

buletin seadpri

institut kajian bencana asia tenggara
southeast asia disaster prevention research institute

NEWSLETTER

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Coordinator of Climatic
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Pemimpin penyelidikan dan
pemindahan ilmu berinovatif
secara syumul mengenai bencana

Leader in innovative research and
knowledge transfer on holistic
disaster prevention

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Pengurangan Risiko Bencana Iklim ke Arah Pembangunan Lestari

Reducing Climatic Disasters Critical for Sustainable Development

Joy Jacqueline Pereira



Arakawa River, Katsushika City, Tokyo

Photo by: Lim Choun Sian

Urbanisasi di Asia Tenggara telah menghasilkan sebuah senario di mana permukaan tanah yang luas menjadi penempatan bandar-bandar yang mempunyai majoriti penduduk. Sesebuah bandar merupakan penggerak kepada pembangunan ekonomi yang memerlukan modal insan dan sumber asli dan kesannya turut memberikan tekanan pada persekitaran. Fenomena perubahan iklim dijangka akan meningkatkan impak kepada sumber asli dan alam sekitar. Laporan Penilaian Keempat oleh Intergovernmental Panel on Climate Change (IPCC) menyatakan bahawa Asia Tenggara dijangka akan terdedah kepada bencana kerana peningkatan banjir. Peningkatan banjir, terutama di kawasan yang sebelumnya tidak terdedah kepada banjir boleh menjurus kepada pengaliran bahan yang tercemar dan toksin ke dalam sungai di mana ia akan memberi impak kepada rawatan air sisa di loji. Pengaliran bahan yang berbahaya dipersekitaran pada permukaan air berkemungkinan besar akan memberikan impak kepada kawasan perindustrian dan tempat pembuangan sampah dan keadaan ini tidak seharusnya dibiarkan berterusan. Akibatnya akan menyebabkan kebinasaan jika masalah tersebut tidak ditangani. Bencana hidrometeorologi dan mangsa banjir dijangka akan meningkat pada tahun-tahun akan datang. Oleh itu, keupayaan untuk mengadaptasi perlu ditingkatkan dan langkah untuk mengurangkan bencana iklim, haruslah diperkasakan untuk memastikan pembangunan yang berterusan di rantau ini.

Urbanisation in Southeast Asia has resulted in a scenario where vast tracts of the land surface are occupied by cities hosting the majority of the population. Cities are drivers of economic development, requiring human capital and consuming natural resources while exerting pressure on the environment. The advent of climate change is expected to increase the current pressures on natural resources and the environment. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) disclosed that Southeast Asia is expected to be vulnerable due to increased flooding. Amplified flooding, particularly in areas previously not exposed to such hazards could lead to the dispersal of contaminants and toxins into rivers where wastewater treatment plants are overwhelmed. The possibility of the circulation of environmentally hazardous substances in surface water where industrial sites and landfills are affected cannot be ignored. The consequences could be disastrous if such risks are not addressed. The already high level of hydrometeorological disasters and number of people affected by flooding is expected to increase in years to come. Thus, it is critical to strengthen adaptive capacity and measures for reducing climatic disasters, to ensure sustainable development in the region.

Climatic Hazards

SEADPRI–UKM Promotes Climate Change Adaptation for Disaster Risk Reduction

Joy Jacqueline Pereira & Sharifah Diyana Syed Ismail

The Climatic Hazards Programme of the Southeast Asia Disaster Prevention Research Institute (SEADPRI-UKM) conducts research and strengthens capacity to support the national agenda on adaptation to extreme weather and climate change. The focus is on disaster prevention including risk reduction and management, post disaster recovery and reconstruction. Aspects taken into account are science and technology for disaster risk reduction, socio-economic impacts and vulnerability assessments, education and awareness as well as governance for human security and sustainability. The Programme implements its outreach activities in conjunction various stakeholders at national and international levels.

