, where Asia has been presented as the world's back office, as a threat to employment in all developed countries as well as a site of exploitation of cheap labour. Case study approach is used to investigate the firms that undertake telemediated work from Europe, focusing on the firm's characteristics, business functions, motives of management of both 'source' and 'destination' firms engaged in the telemediated work, the process of relocation: facilitators and barriers, impact and effects in source firms, consequences on labour and government.

Duration: 1 June 2002 to 31 December 2005

Investigator: Dr Sununta Siengthai

Collaborator: Institute for Employment Studies, UK

Sponsor: European Commission

Total Contracted Amount: Baht 7,254,204

Strategic Human Resource Management for Firm Innovation and Competitive Advantage

Project Description: This research investigates on (1) human resource management as a critical success factor in productivity improvement and innovation enhancement in the manufacturing and service industries; (2) the role and development of the management information system in these industries; and (3) factors enhancing the learning process and knowledge management in the industries to increase the organizational competitiveness.

Duration: 1 June 2002 to 30 June 2005

Investigators: Dr Sununta Siengthai

Prof Chongrak Polprasert

Dr Clemens Bechter

Collaborator: Dr Uthai Tanlamai, Chulalongkorn University

Sponsor: Royal Thai Government

Total Contracted Amount: Baht 900,000

25.8 Publications

Conference Proceedings

Serkkola, Ari, Hänninen, Seppo, Ikävalko, Jaakko, and Kauranen, Ilkka (2005), Integrating Technological and Service Characteristics in the Study of Innovation, Presented at the *14th International Conference on Management of Technology*, Austria, May 20-24, in Vienna, Austria.

Other Publications

Lars, Strang and Kauranen, Ilkka (2005), Ericsson's successful turnaround, Teaching case. European Case Clearing House, ECCH. Cranfield University, Wharley End, United Kingdom. Accepted for publication.

Lars, Strang and Kauranen, Ilkka (2005), Ericsson's successful turnaround", Teaching note. European Case Clearing House, ECCH. Cranfield University, Wharley End, United Kingdom. Accepted for publication.

Ruokolainen, Jari, Kauranen, Ilkka and Igel, Barbara (2005), T J S Consultants' First Customer References – A Teaching case for IT Firms Entering Business, Teaching case. *Management Case Study Journal*. International Graduate School of Business, University of South Australia, Adelaide, Australia.

Ruokolainen, Jari, Kauranen, Ilkka and Igel, Barbara (2005), T J S Consultants' First Customer References – A Teaching case for IT Firms Entering Business", Teaching note. *Management Case Study Journal*. International Graduate School of Business, University of South Australia, Adelaide, Australia.

25.9 Doctoral Students' Dissertation

International Business

National R & D Program: A Study of the Highly Advanced National (HAN) Program in the Korean Innovation System

by Tai-Surp Joe
Supervisor: Prof Lalit M Johri

Relational Capital and Performance of International Joint Ventures in Vietnam

by Lai Xuan Thuy
Supervisor: Dr Truong Quang

The Effect of Cognitive Dissonance and Human Resource Management on Learning Work Behavior for Performance Improvement: An Empirical Investigation of Thai Corporations

by Decha Dechawatanapaisal
Supervisor: Dr Sununta Siengthai

Management of Technology An Empirical Study of the Impact of Absorptive Capacity on Technology Transfer Effectiveness in the Flexible Packaging in Thailand

by Naruemon Whangthomkum
Supervisor: Dr Barbara Igel

Managing Knowledge for Business Process Innovation-Multiple Case Studies in Implementing IT Solutions

by Phasit Kanjanasanapetch
Supervisor: Dr Barbara Igel

Technological Capability Development after Privatization: Case Studies of Two Telecommunications Service Providers

Dhammika Padmakumari Abeysinghe
by Prof Himangshu Paul
Supervisor: Dr Nazrul Islam

Technology Usage, Quality Management Systems and Service Quality: A Study of Thai Hospital

by Nilubon Sivabrovornvatana
Supervisors: Dr Donyaprueth Krairit
Prof Himangshu Paul

25.10 Masters Students' Theses and Research Studies

International Business

Organizational Effectiveness in Product and Service Delivery: A Comparative Study the Provincial Electricity Authority (PEA) and Small Power Producers (SPPs) in Thailand

by Plemruthai Chayantnakorn
Supervisor: Dr Sununta Siengthai

Research Study: A Business Study of Bus Transportation Sector in Dhaka, Bangladesh

by Ashiqur Rahman
Supervisor: Dr Willi Zimmermann

Research Study: A Comparison of Teeth Whitening Products Toward Customer Satisfaction and Self-Presentation: A Case Study in Thailand

by Ronavish Chulajata
Supervisor: Dr Sununta Siengthai

Research Study: A Corporate Strategy for Agriculture Leasing Company I of Vietnam Bank for Agriculture and Rural Development

by Phan Cu Nhan
Supervisors: Dr Nguyen Thi Hon Thuy
Prof Francois Joel Broustail

Research Study: Airline Web Sites Versus Other Travel Web Sites: An Exploratory Study of Customer Preference and Its Implications for Airlines in India

by Suresh Singh
Supervisor: Dr Fredric W Swierczek

Research Study: Analysis of the Direct Selling Environment in China

by Jinghua Lu
Supervisor: Prof John C S Tang

Research Study: An Analysis of Bond and Equity Indices in Thailand

by Tanaporn Javanaguru
Supervisor: Dr Roy Kouwenberg

Research Study: An Assessment of the Impact of WTO on Bhutan

by Karma Dorji
Supervisor: Dr Fredric W Swierczek

Research Study: An Overview of Foreign Direct Investment in Bhutan

by Tashi Jamtsho
Supervisor: Prof John C S Tang

Research Study: A Strategy for a Digital Marketing Research Service in Thailand

by Benjaporn Jarurak
Supervisor: Dr Fredric W Swierczek

Research Study: A Strategy to Expand International Clients: A Case Study of Bangkok Hospital

