



MOSTI

Ministry of Science, Technology and Innovation

**SECOND NATIONAL CONFERENCE ON  
EXTREME WEATHER &  
CLIMATE CHANGE**  
**UNDERSTANDING SCIENCE AND RISK REDUCTION**  
14 - 15 October 2008  
Putrajaya International Convention Centre

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MAMPU

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Malaysian Meteorological Department  
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In collaboration with:  
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**Rapporteurs Report  
November 2008**

## **EXECUTIVE SUMMARY**

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The Second National Conference on Extreme Weather and Climate Change: Understanding Science and Risk Reduction was co-organised by Malaysian Meteorological Department, the Academy of Sciences Malaysia, University of Malaya and the Universiti Kebangsaan Malaysia with support from the Ministry of Science, Technology and Innovation and Ministry of Natural Resources and Environment, Malaysia and in collaboration with the British High Commission. The conference was held on 14 to 15 October 2008 at the Putrajaya International Conventional Centre. About 200 participants attended the event comprising academics, researchers and practitioners from government, non-government organisations as well as the private sector. The Conference aimed to (i) understand the current science of extreme weather and climate change, (ii) identify the vulnerability and adaptation responses of different sectors to extreme weather and climate change and (iii) create awareness and enhance capacity on risk reduction. It brought together leading international and national experts in climate change to exchange information and share experiences to better understand the science of climate change and identify the vulnerability and adaptation responses of different sectors to extreme weather and climate change.

### **IPCC Assessment Processes and Findings**

The assessments under the Intergovernmental Panel on Climate Change (IPCC) link the policy (government representatives) and science (scientists). On the one hand statements about climate change that reveal the current state of knowledge amongst the scientific community are expressed, which on the other are approved by governments. The Fifth Assessment will have a better coverage of economics and technology, and non-English literature. There will be greater involvement of managers, as well as scientists, in IPCC authorship, including the involvement of other United Nations agencies as well as a better integration of Working Group reports. There will also be a stronger steering of new research to fill key gaps in knowledge and a need for an effective organisation (to parallel the World Climate Research Programme, WCRP) covering international research on climate change impacts and adaptation.

There was a clear lack of data and research related to climate change being included in the Fourth Assessment Report (AR4) from Asia and Africa. For Malaysia, there are several means to address this issue in the Fifth Assessment Report (AR5), including making sure that Malaysian scientists are nominated as authors for the AR5, Malaysian scientists should participate in expert reviews of the AR5 (to make their scientific opinions and expertise known), and scientists in the region should ensure that their publications, both peer-reviewed and non peer-reviewed, are known by the AR5 authors, if necessary to the relevant authors or co-authors.

### **Regional climate projections**

While the IPCC's Fourth Assessment Report concluded that "warming of the climate system is unequivocal", projections of future warming show similarity to the global mean in Southeast Asia. The results of these simulations showed an increase in the annual mean temperature over the region during the 21<sup>st</sup> century.

While the IPCC's Working Group I reported that precipitation in summer is likely to increase in most of Southeast Asia and the pattern is broadly one of wet season rainfall increase and dry season decrease, the local study using PRECIS Regional Climate Model indicated that there is an overall positive anomaly of mean annual rainfall over Southeast Asian landmass while negative anomaly over the maritime region, but overall a deficit in mean annual precipitation is expected over the region.

Extreme rainfall and winds associated with tropical cyclones are likely to increase in Southeast Asia. Specifically, for the floods during the northeast monsoon season, the roles and interactions of three circulation atmospheric systems namely the northeast cold surges, the Borneo vortices and the intra-seasonal Madden-Julian Oscillation (MJO) were discussed. It was pointed out that these motion systems and their interactions largely determine the distribution of deep convection region over western Maritime Continent and hence influence the occurrences of flood in the region.

## **Projection of future climate in Malaysia**

The Regional Hydroclimate Model for Peninsular Malaysia developed by NAHRIM runs at fine spatial resolution. Through this localised projection modeling efforts, some insights on possible future climate were gained. Future temperature may increase up to 1.4<sup>0</sup>C (mean) and 2.0<sup>0</sup>C (monthly maximum) compared to historical period. More extreme hydrological conditions (higher maximum and lower minimum precipitation) in the future may be expected, with increase in maximum monthly precipitation of up to 51% over Pahang, Kelantan and Terengganu as well as decrease in minimum monthly precipitation from 32% to 61% for all over Peninsular Malaysia. That leads to increase in maximum monthly flows from 11% to 47% for all over Peninsular Malaysia, whilst Johor and Selangor may experience decrease in minimum monthly flows from 31% to 93%.