SEADPRI-UKM welcomed the new decade by convening the Forum on Climate Change Adaptation and Spatial Planning: Assessment and Communication of Vulnerability. Held on 5th January 2010 at Puri Pujangga, Universiti Kebangsaan Malaysia, Bangi, the Forum was co-organised with the Minerals and Geoscience Department of Malaysia (JMG), Geological Society of Malaysia (GSM), Geological Survey of Finland (GTK) and the International Union of Geological Sciences (IUGS). Dr. Philipp Schmidt-Thomè, Senior Scientist of Geological Survey of Finland (GTK) and International Fellow of SEADPRI-UKM was the principal speaker while Mr. Chen Shick Pei, Honorary Fellow, served as moderator. About 60 participants from federal and state government agencies, local authorities, universities, non-government organisations and the private sector attended the Forum. It commenced with a warm welcome from Prof. Dr. Joy Jacqueline Pereira, Deputy Director of SEADPRI-UKM and ended with presentations of tokens of appreciation by Tuan Haji Zakaria Mohamad, Director of Minerals and Geoscience Selangor Department, to the speaker and moderator.

Dr. Schmidt-Thomè focused on explaining uncertainties associated with climate change projections based on evidence-based observations, as well as its implications on climate change adaptation and mitigation responses. The uncertainties as to how the climate will develop over the 21st Century should be communicated to policy and decision makers so that appropriate interventions can be implemented. It was stressed that even without climate change, there is constantly evolving vulnerability, making adaptation to extreme climate events a current necessity. If vulnerability to extreme events is

understood, additional measures on climate change adaptation can be taken into consideration, so that they are more effective in preventing disasters. Understanding underlying vulnerability processes of natural hazards supports the sustainability of adaptation strategies. Scientific support in decision making processes demands the proper shaping of communication processes and building of trust and confidence. Since decision making is a very different task in comparison to scientific research work, a common understanding of demands and potentials among the scientists and decision makers is vital. Vulnerability assessments as well as climate change scenarios should function as an integral part of spatial planning – and thus provide more effective results for adapting to a changing climate change.

A lively discussion ensued upon the presentation of this emerging approach in Europe, which is yet to be taken in Southeast Asia and many parts of the world. Many issues were raised ranging from the means of communication of risks to various stakeholders and strengthening of spatial planning systems, the need for innovative partnerships at the local level and effective management of federal-state relations, to the December 2009 United Nations climate change negotiations in Copenhagen and its implications to Malaysia and Southeast Asia. There was general consensus that everyone had a role to play in climate change adaptation, from the individual right up to the government agencies at all levels as well as corporate and civil organisations. This information has to disseminated to all relevant stakeholders in an effective and appropriate manner, taking into account the local cultural context.

SEADPRI-UKM believes that successful adaptation to climate change requires integration across scales and effective communication among different stakeholders, especially between scientists and policy-makers. The Forum promotes this effort by building the capacity of local researchers and practitioners involved in climate change and spatial planning. SEADPRI-UKM is currently involved in the Intergovernmental Panel on Climate Change (IPCC) Special Report on "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), which is due in 2011. Interested parties are requested to contact Prof. Dr. Joy Jacqueline Pereira at SEADPRI-UKM for further information.



Dr. Philipp Schmidt-Thomè, International Fellow of SEADPRI-UKM and Mr. Chen Shick Pei, Honorary Fellow emphasized the need for innovative partnerships to address climate change adaptation during the discussion.

Geological Hazards



Photo by : Tajul Anuar Jamaluddin

Al-Fisaliah Makkah Al-Mukarramah Tunnel needs detailed engineering geological studies to assess the geohazards of rock fall and rockslide.

Engineering Geology in Slopes and Tunnels

Tajul Anuar Jamaluddin

SEADPRI-UKM is actively contributing its expertise and knowledge on engineering geology to the Geological Hazards Programme through research, outreach and networking activities, as well as consultancy services.

On 26-29 April 2010, Minerals and Geoscience Department Malaysia (JMG) organised a talk on Engineering Geology for Level 2 Officers, at Heritage Hotel, Tanah Rata, Cameron Highlands. This programme is part of the intensive training programme for Grade 41-44 Geoscience Officers. This program is a follow-up from the success of Level 1 Programme, which was held at Dungun, Terengganu in July 2009. During this talk, the Coordinator of Geological Hazards Programme was entrusted to be the main facilitator and a total of four working papers were presented, which were: The Role of Engineering Geology in the National Development; Highway Route Selection of Tropical Mountainous Areas i.e. Case studies at Pos Selim Road, Cameron Highland; Debris Flow Geohazards (geological hazards risk which is alarming in Malaysia) and; Discontinuities Data Analysis in Engineering Geology for Slopes.