by Urapa Watanachote
Supervisor: Dr Fredric W Swierczek

Research Study: A Study of the Current Tools/ Methodologies Used for Country Risk Assessment

by Amit Kumar Ghosh
Supervisor: Prof John C S Tang

Research Study: A Study on Non-Tradable Shares in China's Listed Firms: History, Problems and Reforms

by Chen Muyu
Supervisor: Prof John C S Tang

Research Study: A Survey of Financial and Management Accounting Practices in SMEs in Thailand

by Earl Kongsuwan
Supervisor: Dr Sundar Venkatesh

Research Study: A Survey of Financial and Management Accounting Practices in SMEs of Bangladesh

by S M Miraj Ahmmud
Supervisor: Dr Sundar Venkatesh

Research Study: Bilateral Investment Relationship Between ASEAN and Yunnan Province, P.R. China

by Dong Yu
Supervisor: Prof John C S Tang

Research Study: Brand Awareness, Associations, and Influences on Purchasing Decisions: A Case Study of the Body Shop Thailand

by Jitchaya Wiroonrat
Supervisor: Prof Lalit M Johri

Research Study: Branding Strategy of "Double A" in Thailand: The Study of Strategic Brand Concept Management (BCM)

by Thanawan Sirivorapat
Supervisor: Prof Lalit M Johri

Research Study: Business Challenges in China: A Case Study of Thai-Chinese Business Center in Kunming, Yunnan Province

by Piyathida Teerakunchaikij
Supervisor: Prof John C S Tang

Research Study: Business Development Plan for Rapid Prototyping Technology in Medical Application

by Kiattichai Kalasin
Supervisor: Dr Barbara Igel

Research Study: Business Prospects of the Lucky Spinning Company Ltd., in Light of WTO

by Selvaraj Sudhagar
Supervisor: Prof John C S Tang

Research Study: Career Development Practices in the Hotel Industry: A Case Study of Selected Hotels in Yunnan Province, China

by Zhang Haowei
Supervisor: Dr Sununta Siengthai

Research Study: China's WTO Accession: A Study on Chinese Engineering Consulting Industry

by Liu Guobo
Supervisor: Prof John C S Tang

Research Study: Collateralized Debt Obligations (CDOs) in an Emerging Market: A Study of the Thai Banking Sector

by Vilai Aerprasertwong
Supervisor: Dr Roy Kouwenberg

Research Study: Cross Cultural Management in a Korean-Myanmar Joint Venture Firm

by Myo Thet Nwai
Supervisor: Dr Fredric W Swierczek

Research Study: Current Financial Structure and Regulations of the Banking Sector: A Comparative Study of Nepal and Thailand

by Rajiv Kumar Gupta
Supervisor: Dr Roy Kouwenberg

Research Study: Customer Relationship Management (CRM) of Service Industry in Thailand: A Case Study of Advance Info Service Public Company Limited (AIS)

by Thunwita Sirivorapat
Supervisor: Dr Donyaprueth Krairit

Research Study: Developing an International Program for Kunming Medical College

by Cai Hong Yu
Supervisor: Dr Fredric W Swierczek

Research Study: Differences in Cultural Values in the Myanmar Business Environment

by Sandar Win
Supervisor: Dr Fredric W Swierczek

Research Study: Digital Money-Opportunities and Challenges: A Comparative Study of France-Thailand

by Christine Poilane
Supervisors: Dr Fredric W Swierczek
Dr Nicholas J Dimmitt

Research Study: Economic Sanctions: A Credible Instrument in Foreign Policy?

by Stephane Korvin
Supervisor: Prof John C S Tang

Research Study: Effects of Kyoto Protocol on Energy Efficiency & Environmental Upgrading Initiatives in Indian Corporations and the Development of Emissions Trading Market in India

by Suparno Ranjan Majumdar
Supervisor: Dr Willi Zimmermann

Research Study: Factors Influencing Service Performance of Frontline Staff in the Airlines Service Delivery

by Orawan Charoensukmongkol
Supervisor: Dr Fredric W Swierczek

Research Study: Government Policy, Growth and Investment in Textile Industry in India

by Pradip Ghosh
Supervisor: Dr Roy Kouwenberg

Research Study: Is the Thai Market Ready for Health-Conscious Food Concepts? Overall Study and Proposition of a Low-fat

by Guillaume Vimard
Supervisor: Prof Lalit M Johri

Research Study: Management of SARS: The Case of Hong Kong

by Helene Piques
Supervisor: Prof Ilkka Kauranen

Research Study: Management Skill Training Needs for Different Groups of Supervisors of Electrical and Electronics Firms

by Kamoltip Sin-Am
Supervisor: Dr Sununta Siengthai

Research Study: Marketing Communication for Life Insurance: A Case Study of Thai Life Insurance Co., Ltd.