## **Outreach and guidance on the use of future climate projection**

There is already considerable activity in Malaysia to generate high resolution scenarios of future climate change. They may be misinterpreted by, for example, impact analysts, as predictions rather than scenarios. It is, therefore necessary to develop guidance information for impacts and adaptations work, so that proper use of these scenarios can be made.

## **Education and research on climate change science**

There is a need for university in Malaysia to offer appropriate academic program in atmospheric science, with the undergraduate training to prepare students for R&D work in climate and climate change at post-graduate level. While R&D for regional climate change system needs to be enhanced, it is important to adopt a multi- and cross-disciplinary approach that covers science to governance and addresses issues such as the role of oceans on climate, the impact on monsoon system and how climate change impacts various sectors such as water resources, ecosystem, biodiversity and etc.

Data requirements for research in climate change and an integration of the various components for climate change studies is very important and effort should be made to establish a national data center to promote long-term research in climate change. One such effort includes the Sea to Space cluster under the MOSTI that is directly and indirectly involved in promoting climate change research. Notwithstanding that, it is also emphasised that there is a need for increased funding support from the government or other sources.

### **Impacts of climate change and adaptation strategies**

Water resource is a key resource to ensure a sustained economic development. However, the sectoral development of water resources has exacerbated the challenges facing its management. As the immediate impact from climate change is on water resources, it will further exacerbate the challenges facing its management. Both water resources and climate change management require holistic initiative and support from the issue of governance; hence they must be integrated in the country's overall economic development, to ensure future sustainable development.

Rice yield potential is likely to decline due to even small rises in global temperature, greater frequency of droughts and floods will affect local production. The S&T must spearhead agricultural production in the next 30 years at a pace faster than the Green Revolution's during the past three decades and adaptation to climate change must start now. To this end, the research and development activities towards building adaptation strategies in the context of food security and under climate change are necessary.

Although the results from a Preliminary Coastal Vulnerability Index study indicate that Malaysia may not be vulnerable to sea-level rise, adaptive actions are still necessary in order to face the phenomena of sea level rise as it will cause land loss, change in maritime storm and flooding, and response to implications for water resources. The adaptation measures may include coastal defence (essentially hard and soft engineering solutions), allow mangroves to regenerate under natural processes, retreat, reclaiming land from the sea, and implementing an integrated coastal zone management.

It is important to conduct a study on the risk assessment of climate vulnerability impacts against the predicted climate variations from the national and international climate models for the oil and gas industry in Malaysia. Such study requires the establishment of the assessment tools to be used for various business sectoral activities of the oil and gas industry from both the upstream and downstream operations. Among the climatic variable, the extreme weather events has the highest impact on the energy and power sector, gas processing, oil depots and terminals, and petrochemical industry. Also of great importance to climate vulnerability impact and adaptation study is the prediction of lightning occurrences in climate variables in terms of reliability of energy supply and distribution.

### **Planning for reduction of disaster risk and climate change adaptation**

Planning mechanism is an instrument to prevent and reduce disaster risk. In particular, the geo-hazards research on flood, landslide and forest fire play important roles in development plan. Despite efforts in creating awareness among planners and decision makers on land use planning appraisal in risk areas, there remains several issues and challenges in applying planning tools for disaster risk reduction, including the compliance to development plans and planning guidelines, data availability for detail assessment, ineffective implementation of development policies as well as support and commitment from local, state and relevant authorities.

As climate change adaptation is growing in importance national planning and development, it is certain that its assessments are to consider current extents of potential natural hazards and combine those with relevant scenarios. Projects integrating natural hazards and climate change can support the formulation of risk oriented policy recommendations for concrete actions and decisions to mitigate the potential impacts of natural hazards and climate change in planning and development.