Activities for the Geological Hazards Programme were further established when a Seminar on Landslides Mitigation & Maintenance of Slopes was jointly organised by Slope Engineering Unit of Works Department (JKR) on 26 May 2010 at the Legend Hotel, Kuala Lumpur. An invitation to this kind of seminar serves as high recognition for geologists and

was attended by a group of professional engineers and had 300 participants. The invited paper presented during the Seminar was "Importance of Engineering Geology in Slope Stability".

The Geological Hazards Programme collaborated with E-Geo Consultant and Lebuhraya SILK Sdn. Bhd to carry out soil investigation studies at KM16.5 SILK Kajang Highway and propose suitable steps to safeguard slopes. A working paper on "Geological Mapping for Rock Slope Failure Investigation and Design of Remediation Works at KM14.6 Silk Highway, Kajang Selangor" co-authored by Ir. Neoh Cheng Aik was presented in a meeting session with Lebuhraya SILK Sdn. Bhd on 12 April 2010 at SILK Head Office, Sungai Balak, Kajang, Selangor.

The Geological Hazards Programme is also involved in projects at the international level, in the Makkah Tunnels Development and Assessment Study for the Municipality of the Holy City of Makkah and Sacred Places, Kingdom of Saudi Arabia. The SEADPRI-UKM expertise was recognised at the international level when the Coordinator of Geological Hazards Programme was entrusted to lead and become the advisor to geologists and geophysicists from Egypt and Saudi Arabia to investigate 58 existing tunnels around Makkah City. This project intends to assist Makkah City Council to plan and identify strengthening works, monitoring and upgrading works and safety for the tunnels, built in the 1970's and 1980's.