by Jitvimol Mekingthong
Supervisor: Dr Nicholas J Dimmitt

Research Study: Marketing Strategy of Tourism Industry: A Case Study of Huong Giang Travel Company

by To Manh Ha
Supervisors: Dr Vo Thanh Hung
Prof Francois Joel Broustail

Research Study: Obstacles of Company Financing: Case Study of Small and Medium Enterprises in Cambodia

by Bun Sonia

Supervisor: Prof John C S Tang

Research Study: Organizational Behavior in Small and Medium-Sized Enterprises in China

by Zhang Yao

Supervisor: Dr Fredric W Swierczek

Research Study: Outlook for the Chinese Pulp and Paper Industry: Case Study of Stora Enso in China

by Huang Yan

Supervisor: Prof John C S Tang

Research Study: Ownership Concentration and Firm Performance: Evidence From Thailand

by Krishna Prasad Kafley

Supervisor: Dr Sundar Venkatesh

Research Study: Post-Quota Garment Industry and WTO Membership: Strengthening the Cambodian Garment Industry in the WTO

by Ken Rathna

Supervisor: Dr Willi Zimmermann

Research Study: Rock of Ages Corporation: A Case Study of a Stagnant Company in a Stagnant Industry

by Jesse Douglas Bronson

Supervisor: Prof Lalit M Johri

Research Study: SMEs in Lao: Developing Successful Entrepreneurship: The Case of Mekoxab Company

by Anousith Luanglath

Supervisors: Dr Nguyen Chan

Prof Francois Joel Broustail

Research Study: Sponsoring and the Event Market in Thailand: A Key Entry Strategy for Foreign Firms?

by Fleur Gastaldi

Supervisor: Dr Fredric W Swierczek

Research Study: Stock Selection in the Chinese Equity Market

by Zhao Weilu

Supervisor: Dr Roy Kouwenberg

Research Study: Strategic Brand Management and Communication: A Case Study of Audi in Thailand

by Patcharaporn Charoenjirakajorn

Supervisor: Prof Lalit M Johri

Research Study: Strategic Counterfeiting Management in the Pharmaceutical Industry: An Implementation Approach

by Rafael Zeis

Supervisor: Dr Fredric W Swierczek

Research Study: Strategic Decision Making for Private Label Introduction: A Case Study of Hypermarkets in Thailand

by Sujin Rattanajareet

Supervisor: Dr Sundar Venkatesh

Research Study: Strategic Operations Management in the Airlines Industry: A Comparative Case Study of Scandinavian Airlines and Nok Air

by A K M Abdus Shakoor

Supervisor: Dr Sununta Siengthai

Research Study: Sustainable Tourism: A Review of Good Practices in Future Stakes

by Camille Giordani

Supervisor: Dr Nicholas J Dimmitt

Research Study: Tangerine Marketing in Thailand: A Study of a Tangerine Wholesale Market at Talaad Thai

by Siriporn Promdee

Supervisor: Dr Sununta Siengthai

Research Study: The Business Environment in Shanghai, China: Opportunities and Challenges

by Yongmei Chen-Wegmann

Supervisor: Prof John C S Tang

Research Study: The Fragrance Industry in Thailand: The Scent of Success

by Michael Corp Dyrendal

Supervisor: Dr Fredric W Swierczek

Research Study: The Glass Ceiling as a Gender Issue

by Marlene Ivars

Supervisor: Dr Donyaprueth Krairit

Research Study: The Future of Organized Retailing in India: Strategies and Implications

by Rahul Kholi

Supervisor: Dr Fredric W Swierczek

Research Study: The Impact of Generics on the Indonesian Crop Protection Business

by Anshul Sarda

Supervisor: Dr Roy Kouwenberg

Research Study: The Impact of Liquidity on a Bank's Overall Performance: Comparative Study of Bank Muamalat Indonesia and Bank Mandiri

*by Rama Ruchyama
Supervisor: Dr Sundar Venkatesh*

Research Study: The Increasing Role and New Challenges of Project Risk Management in Companies Today

*by Kevin Rochard
Supervisor: Dr Do Ba Khang*

Research Study: The Microcredit: A Viable Instrument for a Sustainable Alleviation of Poverty?

*by Marie-Helene Korvin
Supervisor: Dr Fredric W Swierczek*

Research Study: The Poor as the Center of the Value Chain: New Challenges for Corporate Social Responsibility

*by Imae Ann F Mojado
Supervisor: Dr Willi Zimmermann*

Research Study: The Recruitment and Selection Practices of MNCs and SMEs in Myanmar: A Case Study of Schlumberger Oilfield Services and ACE Data Systems Ltd.

*by Moe Moe Swe
Supervisor: Dr Sununta Siengthai*

Research Study: The Textile and Clothing Problem of the EU Trade Policy Towards China

*by Arya-Marie Ba Trung
Supervisor: Dr Fredric W Swierczek*

Research Study: The Tourism Industry in the Kyrgyz Republic: Challenges and Prospects

*by Asel Bektashova
Supervisor: Dr Fredric W Swierczek*

Research Study: Tourism Recovery on Tsunami Affected Area in Thailand

*by Benjamin Conrazier
Supervisor: Dr Nicholas J Dimmitt*

Research Study: Tourism Risk Management in Asia: The Actors Strategies Against Emerging Threats

*by Johann Breton
Supervisor: Dr Fredric W Swierczek*

Project: Being a Strategist on a Trading Floor

*by Aviva Biglaizer
Supervisors: Dr Willi Zimmermann
Dr Patrick Epingard*

Project: Commodity Futures Exchange in Thailand)-Challenges and Outlook

*by Dileep K V
Supervisor: Dr Roy Kouwenberg*

Project: Crises Increasingly Lead Firms to a Communication Dead-End: A Case Study on Altran Group

*by Gelebart Erwan
Supervisor: Dr Nicholas Dimmitt*

Project: Environmental Sustainability vs Business Strategy

*by Aurelie Longuet
Supervisor: Dr Fredric W Swierczek*

Project: Market Study for MVIOS in ROA (Rest of Asia)

*by Ajay Kumar Garg
Supervisor: Prof Lalit M Johri*

Project: Measuring Customer Engagement and Service Quality: A Case Study of Siam Commercial Bank (SCB), Thailand