## **Communication and stakeholder participation for climate change adaptation**

The understanding about climate change is limited in many developing countries such as in Southeast Asia where priorities of people and the government are generally short-term and focused on immediate economic survival. Among all people with very limited capital assets who live in marginal areas and mostly dependent on rain and favourable climate are most vulnerable to the impacts of climate related events and those related to the rising in sea levels, temperature and rainfall. It is vital that various stakeholders, particularly the local ones, are engaged actively in determining the impacts and vulnerable groups and locations, formulating the adaptation strategies, and maintaining communication along the process. Notwithstanding that, experience show several challenges and opportunities to effective stakeholder participation, including promoting more responsive research to meet multiple objectives/interests of different stakeholders, advancing the science of climate change to inform planned adaptation, empowering stakeholders, quantifying adaptation costs and benefits, promoting best adaptation practices and institutionalising multi-stakeholder processes and long-term support system.

## **Stakeholder engagement and communication for disaster risk reduction**

The total disaster risk management consist of response, rehabilitation and reconstruction, reduction and preparedness. Despite potentially significant saving in economic losses from disasters, there is only a small percentage in annual humanitarian assistance is devoted to reduction. On the other hand, climate change, rapid urbanisation and environmental degradation are expected to contribute to more frequent and devastating disasters. Under such circumstances, the Hyogo Framework acts as a useful mean to reduce disaster losses. It outlines guidance in making disaster risk reduction a priority, knowing the risks and taking action, building understanding and awareness, reducing risk and be prepared and ready to act. Knowledge, innovation and education are particularly important in building a culture of safety and resilience at all levels. Factors crucial to effective disaster risk reduction include strengthening the information-sharing system and networks, promoting dialogue and cooperation among scientists and practitioners, strengthening research

capacity, engaging the media in raising awareness, and contextualising the local knowledge.

### **Communications during disaster**

The Amateur Radio Society is an important network in disaster communication which has been overlooked though they have extensive stations world-wide. Experiences from local incidents reveal common difficulty in conventional communication system in disaster region to ensure interconnectivity of all communication systems to relevant participated agencies. The amateur radio serves as an important resource for disaster communications and relief effort. Notwithstanding that, there is challenge to ensure such assets are being capitalised during disaster where an integrated inter-agency communication system that is less dependent on basic infrastructure need to be resolved.

### **Adaptation by Reducing Present Vulnerability**

Essentially the future depends largely on reducing vulnerability and enhancing adaptation now. It is fundamentally critical to understand today's problems and mitigate those first as this will help in reducing future climate change impacts. There is no need for reinventing spatial planning; current practices should be further developed. On the other hand, contingency plans for adapting to climate change need to be flexible due to uncertainty in climate scenarios. Solutions should be applied progressively as the situation warrants. Decision ladders may prove useful as the available options vary by situation and prognosis may likewise vary.

### **Policy Responses**

Climate change is happening. Adaptation is a necessity and a crucial, realistic response along with mitigation. Climate change policy should be based on national needs, for a 'climate resilient development'. Cost effective adaptation and mitigation strategies that integrate considerations of current and future aspects on physical manifestations of climate change (including climate variability) as well as international



socio-political demands on sovereign states (to limit GHG emissions), both of which may undermine the economy and threaten development.

Adaptation and mitigation need to be balanced to ensure climate resilient development that will deliver climate-proof development and a low carbon economy. For this to happen, climate change considerations need to be mainstreamed into policy and decision-making. Research and strategic thinking is much needed in years to come to balance adaptation and mitigation in climate and other development policies while ensure mechanisms for adequate and sustainable stakeholder participation and collaboration.