Technological Hazards

SEADPRI–UKM Initiates Petroleum Hazards Studies in Langkawi

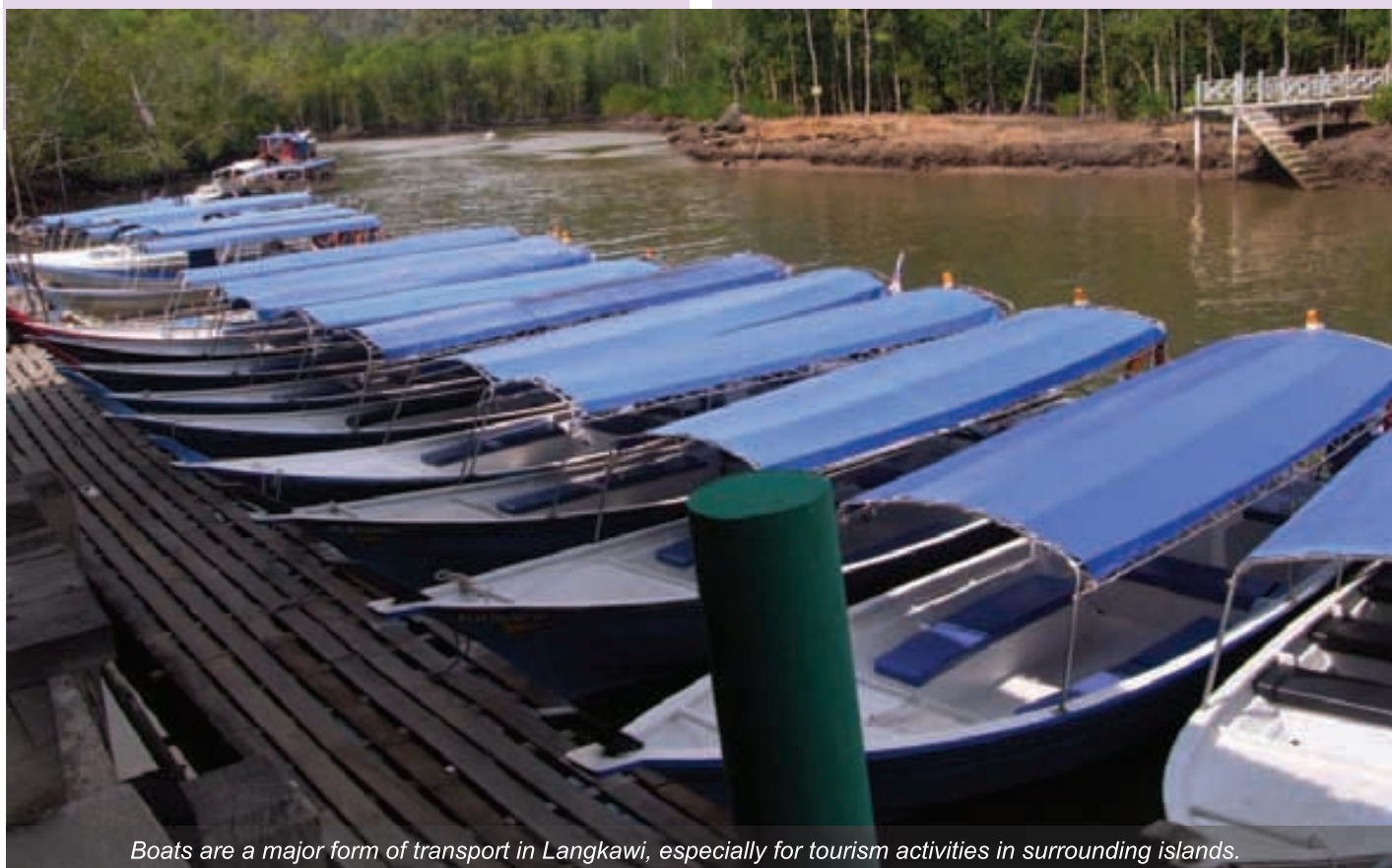
Lee Yoke Heng

The whole of Langkawi Island is now designated as a conservation area under the UNESCO Geopark. Since the acquisition of Geopark status, the arrival of tourists to Langkawi Island has increased many fold. The increase in tourism activities may lead to environmental degradation and conflict between environmental protection and economic development will arise. Because the tourism activities around Langkawi Island mainly involve land and sea travel, especially traveling to and from many of the surrounding smaller islands, the use of petroleum for cars, boats and ships is expected to exert major impacts on the environment.

In general, petroleum is a hazardous substance that can result in physical, health and environmental hazards. Spillage of petroleum (oil spills) in the environment, especially in the sea can lead to damage of fisheries, wildlife and recreation. Another important issue is the lack of awareness and communication among industries and stakeholders regarding chemical disasters and accidents from petroleum storage and distribution facilities. Understanding the need to balance both environmental protection and regional economic

development, the Technological Hazards Programme of SEADPRI-UKM has recently initiated a study on petroleum hazards on Langkawi Island. The intergrated study aims to assess the current state of petroleum hazards management and environmental impacts on Langkawi Island.

Ultimately, the project is aims to address several issues that have not been looked into regarding chemical hazards risk management and disaster prevention in the use of petroleum and related chemicals in Langkawi. The study will eventually draw on the experience of the Research Centre of Environment and Economic Sciences, Chinese Academy of Science to assess the state of petroleum hazards risk management in the Langkawi Geopark. The main output of the project will be the state of environmental impact from petroleum usage, the current management practice of petroleum hazards and guideline documents regarding petroleum hazards risk management, with the hope of preventing future petroleum hazards related disasters from occurring in the Langkawi Geopark.



Boats are a major form of transport in Langkawi, especially for tourism activities in surrounding islands.

SEADPRI–UKM Offers Postgraduate Programmes

The Southeast Asia Disaster Prevention Research Institute, Universiti Kebangsaan Malaysia (SEADPRI-UKM) was established to carry out research and provide advice on disaster related fields, especially in the Southeast Asian region. SEADPRI-UKM provides a new platform for cross-, multi-, and inter-disciplinary research in understanding and solving problems associated with disasters. Research conducted in SEADPRI-UKM contributes to the development of new systems and technology to increase knowledge about processes relating to disaster prevention and management.

The objectives of SEADPRI-UKM are to:

- Contribute as a research centre focused on climatic, geological, and technological hazards at the national and regional levels;
- Promote multidisciplinary research in disaster management especially in the context of governance for disaster prevention as well as postdisaster response;
- Develop skilled human capital in disaster issues for the government and private sectors through graduate programmes, especially in science, technology, social and governance aspects of disasters; and
- Serve as the reference centre on science and governance of disasters in Southeast Asia

Presently SEADPRI-UKM offers graduate research programmes at Master and Ph.D levels which involves studies relating to disasters.

PROGRAMMES OFFERED

Master in Disaster Studies and Doctor of Philosophy in the following areas:

- Policy and Disaster Management
- Climatic Hazards
- Geological Hazards
- Technological Hazards

ENTRY REQUIREMENTS

Master Degree

- Bachelor degree with honours in areas of relevance from Universiti Kebangsaan Malaysia with CGPA >2.75 or other universities accredited by the Senate.