*by Sharita Violet Serrao
Supervisor: Dr Do Ba Khang*

Project: MNC Versus Domestic Companies in Emerging Markets: A Case Study of Indian Television Industry

*by Durlov Jyoti Sarma
Supervisor: Dr Sundar Venkatesh*

Project: Multinational Companies, Cross-Cultural Management Issues and the Wisdom of the Ancients

*by Laurent Billon
Supervisor: Dr Fredric W Swierczek*

Project: Risk in Shipping Finance: Banking Side

*by Pierre Sauvage
Supervisor: Dr Roy Kouwenberg*

Project: The Challenges of the Multi Fiber Arrangement: A Comparative Analysis of India and Sri Lanka

*by Kanapathipillai Mahesan
Supervisor: Dr Fredric W Swierczek*

Project: The Positive Role of Trade Union in Bangladesh: A Study of Employment Practices of Dhaka Export Processing Zone

*by Md Aftab Anwar
Supervisor: Dr Sununta Siengthai*

International Public Management

Research Study: A Comparative Study of Impacts of Cultural Aspects on Individual Behaviors in International Development Projects in Vietnam

by Vo Thi Ngoc Uyen

Supervisors: Prof Francois J Broustail
Dr Do Ba Khang

Research Study: Analysis of Economic System and Business Environment: Exploration of Business Opportunities in Cambodia

by Leng Senglan

Supervisor: Prof John C S Tang

Research Study: A Survey of Financial and Management Accounting Practices in Small and Medium Enterprises in Cambodia

by Yath Sophanna

Supervisor: Dr Sundar Venkatesh

Research Study: Capacity Building for ODA Project Management in Vietnam

by Nguyen Thi Minh Trang

Supervisor: Dr Do Ba Khang

Research Study: Concepts of Decentralization Reforms at National and Local Levels: The Case Study of Commune/Sangkat Councils as Services Delivery Units in Cambodia

by Ty Makararavy

Supervisor: Dr Willi Zimmermann

Research Study: Critical Success Factors and Success Criteria for International Development Projects Funded by Official Development Assistance in Vietnam

by Tang Thi Thu Hoai

Supervisors: Prof Francois J Broustail
Dr Do Ba Khang

Research Study: Critical Success Factors for International Development Projects in Rural Development and Environment in Vietnam

by Nguyen Thuy Linh

Supervisors: Prof Francois J Broustail
Dr Do Ba Khang

Research Study: Critical Success Factors in Public-Private Partnership

by Belhout Xavier

Supervisor: Dr Do Ba Khang

Research Study: Current Performance Management Practices of Selected International NGOs in Myanmar

by Win Min Thit

Supervisor: Dr Sununta Siengthai

Research Study: Decentralization and Local Government Reform in Cambodia: An Assessment of the Roles of Stakeholders of the Assessing the Roles of Stakeholders

by Prak Tepvichet

Supervisor: Dr Willi Zimmermann

Research Study: Developing an Effective Trade Promotion Strategy in Vietnam: A Case Study of Vietnam Trade Promotion Agency's Network

by Nguyen Khanh Cam Chau

Supervisor: Dr Fredric W Swierczek

Research Study: FDI in Laos: The Policy Measures for Attracting Foreign Direct Investment

by Senesakoune Sihanouvang

Supervisor: Prof John C S Tang

Research Study: Human Resource Practices and Job Satisfaction of Non-Managerial Employees in Vietnamese Commercial Banks

by Tran Thu Hang

Supervisor: Dr Sununta Siengthai

Research Study: Improving Effectiveness of NGOs Advocacy for Poverty Alleviation Through Partnership and Network: Cambodia

by Thav Phat Sophearin

Supervisor: Dr Willi Zimmermann

Research Study: Management in a Public Hospital: Dong Da General Hospital Case Study

by Phan Thanh Nga

Supervisors: Dr Vu Hoang Ngan
Dr Willi Zimmermann

Research Study: On-Lending Fund Management: A Case Study of the Official Development Assistance Fund in Vietnam

by Le Hai Ha

Supervisor: Dr Do Ba Khang

Research Study: Public Management of Vietnam's Tourism Resources

by Nguyen Thi Huong Giang

Supervisor: Dr Fredric W Swierczek

Research Study: Reengineering the Cambodian Customs Department for the 21st Century International Trade

by Suon Seima

Supervisor: Dr Willi Zimmermann

Research Study: Social Marketing in the Public Health Sector in Vietnam

by Nguyen Thao Linh

Supervisor: Dr Fredric W Swierczek

Research Study: State-owned Enterprise Reforms in the Power Sector of Lao PDR: The Case of Electricite Du Laos

by Nittana Southiseng
Supervisor: Dr Willi Zimmermann

Research Study: Success Factors and Criteria of Projects Funded by International Non-Governmental Organizations in Vietnam

by Nguyen Thuy Hang
Supervisors: Dr Nguyen Dinh Tai
Dr Do Ba Khang

Research Study: Supply Chain Management in the Beer Industry: A Case Study of Lao Brewery Co., Ltd., Lao PDR

by Sonenaly Inthavong
Supervisor: Prof John C S Tang

Research Study: The Crisis of the Music Industry: The Role of the State and the Intellectual Property Issues in France

by Lionel Almeida
Supervisor: Dr Roland Amoussou-Guenou

Research Study: University-Industry Linkages: A Case Study of ESCP-EAP and the Perspectives of the Vietnamese Faculty

by Do Quang Huy
Supervisor: Dr Willi Zimmermann

Research Study: What Affects Stock Market Liquidity? An Empirical Study on the Stock Market in Vietnam