# CONTENTS

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|  |    |
|--|----|
| Executive Summary  |    |
| Introduction   | 1  |
| Session 1: Vulnerability and Adaptation                                  | 2  |
| Keynote 1: Climate Change Impacts, Adaptation and Vulnerability          | 2  |
| Climate Change and Water Resources Management in Malaysia                | 3  |
| Impacts of Climate Change on Agriculture Production and Food Security    | 4  |
| Coastal Vulnerability  | 4  |
| Climate Vulnerability Impact Assessment of Malaysian Oil & Gas Industry  | 5  |
| Q&A  | 5  |
| Session 2: Science of Climate Change                                     | 6  |
| Keynote 2: The Science of Climate Change                                 | 6  |
| Climate Variability/Extreme Weather                                      | 7  |
| Climate Change Scenario for Malaysia                                     | 8  |
| Climate Change Scenario & Impact of Global Warming on the Winter Monsoon | 9  |
| Q&A  | 10 |
| Panel Discussion: Science & Technology Requirement for Climate Change    | 11 |
| Session 3: Planning and Communication for Disaster Risk Reduction        | 13 |
| Planning Responses for Natural Hazard & Climate Change Impact Reduction  | 13 |
| Management of Geohazards Through Spatial Planning                        | 14 |
| Enhancing Stakeholders Communication for Disaster Risk Reduction         | 16 |
| MARES Experience & Role of Amateur Radio in Disaster Communication       | 17 |
| Q&A  | 18 |

|   |    |
|---|----|
| Session 4: Policy Responses and Strategies                              | 19 |
| Communication & Stakeholder Participation in Climate Change Adaptation  | 19 |
| Forest Ecosystem, Services & Productivity                               | 21 |
| Responding on Climate Change Adaptation: A Corporate Sector Perspective | 22 |
| Q&A   | 24 |
| Panel Discussion: Policy Requirements for Climate Change                | 25 |
| Appendix 1: Conference Programme  | 28 |
| Appendix 2: List of Chairs, Keynote & Session Speakers and Panelists    | 31 |
| Appendix 3: List of Participants  | 38 |
| Appendix 4: List of Rapporteurs   | 42 |

## **INTRODUCTION**

The Second National Conference on Extreme Weather and Climate Change: Understanding Science and Risk Reduction was co-organised by Malaysian Meteorological Department, the Academy of Sciences Malaysia, University of Malaya and the Universiti Kebangsaan Malaysia with support from the Ministry of Science, Technology and Innovation and Ministry of Natural Resources and Environment, Malaysia and in collaboration with the British High Commission. The conference was held on 14 to 15 October 2008 at the Putrajaya International Conventional Centre. About 200 participants attended the event comprising academics, researchers and practitioners from government, non-government organisations as well as the private sector.

The objectives of the Conference are to (i) understand the current science of extreme weather and climate change, (ii) to identify the vulnerability and adaptation responses of different sectors to extreme weather and climate change and (iii) to create awareness and enhance capacity on risk reduction. It brought together leading international and national experts in climate change to exchange information and shares experiences to better understand the science of climate change and identify the vulnerability and adaptation responses of different sectors to extreme weather and climate change.

The two-day Conference was divided into four sessions. Day One covered the themes of “Vulnerability and Adaptation” and “Science of Climate Change”; whilst the thematic areas in Day Two were “Planning and Communication for Disaster Risk Reduction” and “Policy Responses and Strategies”. The official opening of the conference was held on the second day by the Honourable Tuan Haji Fadillah Haji Yusof, Deputy Minister of Science, Technology and Innovation (MOSTI), Malaysia. After each two session on both days, a Panel Discussions was held on “Science and Technology Requirement for Climate Change” and “Policy Requirement for Climate Change” respectively.

## **SESSION 1: VULNERABILITY AND ADAPTATION**

Session 1 was devoted to the adaptation aspects of climate change. After a keynote address, the session was followed by four short presentations.

### **Keynote 1: Climate Change Impacts, Adaptation and Vulnerability – The IPCC Working Group II Fourth Assessment by Dr. Jean Palutikof, Hadley Centre, Meteorological Office UK.**

Dr. Palutikof, in her presentation, described the process by which the IPCC carries out its assessments, and the major findings of the Working Group II report which addresses climate change impacts, adaptation and vulnerability. She pointed out that the key to IPCC assessments is the coming together of government representatives and scientists to produce statements about climate change which on the one hand express the current state of knowledge amongst the scientific community and on the other are approved by governments. This is achieved through three cycles of writing, review and re-writing, and by the meeting of the two communities to agree the text of the Summary for Policymakers. The end result is a set of statements to which governments subscribe, which feed into the negotiations surrounding the Kyoto Protocol. The WGII report contains 20 chapters, describing observed and future projected impacts of climate change by sector and by region, and adaptation and mitigation response strategies, and their interrelationships with sustainable development. Dr. Palutikof's presentation described the major new findings of the Assessment, especially:

- the quantitative description of impacts in relation to temperature change and hence time, allowing stakeholders to consider the damages avoided for different levels of mitigation.
- the identification of those regions and those sectors and communities most vulnerable to climate change.