OR

- Bachelor degree with honours in areas of relevance from Universiti Kebangsaan Malaysia with CGPA <2.75 or other universities accredited by the Senate with at least one year's experience in areas of relevance.

Doctor of Philosophy

- Master in areas of relevance from Universiti Kebangsaan Malaysia or other universities accredited by the Senate

OR

- Presently following a master programme in a related field in UKM and approved by the Graduate Management Committee to change the status to Doctor of Philosophy programme with the approval of the UKM Senate

OR

- Bachelor degree with honours in a related field from UKM or any institutions of higher learning accredited by the UKM Senate and acquired CGPA \geq 3.70

CURRICULUM STRUCTURE

Master and Ph.D candidates :

- Research and thesis only
- All candidates are required to attend SFTH6014 Research Methodology course

DURATION OF STUDIES

Programme	Full Time	Part Time
Masters	2-4 Semesters	4-8 Semesters
Doctor of Philosophy	6-12 Semesters	8-14 Semesters

For more information, please log on to:

<http://www.ukm.my/seadpri>

Welcome to The Fellows of SEADPRI–UKM

PROF. DR. MASAHIRO CHIGIRA

Prof. Dr. Masahiro Chigira is a Professor and Vice Director of Disaster Prevention Research Institute (DPRI), Kyoto University, Japan. He also heads the Mountain Hazards Division of DPRI. Prof. Chigira obtained his M.S and Doctor (Science) from University of Tokyo in 1980 and 1987 respectively. He conducted research in the fields of natural disaster science and geology. His area of research specialisation includes gravitational deformation of mountains, rock weathering and landslides. Prof. Dr. Masahiro has been actively publishing his work in journals and papers relating to landform evolution, weathering, large-scale landslide, deep-seated sliding, and mountain hazards. He is also a member of the International Association for Engineering Geology and the Environment (AIGI/ IAEG) and European Geoscience Union.



PROF. DWIKORITA KARNAWATI



Prof. Dwikorita Karnawati, is a professor and Head of the Geological Engineering Department, Faculty of Engineering, Gadjah Mada University. She obtained her Ph.D in Engineering Geology from Leeds University, United Kingdom in 1996. Prof. Dwikorita's main research interests and specialisation are in the fields of environmental geology, engineering geology and also landslides. She has conducted many research projects at the national and international levels. One of them is: Landslide Mitigation in ASEAN, a collaborative research with ASEAN University Network/South East Asian Engineering Education Network (AUN/SEED Net). Prof. Dwikorita has published numerous books, proceedings and journals on the subject of earthquakes, landslide hazards and community-based risk reduction.

DR. PHILIPP SCHMIDT-THOMÉ

Dr. Philipp Schmidt-Thomé is currently the Senior Scientist at the Section of Land Use and Environment, Geological Survey of Finland (GTK) and has been attached to GTK since 1998. Dr. Schmidt-Thomé obtained his PhD in Geology from the University of Helsinki in 2007. His expertise include project management, natural hazards, climate change adaptation, spatial planning, vulnerability and risk assessment, stakeholder communication, applied environmental geosciences, soil science and quaternary geology. Dr. Schmidt-Thomé is also a member of the advisory editorial board for the Encyclopedia on natural hazards, Springer and the external expert in the Regional Adaptation Strategies for the German Baltic Sea Coast (RADOST). Dr. Schmidt-Thomé has many publications to his name and the most recent publication is *Response to Natural Hazards and Climate Change in Europe*.



PROF. DR. FELIX TONGKUL



Prof. Dr. Felix Tongkul is a Professor of Geology and Head of Centre for Natural Disaster Studies in Universiti Malaysia Sabah (UMS). He obtained his Ph.D. in Geology (Sedimentology and Structural Geology) from University of London, England in 1987. Prof. Dr Felix's specialisations are in structural geology, sedimentology and geological hazards, as well as geology and tectonics of the Southeast Asian region. As a geologist, Prof. Dr. Felix is an active member in geoscience communities both locally and internationally. Among his professional affiliations are the Geological Society of Malaysia, American Geological Union and Malaysian Geological Heritage Group. In academic research, he has led and jointly studied a broad spectrum of topics namely, Studies of active faults in Ranau and Lahad Datu areas, Sabah; Policy and Planning Responses for Earthquake and Tsunami Hazards in Malaysia; and Structural Geology of Danum Valley and Surrounding Areas, Lahad Datu, Sabah. With his extensive experience in geology, Prof. Dr. Felix has published his findings in numerous journals and proceedings in the fields of geological hazards, structural geology and geological heritage.