by Cao Thi Phuong Mai
Supervisor: Dr Sundar Venkatesh

Management of Technology

Research Study: Barriers and Facilitators in High-Tech Government Ventures: A Case Study of Thailand Microelectronics Center (TMEC)

by Vineet Tewari
Supervisor: Dr Barbara Igel

Research Study: Consumer Behaviors Toward Mobile Payment in Thailand

by Anchana Lakviramsiri
Supervisor: Dr Donyaprueth Krairit

Research Study: Critical Success Factors of Start-up Software Companies in Thailand

by Tivaporn Hanbunjerd
Supervisor: Dr Barbara Igel

Research Study: Effects of Removing Oil Subsidy on a Country's Economy: A Case Study of Thailand

by Phaisit Phianphithak
Supervisor: Prof John C S Tang

Research Study: Government-Assisted Technology Transfer to Small and Medium Enterprises (SMEs): The Case of Automotive and Parts Industry in Thailand

by Orawan Tilokskulchai
Supervisor: Dr Nazrul Islam

Research Study: Government-Assisted Technology Transfer Small and Medium Enterprises (SMEs): The Case of Electrical and Electronics Industry in Thailand

by Anyarat Phuphokai
Supervisor: Dr Nazrul Islam

Research Study: Impact of the Regulator's Independence on the Telecommunications Industry

by Ihala Walawwe Namal Bandaranayake
Supervisor: Dr Barbara Igel

Research Study: Improving Supply Chain Performance with RFID

by Frederic Biondi
Supervisor: Prof Himangshu Paul

Research Study: Integration of Communities of Practice (COP) in Business Process Improvement: A Case Study

by Agus Nugroho
Supervisor: Dr Barbara Igel

Research Study: Logistics Outsourcing: A Case Study of Third Party Logistics Service in Thailand

by Netraya Kaipunlert
Supervisor: Prof John C S Tang

Research Study: Market Opportunity for International Enterprise Resource Planning (ERP) Providers in the Philippines

by Rowena N Elemento
Supervisor: Dr Donyaprueth Krairit

Research Study: Negotiation Analysis for an Architectural Design Project in China

by You Guanhe
Supervisor: Dr Do Ba Khang

Research Study: Opportunities for Investment and Innovation in the Production Process of the Eagle Dry Cell Factory in Ho Chi Minh City, Vietnam

by Huynh Thi Nguyet Anh
Supervisor: Dr Barbara Igel

Research Study: Quality Improvement in Some Privatized Telecoms Companies

by Pattanun Rujirathavornwit
Supervisor: Prof Himangshu Paul

Research Study: Service Quality and Customer Satisfaction Assessment: A Case Study on Information Technology and the Telecommunication Industries In Thailand

by Vanicha Sangvornvetphan
Supervisor: Dr Do Ba Khang

Research Study: Strategies and Challenges of the Supply Chain in the Automotive Sector: A Case Study of Valeo

by Katell Plunet
Supervisor: Prof Himangshu Paul

Research Study: Study on the Technology Strategies of Local Automobile Firms in China

by Yi Li
Supervisor: Dr Nazrul Islam

Research Study: Supply Chain Management for Perishable Foods: A Case Study of Tops Supermarket, Thailand

by Thidarat Wongsakul
Supervisor: Dr Sundar Venkatesh

Research Study: Technology Transfer in Small and Medium Enterprises in Nepal: A Study of Garment Industry in Kathmandu Valley

by Arjun Prasad Paudel
Supervisor: Dr Nazrul Islam

Research Study: Telecommunications Fraud: A Case Study of TOT Corp. Wireline High Usage Fraud Detection

by Benjaporn Chatsirilerd
Supervisor: Dr Donyaprueth Krairit

Research Study: The Effective Use of Information Systems: A Case Study of Myanmar

by Kyaw Aung Myint
Supervisor: Dr Donyaprueth Krairit

Research Study: The Napsterization of Telecom-How Skype is Changing the Mobile Communications Industry

by Vinti Bhargava
Supervisor: Dr Donyaprueth Krairit

Project: Critical Success Factors of Software Projects in Thailand

by Piyapon Sereeyotin
Supervisor: Dr Do Ba Khang

Project: Establishment of a Technology Business Incubator in Nepal

by Ritesh Shrestha
Supervisor: Dr Barbara Igel

Service Marketing and Technology

Research Study: Broad-based Credit Risk Management: Approach and Application in Vietnamese Banking System

by Le Ho An Chau
Supervisor: Dr Roy Kouwenberg

Research Study: Customer Acceptance and Preference towards Mobile Messaging Application for Marketing in Indonesia

by Pandu Wirawan Arief
Supervisor: Dr Donyaprueth Krairit

Research Study: Destination Vietnam: Potential Attractions for French Tourists

by Luong Thuy Tien
Supervisor: Dr Fredric W Swierczek

Research Study: Marketing of Mobile Phone Service in the Lao PDR: A Case Study of Telecommunications Lao (ETL)

by Phaignaek Thammanam
Supervisor: Dr Fredric W Swierczek

Research Study: Service Positioning and Service Improvements in Narita Office Product Co., Ltd.

by Chheang Poly
Supervisor: Dr Frederic W Swierczek

Project: Performance Appraisal and Requirement for SME Owner and Worker: Photo Shop Business Case

by Chaiyos Kobsirichokdilok
Supervisor: Dr Sununta Siengthai

**International Business –
Management of Technology**

Research Study: Assessing Management Training Needs in the Paper Industry of Vietnam: A Case Study of Bai Bang Paper Company

*by Dao Khanh Van
Supervisor: Dr Fredric W Swierczek*

Research Study: Assessing the Training Needs in the Department of International Organizations, Ministry of Foreign Affairs of Laos