Finally, in her presentation, Dr. Palutikof briefly mentioned the progress towards the Fifth Assessment. Basically the next assessment will have a better coverage of economics and technology, and non-English literature. There will be greater involvement of managers, as well as scientists, in IPCC authorship, including the involvement of other UN agencies. There will be a better integration of Working Group reports. Finally there

will be a stronger steering of new research to fill key gaps in knowledge and a need for an effective organisation (to parallel the World Climate Research Programme, WCRP) covering international research on climate change impacts and adaptation.

**Climate Change and Water Resources Management in Malaysia by Ir. Dr. Salmah Zakaria, National Hydraulic Research Institute Malaysia (NAHRIM).**

Dr. Salmah presented on the impact of climate change on water sources in Malaysia. Here, she presented the results of the Regional Hydroclimate Model for Peninsular Malaysia that run at fine spatial resolution. Temperature showed a uniform increase whereas rainfall showed extremes with some regions showing positive increase while other had decreasing trend. On the hydrological front, more severe floods and droughts are expected. With regard to water resources status and challenges, Dr Salmah highlighted that globally it is crisis of management where there is an unsustainable exploitation of water, and in Malaysia she pointed out that it is sartorially managed. The challenges that we are facing are related to water supply, water quality, environmental changes and issues of governance and management instruments. To meet these challenges, Dr Salmah emphasised the need for integrated water resource management, a process which promotes the coordinated development and management of water, land and related resources to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. In her conclusion, she highlighted the following pertinent points:

- Water resource is a key resource to ensure a sustained economic development (*The sectoral development of water resources has exacerbated the challenges facing its management*)
- The immediate impact from climate change is on water resources (*This will further exacerbate the challenges facing its management*).
- Both water resources and climate change management require holistic initiative and support from the issue of governance (*Must be integrated in the country's overall economic development, to ensure future sustainable development*).

**Impacts of Climate Change on Agriculture Production and Food Security by Dr. Mohd. Yusoff Abdullah, Malaysia Agriculture Research Institute Malaysia (MARDI).**

Dr. Mohd. Yusoff, in his presentation, reviewed the basic concept of food production and general overview of climatic requirements for selected Malaysian economic crops in relation to current and future climatic trends. He further elaborated on some climatic factors and extreme climatic events affecting agriculture production in Malaysia as well as South East Asia. Rice as a staple crop was examined in detail with respect to vulnerabilities to climate change, current food security policy and possible scenarios under various climate change scenarios with emphasis on water and temperature variability. He pointed out that yield potential is likely to decline due to even small rises in global temperature, greater frequency of droughts and floods will affect local production. He emphasised that S&T must spearhead agricultural production in the next 30 years at a pace faster than the Green Revolution's during the past three decades and adaptation to climate change must start now. To this end, he highlighted the research and development activities towards building adaptation strategies in the context of food security and under climate change.

**Coastal Vulnerability by En. Zainal Akamar bin Harun, Department of Irrigation and Drainage (DID) Malaysia.**

En Zainal presented a Preliminary Coastal Vulnerability Index Study (CVI) to determine the potential impacts of climate change on sea level rise that may cause inundation of coastal areas and islands, shoreline erosion, and destruction of important ecosystems such as wetlands and mangroves. The study, which focused on two pilot sites in the West Coast of Peninsular Malaysia, had been commissioned to identify the susceptibility of coastal areas to the impacts of sea level rise. The two pilot sites with widely varying characteristics are: coastal stretches from Tg Piai to Sg Pulai Estuary in Johor and western shorelines of Pulau Langkawi from Tg Belikit to Tg Malai in Langkawi. The results from this CVI study indicate that Malaysia may not be vulnerable to sea-level rise. Anyhow, a necessary action is recommended to face the phenomena of sea level rise as it will cause land loss, change in maritime storm and flooding, and response to implications for water resources. En. Zainal suggested

a number of adaptive measures, which included: coastal defence (essentially hard and soft engineering solutions), allow mangroves to regenerate under natural processes, retreat, reclaiming land from the sea, and implementing an integrated coastal zone management.