PROF. IR. DR. ZAINAB MOHAMED

Prof. Ir. Dr. Zainab Mohamed is a Professor of Civil Engineering in Universiti Teknologi MARA (UiTM). Prof. Ir. Dr. Zainab is currently attached to Universiti Teknologi MARA (UiTM) as the Dean of Faculty of Civil Engineering. She obtained her Ph.D. from Universiti Kebangsaan Malaysia in 2004. Her fields of expertise are site investigation, soil engineering, soil remediation, tropical rock engineering, georisk management and environmental geotechniques. Prof. Ir. Dr. Zainab is a group member of the Malaysia-Japan Geotechnical and Ecological Environment Management Core University Program, under Japan Society for Promotion of Science-Vice Chancellors Council (JSPS-VCC). She is also associate researcher in a number of joint projects carried out in Universiti Kebangsaan Malaysia, Universiti Teknologi Malaysia and Universiti Sains Malaysia. She published numerous journals and conference proceedings related to geotechnical engineering and weak rock mass.



DR. EDY TONNIZAM MOHAMAD



Dr. Edy Tonnizam Mohamad is a Senior Lecturer in the Department of Geotechnics and Transportation, Faculty of Civil Engineering, Universiti Teknologi Malaysia. He obtained his Ph.D. in Civil from University of Leeds, United Kingdom in 2006. He specializes in tropical rock engineering, excavation, quarrying and rock blasting, and geo-environment. His academic affiliations both locally and internationally, are Fellow of Institute of Quarrying, United Kingdom, the secretary of National Tropical Rock Engineering Research Group (NaTROCK), secretary of International Society of Rock Mechanics (ISRM), and corporate member of Institute of Geology Malaysia. Dr. Edy Tonnizam is often sought as an expert advisor and speaker in workshops related to rock blasting, rock slope stability and quarrying. One of his current works is: Engineering Properties of Weathered Rock Mass for Surface Excavation Works (Project Leader) and Assessment of Excavation Performance of Old Alluvium in Earthworks (Project Leader).

Activities

Dialogue on MyCLIMATE–NGO: Mobilising Communities and Industries to Address Climate Change, UKM Bangi, 23 March 2010



The Dialogue session with the stakeholder groups

Climate change is an issue of high importance, which needs immediate action by various parties. Effective implementation of the National Policy on Climate Change requires involvement from non-government organizations (NGOs) to mobilize communities and industries. To initiate the mobilization process, the Department of Conservation and Environmental Management Division (CEMD), Ministry of Natural Resources, and Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, in conjunction with selected stakeholders, including Southeast Asia Disaster Prevention Research Institute (SEADPRI-UKM) organized the Dialogue on “Mobilising Communities and Industries to Address Climate Change” on 23 March 2010 at Bilik Majlis, 5th Floor Chancellery Building, Universiti Kebangsaan Malaysia, Bangi. The main objective of the Dialogue was to discuss the gaps and opportunities related to climate change in education and raising awareness among communities and industries. The meeting was attended by representatives from Malaysian Medical Relief Society (MERCY Malaysia) and Malaysian International Chamber of Commerce and Industry (MICCI) and Malaysian Environmental NGOs (MENGO). The Dialogue commenced with four presentations to share experience on climate change related initiatives. These were from LESTARI-UKM, Malaysian Medical Relief Society (MERCY Malaysia), Malaysian International Chamber of Commerce and Industry (MICCI) and Environmental Protection Society Malaysia (EPSM/MCCG). The Dialogue session saw many issues being raised and clarified, to promote better understanding between different stakeholder groups.