*by Vanpheng Sengmanothong
Supervisor: Dr Nicholas Dimmitt*

Research Study: Building a Human Resource Information System at the University of Economics, Ho Chi Minh City, Vietnam

*by Nguyen Viet Anh
Supervisor: Dr Truong Quang*

Research Study: Building a Human Resource Information System for BIDV Securities Company, Vietnam (BSC)

*by Nguyen Ngoc Duc
Supervisor: Dr Truong Quang*

Research Study: Developing a Long Term Training Strategy for an Oil and Gas Corporation in Vietnam

*by Le Thi Lam Tra
Supervisor: Dr Willi Zimmermann*

Research Study: Development of Staff Capacity: A Case Study of the Ministry of Justice, Cambodia

*by Ku Khemlin
Supervisor: Dr Sununta Siengthai*

Research Study: Employee Motivation for Improved Performance: The Case of SUFA Project, Ministry of Fisheries, Vietnam

*by Tran Thu Huyen
Supervisor: Dr Fredric W Swierczek*

Research Study: Enhancement of the Job Analysis Practices for the Effective Human Resources Management Activities at the Cambodia National Mekong Committee Secretariat

*by Ou Sophanna
Supervisor: Dr Sununta Siengthai*

Research Study: Human Resource Development for Apsara Authority in Cambodia

*by Oum Sivannat
Supervisor: Dr Sununta Siengthai*

Research Study: Human Resource Development in the Agricultural Sector at the Provincial Level: A Case Study of the PAFO, Huaphan Province, Lao PDR

*by Sorsavanh Bankhammy
Supervisor: Dr Truong Quang*

Research Study: Human Resource Development in the Royal Railways of Cambodia

*by Sok Naty
Supervisor: Dr Sununta Siengthai*

Research Study: Human Resources Development Strategy for Port Authority of Sihanoukville

*by Thong Viro
Supervisor: Dr Willi Zimmermann*

Research Study: Impacts of Reorganization: A Case Study of the Royal University of Law and Economics, Cambodia

*by Long Sophat
Supervisor: Dr Willi Zimmermann*

Research Study: Improving the Recruitment Process for the Department of Cooperation and Planning, Ministry of Communication, Transport, Post & Construction, Lao PDR

*by Chanthanom Souligno
Supervisor: Dr Sununta Siengthai*

Research Study: Improving the Staff Recruitment Process at the Inland Fisheries Research and Development Institute, Cambodia

*by Kong Chea
Supervisor: Dr Sununta Siengthai*

Research Study: Improving the Staff Recruitment Process at the Lao National Television, Lao PDR

*by Phitsamay Bounvilay
Supervisor: Dr Sununta Siengthai*

Research Study: Improving the Quality of Service of Tourist Guides in Vientiane, Lao PDR

*by Khamlay Sipaseuth
Supervisor: Dr Truong Quang*

Research Study: Institutional Strengthening of the Mekong Units at Line Ministries of Cambodia National Mekong Committee

*by Chheang Hong
Supervisor: Dr Willi Zimmermann*

Research Study: Motivational Factors in the Reorganization Process: A Case Study of the Production Control Division, Ministry of Public Security, Lao PDR

*by Pathumma Khamphengphet
Supervisor: Dr Sununtha Siengthai*

Research Study: Needs Assessment on Training and Development for the Sub-Institute of Forest Inventory and Planning, Ministry of Agriculture and Rural Development, Vietnam

*by Nguyen Thi Dieu
Supervisor: Dr Truong Quang*

Research Study: Re-Directing Marketing Strategy: The Case of the Thai-German Specialty Glass Co., Ltd.

*by Vasana Chuasuvan
Supervisor: Prof Himangshu Paul*

Research Study: Strategic Training and Development Plans for the Department of Domestic and Foreign Investment, Lao PDR

*by Niphaphone Souk Aloun
Supervisor: Dr Sununta Siengthai*

Research Study: Strengthening the Capability of the Local Women Union of Nguyen Du People's Ward Committee in Its Campaign Against HIV/AIDS Hanoi, Vietnam

*by Nguyen Thanh Loan
Supervisor: Dr Sununta Siengthai*

Research Study: The Quest for Competence Enhancement in the State Sector: A Case Study of Tien Giang Province in the Mekong Delta of Vietnam

*by Luu Van Phi
Supervisor: Dr Truong Quang*

Research Study: Training Needs Assessment of the Lao National Commission for Drug Control (LCDC), Lao PDR

*by Malichanh Srithirath
Supervisor: Dr Sununta Siengthai*

Project: Adapting to Integration and Globalization in the Petrovietnam Insurance Company

*by Dang Tien Dung
Supervisor: Dr Fredric W Swierczek*

Project: A Marketing Strategy for Piaggio

*by Lai Kim Oanh
Supervisor: Dr Fredric W Swierczek*

Project: An Import Business Solution for Nestle, Vietnam

*by Trinh Quang Hong
Supervisor: Dr Fredric W Swierczek*

Project: A Retention Strategy for SLB Vietnam Services

*by Dang Thi Minh Tran
Supervisor: Dr Fredric W Swierczek*

Project: A Technology Change Strategy for the Can Tho Thermal Powerplant

*by Nguyen Dinh Hai
Supervisor: Dr Fredric W Swierczek*

Project: ATM Machine Expansion Strategy: A Case Study of Siam Commercial Bank Public Company Limited

*by Kasidit Billamas
Supervisor: Prof Lalit M Johri*

Project: BPB Thai Gypsum Service Quality Program

*by Pornthep Larpyongyot
Supervisor: Dr Do Ba Khang*

Project: Brand Building Strategy in a Service Company: A Case Study of Siam Commercial New York Life Insurance Public Company Limited

*by Kanyarat Jarujareet
Supervisor: Prof Lalit M Johri*

Project: Building Competitive Advantage: A Case Study of SCT Trading Company Ltd.