### **Climate Vulnerability Impact Assessment of Malaysian Oil and Gas Industry by Dr. Foo Say Moo, PETRONAS.**

In his presentation, Dr. Foo explained that, for the oil and gas industry in Malaysia, it is important to conduct a study on the risk assessment of climate vulnerability impacts against the predicted climate variations from the national and international climate models. He pointed out that this requires the establishment of the assessment tools to be used for various business sectoral activities of the oil and gas industry from both the upstream and downstream operations. Dr. Foo stressed that lightning is of great concern, because not only it causes disruption to plant operations but also fire safety. He further emphasised that the prediction of lightning occurrences in climate variables is of great importance to climate vulnerability impact and adaptation study to the oil and gas industry in terms of reliability of energy supply and distribution. Dr. Foo highlighted the findings of the climate vulnerability impact study conducted by NAHRIM as well as the lightning scenario and its influence in climate vulnerability to the oil and gas industry in Malaysia. He concluded that among the climatic variable, the extreme weather events has the highest impact on the energy and power sector, gas processing, oil depots and terminals, and petrochemical industry.

### **Questions / Comments**

- 1) Dr. Abdul Rahim Nik (Forest Research Institute Malaysia, FRIM) to Dr. Jean Palutikof: You mentioned that there was a clear lack of data and research related to climate change being included in the Fourth Assessment Report from Asia and Africa. How can we address this issue in the coming Fifth Assessment Report (AR5) so that all regions are well represented in the assessment?

A: The following actions could be done:



- Make sure that Malaysian scientists are nominated as authors for the AR5;
- Malaysian scientists should participate in expert reviews of the AR5. This way they can make their scientific opinions and expertise known; and
- Scientists in the region should ensure that their publications, both peer-reviewed and non peer-reviewed, are known by the AR5 authors, if necessary to the relevant authors or co-authors.

2) Dr. Jean Palutikof to Dr. Mohd. Yusoff Abdullah: With respect to production of aerobic rice, how easy will farmers find it to move to aerobic rice growing? What is the training requirement and, what is the input requirement in terms of pesticides, fertilisers etc?

A: It is not too difficult to move to aerobic rice growing and no specific training is required. In terms of input requirements, no additional requirements are required and under elevated CO<sub>2</sub> levels there is no benefit above 32<sup>0</sup>C because of high transpiration rate.

## **SESSION 2: SCIENCE OF CLIMATE CHANGE**

Session 2 covers the scientific aspects of climate change, particularly works on modeling and projections of future climate. After a keynote address, the session was followed by three short presentations.

### **Keynote 2: The Science of Climate Change by Dr. David Wratt, National Institute of Water and Atmospheric Research (NIWA), New Zealand.**

Dr. Wratt pointed out some important scientific conclusions from the IPCC's Fourth Assessment Report, including: "Warming of the climate system is unequivocal", and "Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations". In this presentation, Dr. Wratt outlined the key findings from IPCC Working Group I, and discussed the scientific evidence behind them which included

some discussion of regional projections for the South East Asia area, including Malaysia. The following projections were highlighted by Dr. Wratt:

- Warming is likely to be similar to the global mean in Southeast Asia;
- Area-mean precipitation over Southeast Asia increases in most MMD model simulations, with a median change of about 7% in all seasons but the projected seasonal changes vary strongly within the region. The pattern is broadly one of wet season rainfall increase and dry season decrease;
- Precipitation in summer is likely to increase in most of Southeast Asia;
- Extreme rainfall and winds associated with tropical cyclones are likely to increase in Southeast Asia;
- The region is also likely to share the general tendency for daily extreme precipitation to become more intense under enhanced greenhouse conditions, particularly where the mean precipitation is projected to increase;
- There is a tendency for monsoonal circulations to result in increased precipitation due to enhanced moisture convergence, despite a tendency towards weakening of the monsoonal flows themselves. However, many aspects of tropical climatic responses remain uncertain.