Knowledge for Development Workshop on Scenarios Concerning Climate Change Adaptation in Asia and the Pacific by Year 2030, Port Dickson, 26–28 June 2010

The Knowledge for Development Workshop on Scenarios Concerning Climate Change Adaptation in Asia and the Pacific by Year 2030 was jointly organised by Orbicom, the Network of UNESCO Chairs in Communication and the Institute for Environment and Development (LESTARI) in collaboration with Southeast Asia Disaster Prevention Research Institute (SEADPRI-UKM). The Workshop, which commenced on 26–28 June 2010 at Thistle Port Dickson Resort, Port Dickson was funded by the International Development Research Centre (IDRC). About 35 participants attended the Workshop comprising academics, researchers and practitioners from government, non-government and international organisations as well as the private sector. The Workshop commenced with an official opening by Tengku Mohd. Azzman Shariffadeen, Vice President of Orbicom. Tengku expressed the need to identify issues of climate change adaptation (CCA) in countries in Asia and the Pacific. The objective of the Workshop is to communicate information and knowledge for CCA. The Workshop adopted a ‘scenario planning’ approach to identify the intangibles in order to delineate the potential for knowledge and innovation for development.



Participants of the Workshop

Letusan Gunung Berapi Eyjafjallajokull Iceland Geobencana Bersifat Global

Sharifah Diyana Syed Ismail & Ibrahim Komoo



Photo by : Ingolfur Julliusson/Reuters

Letusan Gunung Berapi Eyjafjallajokull 2010, Iceland. Debu telah menutupi ruang udara Eropah sehingga menjejaskan sistem pengangkutan udara global

Iceland merupakan kepulauan lautan yang terbina daripada siri letusan gunung berapi akibat aliran keluar lava sepanjang zon pisahan kepingan benua di Lautan Atlantik. Letusan dan aliran lava berlaku dari masa ke semasa, dan ini dilihat sebagai fenomena lazim di pulau ini. Letusan baru mulai aktif pada Mac 2010 mengakibatkan lebih 500 penduduk terpaksa dipindahkan demi keselamatan mereka. Letusan berikutnya pada 14 April, 20 kali lebih besar daripada letusan awal telah mencetus fenomena baru – letusan gunung berapi sebagai geobencana bersifat global!

Letusan gunung berapi seperti kebanyakan geobencana lain – banjir atau gelinciran tanah, lazimnya dilihat sebagai fenomena geobencana bersifat tempatan. Kawasan yang terlibat dan mereka yang terimpak adalah yang berada di sekitar, beberapa kilometer hingga ratusan kilometer dari punca geobencana. Peristiwa Eyjafjallajokull telah memberikan perspektif baru kepada komuniti global mengenai impak letusan gunung berapi dan betapa kita tidak bersedia berhadapan dengannya.

Letusan Gunung Eyjafjallajokull telah memuntahkan kepulan asap dan debu dan diterbangkan puluhan kilometer tinggi ke atmosfera. Ini merupakan fenomena

yang unik (luarbiasa) di kawasan gunung berapi yang berlava basik, lazimnya ia hanya mengalir di permukaan bumi sahaja. Apa yang berlaku ialah apabila letusan berlaku di bawah permukaan glasier, air sejuk daripada pencairan ais menyejukkan lava, dan akibatnya ia membentuk zarah kaca yang halus. Letusan dan kepulan asap membawa zarah kaca halus ini ke atmosfera. Zarah kaca halus ini boleh mengganggu sistem penerbangan awam, khususnya mampu merosakkan sistem enjin pesawat udara.

Demi keselamatan awam, dianggarkan lebih 60,000 penerbangan di seluruh dunia, terutamanya di Eropah terpaksa dibatalkan. Ratusan ribu penumpang terkandas, dan terpaksa menunggu beberapa minggu untuk terbang ke destinasi mereka. Mereka yang dalam perjalanan dan meninggalkan kampung halaman, merasa sangat tertekan dalam pelbagai bentuk akibat fenomena ini. Letusan gunung berapi di Iceland, dan debunya yang hanya tersebar di ruang udara Eropah ternyata boleh melumpuhkan sistem pengangkutan udara seluruh dunia – sesuatu yang tidak pernah dibayangkan oleh kebanyakan warga dunia! Inilah pengajaran baru kepada para saintis dan pemimpin dunia, suatu geobencana tempatan yang mempunyai impak global.



Southeast Asia Disaster Prevention Research Institute (SEADPRI-UKM)

Universiti Kebangsaan Malaysia (UKM), 43600 UKM Bangi, MALAYSIA

Tel : +603 8921 4144 Fax : +603 8925 5104 Email : seadpri@ukm.my Website : www.ukm.my/seadpri

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