*by Dinh Bao Anh
Supervisor: Dr Fredric W Swierczek*

Project: Business Development in the Building Material Market in Vietnam: A Case Study of MyDuc Ceramics

*by Duong Manh Dat
Supervisor: Dr Fredric W Swierczek*

Project: Business Strategy for Seafood Testing in Vietnam: A Case Study of PSB Test (Thailand) Company Limited

*by Boey Kok Fai
Supervisor: Prof Lalit M Johri*

Project: Communication Management in International Development Projects of Swisscontact in Vietnam

*by Tran Thi Anh Mai
Supervisor: Dr Do Ba Khang*

Project: Competitive Marketing Strategies for the Training Service Sector in Ho Chi Minh City, Vietnam

*by Le Thi Phuong Lan
Supervisor: Dr Fredric W Swierczek*

Project: Cost Control in Construction Companies in Vietnam

by Ton Anh Thi
Supervisor: Dr Fredric W Swierczek

Project: Crisis Management in JAPFA Vietnam

by Pham Hai Dang
Supervisor: Dr Fredric W Swierczek

Project: Developing a Business Development Strategy for Setcotrading

by Dang Xuan Tho
Supervisor: Dr Fredric W Swierczek

Project: Developing a Competitive Strategy for Sales: A Case Study of Thang Long Garment Company

by Tran Duc Thang
Supervisor: Dr Fredric W Swierczek

Project: Developing a Maintenance Strategy for Vietnsovpetro

by Nguyen Phan Phuc
Supervisor: Dr Fredric W Swierczek

Project: Developing a Marketing Strategy for Expansion: A Case Study of Hai Chau Confectionery

by Le Do Ouyen
Supervisor: Dr Fredric W Swierczek

Project: Developing a Strategy for the Paper Business in SCT Vietnam

by Tran Thi My Yen
Supervisor: Dr Fredric W Swierczek

Project: Developing Strategies to Maintain Competitive Position with Unilever on Hand Dish Wash Category

by Jirawan Tientep
Supervisor: Prof Lalit M Johri

Project: Enhancing the Competitive Capability of the Vietnam Power Market

by Phan Xuan Duong
Supervisor: Dr Fredric W Swierczek

Project: Enhancing the Project Management Capabilities: A Case Study of the Hydropower Project Management

by Truong Thiet Hung
Supervisor: Dr Fredric W Swierczek

Project: Formulating Profit Maximizing Strategies: A Case Study of P T K Mining Company Limited

by Prapat Chaiear
Supervisor: Prof Lalit M Johri

Project: Human Resource Development in Power Transmission Company No. 1

by Tran Thi Xuan Hong
Supervisor: Dr Sununta Siengthai

Project: Identifying Strategic Directions for Netguru in Thailand

by Soumyabrata Chatterjee
Supervisor: Prof Lalit M Johri

Project: Implementing an Information Management System in Power Transmission: A Case Study of the Power Transmission Company No. 3, Electricity of Vietnam

by Nguyen Quoc Anh
Supervisor: Dr Fredric W Swierczek

Project: Improving Delivery Performance at Scanco Vietnam Ltd.

by Ngoc Van To
Supervisor: Dr Fredric W Swierczek

Project: Improving Foreign Direct Investment in the Gas Industry of Vietnam

by Tran Viet Dung
Supervisor: Dr Fredric W Swierczek

Project: Improving Labor Retention in an International Garment Company

by Soeren Juelsbak
Supervisor: Dr Fredric W Swierczek

Project: Improving Lending to Small and Medium – Sized Enterprises (SMEs) in Vietnam

by Dao Thi Huong Le
Supervisor: Dr Fredric W Swierczek

Project: Improving Power Maintenance Management in Thermal Power Plants

by Pham Trong Thuc
Supervisor: Dr Fredric W Swierczek

Project: Improving the Capability of Management: The Case of Vietnam National Petroleum Company (Petrolimex)

by Pham Xuan Khoa
Supervisor: Dr Fredric W Swierczek

Project: Improving the Distribution Strategy: A Case Study of the Vietnam Dairy Joint Stock Company

by Tran Quoc Bao
Supervisor: Dr Fredric W Swierczek

Project: Improving the Effectiveness of Project Management in the Central Power Project Management Board

by Vo Huy Diem
Supervisor: Dr Fredric W Swierczek

Project: Improving the Implementation of the Import/Export Function: A Case Study of the Power Transmission Company No. 3

by Nguyen Van Du
Supervisor: Dr Fredric W Swierczek

Project: Improving the Performance of Power Engineering Consulting Company No. 2, Electricity of Vietnam

by Dinh Thanh Minh
Supervisor: Dr Fredric W Swierczek

Project: Improving the Quality of Power Supply in Hanoi Power Company

by Trinh Xuan Nguyen
Supervisor: Dr Fredric W Swierczek

Project: Lean Manufacturing in Nike's Contractor Factories

by Huynh Thi Ngoc Truc
Supervisor: Dr Fredric W Swierczek

Project: Marketing Strategy for a Comprehensive Preparatory Training Course for Flight Attendants

by Yuth Thongcharoen
Supervisor: Dr Nicholas Dimmitt

Project: Marketing Strategy Formulation for CWE: The Case of Payaman Water Gate Project in North of Thailand

by Lu Jiong Tao
Supervisor: Prof Lalit M Johri

Project: New Strategic Direction with Special Reference to Digital Media: A Case Study of Genesis Mediacom