**Floods and Droughts in Malaysia: The Roles of Various Atmospheric Circulation Systems and Climate Variability over the Maritime Continent by Prof. Dr. Fredolin Tanggang, Universiti Kebangsaan Malaysia (UKM).**

Prof. Tanggang, in his presentation, provided an overview of the roles of various circulation systems and climate variability on floods and droughts in Malaysia. Specifically, for the floods during the northeast monsoon season, the roles and interactions of three circulation atmospheric systems namely the northeast cold surges, the Borneo vortices and the intra-seasonal Madden-Julian Oscillation (MJO) were discussed. He pointed out that these motion systems and their interactions largely determine the distribution of deep convection region over western Maritime Continent and hence influence the occurrences of flood in the region. From some of his past studies, Prof. Tanggang showed that strong northeast cold surges, without the presence of the Borneo vortex, would likely to produce deep convection over eastern Peninsular Malaysia and eastern Sumatra; but, on the other hand, the deep convection would be over western Borneo when the vortex is present. He also noted

that MJO phenomenon tends to reduce the frequency of both the cold surges and Borneo vortices. However, in certain cases, the MJO could strengthen the northeasterlies over southern parts of South China Sea (SCS) and easterlies over Java, which can lead to enhanced deep convection over southern Peninsular Malaysia in which widespread flood may result. In cases where Borneo vortex hovers over the southern parts of SCS for a sufficiently long duration, interaction between strong cold surge and the Borneo vortex may enhance the system into a tropical depression or even a typhoon. Subsequent westward propagation of the enhanced system would likely produce widespread flooding in eastern Peninsular Malaysia. To illustrate these point, he showed examples of three extreme precipitation cases, namely; the Typhoon Vamei (2001), the 9-11 December 2004 flood case in northeastern Peninsular Malaysia, and the December 2006 and January 2007 extreme flood in southern Peninsular Malaysia. He also briefly discussed the long-term behaviour of the Borneo vortex, where it appears that the frequency of Borneo vortex tends to increase over time and stays longer over the ocean than over the land. This long-term changes may have changed the frequency of extreme precipitation events in eastern Peninsular Malaysia. Finally, Prof. Tanggang discussed the interannual oscillation of wet and dry periods over Malaysia associated with the El Niño – Southern Oscillation (ENSO) event, and he pointed out that during the northeast monsoon season, a typical El Niño tends to have significant impacts over East Malaysia while the El Niño Modoki would likely to impact Peninsular Malaysia.

**Climate Change Scenario for Malaysia by Ir. Hj. Ahmad Jamaluddin bin Shaaban, National Hydraulic Research Institute Malaysia (NAHRIM).**

Ir. Ahmad Jamaluddin, in his presentation, showed the results of an assessment of the impact of future climate change on hydrologic regime and water resources of Peninsular Malaysia that was conducted by NAHRIM. The modeling was carried out using a Regional Hydrologic-atmospheric Model of Peninsular Malaysia (RegHCM-PM) by downscaling global climate change simulation data (Canadian GCM1 current and future climate data) that are at very coarse resolution (~ 410km), to Peninsular Malaysia at fine spatial resolution (~9km). Simulated monthly mean air temperatures and precipitation at every sub region of Peninsular Malaysia during the simulated

historical (1984-1993) and future (2025-2034 and 2041-2050) periods were presented. A summary of the results presented by Ir. Ahmad Jamaluddin are as follows:

- Mean temperature during the future period is higher than during historical period up to 1.4<sup>0</sup>C;
- Increase of maximum monthly temperature of up to 2.0<sup>0</sup>C all over Peninsular Malaysia;
- More extreme hydrological conditions in the future may be expected since higher maximum and lower minimum precipitation are observed;
- Increase in maximum monthly precipitation of up to 51% over Pahang, Kelantan and Terengganu;
- Decrease in minimum monthly precipitation from 32% to 61% for all over Peninsular Malaysia;
- An increase in interannual and intraseasonal variability with increased hydrologic extremes is expected in Kelantan, Pahang, Terengganu and Perak;
- Increase in maximum monthly flows from 11% to 47% for all over Peninsular Malaysia; and
- Decrease in minimum monthly flows from 31% to 93% for Johor and Selangor.