by Witaya Mitsattha
Supervisor: Prof Lalit M Johri

Project: Operational and Financial Risk Management: Applications for Vietnamese Companies

by Nguyen Hong Duc
Supervisor: Dr Fredric W Swierczek

Project: Quality Management in the Power Transmission Company No. 3, Electricity of Vietnam

by Bui Thi Ngoc Ly
Supervisor: Dr Fredric W Swierczek

Project: Raw Material Supply Strategy of Nghe An Tate & Lyle Sugar Company Limited

by Tran Vinh An
Supervisor: Dr Do Ba Khang

Project: Retention Solutions in the Sales Department of Hatay Brewery Limited

by Nguyen Thi Mai Phuong
Supervisor: Dr Fredric W Swierczek

Project: SEAQIP and the WTO: Developing the Seafood Industry

by Huynh Le Tam
Supervisor: Dr Fredric W Swierczek

Project: Shaping Bestrade Precision Limited: Strategies for Expansion

by Thawee Sirichan
Supervisor: Prof Lalit M Johri

Project: Staff Turnover and Career Development in Vaco Deloitte: Improving Human Resource Performance

by Nguyen Chi Le
Supervisor: Dr Fredric W Swierczek

Project: Starting the Third Generation (3G) Mobile Telecommunication Business at Thai Mobile

by Wirada Nimmansatit
Supervisor: Dr Do Ba Khang

Project: Strategic Analysis of the Gas Department, Petrovietnam Exploration and Production

by Nguyen Thi Lan Anh
Supervisor: Dr Fredric W Swierczek

Project: Strategic Choices for Improving Competitiveness: Case Study of Hanwha Chemical (Thailand) Co., Ltd.

by Kye Moon Lee
Supervisor: Prof Himangshu Paul

Project: Strategy Planning for a Private Company: A Case Study of Nhat Lo Phat 168

by Vu Thi Thu Huong
Supervisor: Dr Fredric W Swierczek

Project: Sustainability and Training in the Vietnam Seafood Processing Industry

by Ha Thi Mai Huong
Supervisor: Dr Fredric W Swierczek

Project: Sustaining Fixed Line Revenue in Year 2005 of TOT Public Company Limited

by Monwipa Pechrasuwan
Supervisor: Prof Lalit M Johri

Project: The Enhancement of Safety Inspection and Training in Electricity of Vietnam (EVN)

by Doan The Vinh
Supervisor: Dr Fredric W Swierczek

Project: The TOT Public Company Limited Call Center to Support Thai SMEs for Bangkok and Vicinity

by Winai Kaewsawan
Supervisor: Dr Do Ba Khang

**Project: The Vietnam Power Market in the
First Phase: Approach and Design**

by Nguyen Duc Hanh

Supervisor: Dr Fredric W Swierczek

**Project: Vietnamese Culture and Its
Consequences for Retention in Citibank N.A.,
Vietnam**

by Nguyen Manh Quan

Supervisor: Dr Fredric W Swierczek

Chapter 26: OVERVIEW OF RESEARCH ACTIVITIES

26.1 Grant and Sponsored Research

Academic Units	Completed	Ongoing / In Progress	TOTAL
S E T	63	75	138
CS-IM	6	2	8
CEIM	2	7	9
DME-IEM	1	2	3
GGE	13	6	19
Mech-Mic	6	9	15
RSGIS	13	16	29
SE	9	12	21
TC	0	1	1
TE	1	3	4
WEM	12	17	29
ICT	0	0	0
S E R D	65	42	107
ASE	9	7	16
AARM	6	7	13
E	21	0	21
EEM	17	23	40
FEBT	4	4	8
GDS	7	7	14
NRM	2	5	7
PPT	2	0	2
RRDP	0	0	0
UEM	4	2	6
S O M	2	0	2
TOTAL	130	117	247

26.2 Publications

Academic Units	Refereed Journals	Refereed Books/ Chapters	Conference Proceedings	Other Publications	TOTAL
S E T	125	22	193	42	382
CS-IM	10	2	22	0	34
CEIM	8	1	3	3	15
DME-IEM	8	2	16	0	26
GGE	18	6	30	13	67
Mech-Mic	14	1	15	0	30
RSGIS	16	2	28	2	48
SE	10	3	13	7	33
TC	7	0	26	3	36
TE	12	0	11	0	23
WEM	22	5	29	14	70
ICT	0	0	0	0	0
S E R D	117	12	128	30	287
ASE	23	1	25	1	50
AARM	14	0	4	1	19
E	8	3	23	0	34
EEM	25	3	37	3	68
FEBT	13	0	16	7	36
GDS	6	1	10	9	26
NRM	11	2	0	7	20
PPT	4	0	7	1	12
RRDP	4	0	1	0	5
UEM	9	2	5	1	17
S O M	0	0	1	4	5
TOTAL	242	34	322	76	674

26.3 Students's Research

Academic Units	Doctoral	Masters	TOTAL
S E T	23	289	312
CS-IM	8	56	64
CEIM	2	25	27
DME-IEM	3	29	32
GGE	2	22	24
Mech-Mic	1	37	38
RSGIS	2	16	18
SE	1	25	26
TC	0	34	34
TE	2	14	16
WEM	2	27	29
ICT	0	4	4
S E R D	19	194	213
ASE	1	18	19
AARM	5	15	20
E	3	22	25
EEM	1	41	42
FEBT	3	23	26
GDS	0	14	14
NRM	1	12	13
PPT	1	11	12
RRDP	3	13	16
UEM	1	25	26
S O M	7	218	225
TOTAL	49	701	750