**Climate Change Scenario and Impact of Global Warming on the Winter Monsoon by Dr. Wan Azli Wan Hassan, Malaysian Meteorological Department (MMD)**

Dr. Wan's presentation touched on climate change scenario results for the Malaysia region from the IPCC GCMs model runs and from the PRECIS Regional Climate Model (RCM). Temperature and precipitation results from nine GCMs were presented. Dr. Wan also presented the simulations of the wind field at the 850hPa level to look at the impact of global warming on the winter monsoon. The results of these simulations showed an increase in the annual mean temperature over SEA during the 21<sup>st</sup> Century with the PRECIS-RCM being able to capture important regional information on rainfall which was missing in GCM simulations. There is an overall positive anomaly of mean annual rainfall over South East Asian landmass while negative anomaly over the maritime region, but overall a deficit in mean annual precipitation is expected over SEA region. The impact of global warming indicates an

overall weakening of the Winter Monsoon northwest flows over northern China as shown by the negative trend of Winter Monsoon Index (WMI). The simulations also showed that the easterly winds during the winter months of December to February weakened over the western Pacific region, indicating a weakening of the NE monsoon in SEA region. Global warming in the future is likely to produce anomalous circulation with the weakening of Siberia High & weakening and/or northward shift of the Aleutian Low during Winter Monsoon, coupled with intensified north Pacific High and warmer SST condition in the tropical Pacific.

### **Questions / Comments**

1) Dr. Jean Palutikof to Ir. Hj. Ahmad Jamaluddin bin Shaaban: There is considerable activity in Malaysia to generate high resolution scenarios of future climate change. They may be misinterpreted by, for example, impact analysts, as predictions rather than scenarios. What effort is Malaysia putting into developing guidance information for impacts and adaptations work, so that proper use of these scenarios can be made?

A: NAHRIM agrees with the suggestion by Dr. Palutikof that a guide for users of hydroclimatic projection need to be made available. This is necessary as experience from UK shows that the users may misinterpret the climate projections if they are not guided.

2) Dr. Yap Kok Seng to Dr. David Wratt: Probabilistic representation is probably one good approach to represent the results for adaptation usage in the various sectors. Where can we get the methodologies or tools to do this? Is there a network for this?

A: At present such tools are not available; perhaps in the IPCC-AR5 they will include probabilistic representations.

## **PANEL DISCUSSION: SCIENCE AND TECHNOLOGY REQUIREMENT FOR CLIMATE CHANGE**

Chair: Dr. Yap Kok Seng, Director General, Malaysian Meteorological Department

Panel members:

- Prof. Dato' Dr. Azizan Abu Samah, University Malaya
- Prof. Dr. Nor Aieni Hj. Mokhtar, National Oceanography Directorate, Ministry of Science, Technology and Innovation (MOSTI)
- Prof. Dr. Fredolin Tanggang, University Kebangsaan Malaysia

The Chair informed the panel that the discussion topic was: "Science & Technology Requirement for Climate Change", and he wanted the panel to discuss the institution of higher learning's role in climate change education and also research activities in climate change.

Prof. Azizan pointed out that the job market for meteorology or atmospheric science graduates is very limited at the present moment in Malaysia and therefore not viable to start a full fledged program in these fields at the undergraduate level. He also pointed out that even in the United Kingdom there are only two universities that offer programs in meteorology at the undergraduate level. However, Prof. Azizan felt that it is better to start the program at the MSc level by course work. On the research front Prof. Azizan informed that R&D strategies need to be more focused. At the moment no special fund focusing on climate change is available. Apart from that, Prof. Azizan also stressed that there are still many areas of R&D covering not only the science but also the governance, e.g. integrated water governance and how climate change will impact on the resources that needs to be addressed. Regarding the question on awareness Prof. Azizan mentioned that the awareness among the Malaysian public is quite high. Recently, University Malaya held a multi-media competition on climate change for secondary school students in the Klang Valley and got some very good response.

Prof. Nor Aieni remarked that data requirements for research in climate change and an integration of the various components for climate change studies is very important

and effort should be made to establish a national data center to promote long-term research in climate change. MOSTI through its Sea to Space cluster is directly and indirectly involved in promoting climate change research. Prof. Nor Aieni explained that funding for climate change research in the bottom-up approach, researchers can apply for the Science Fund which is open to all. Under the top-down approach, MOSTI has instituted various programs like the Antarctic Research program and others which are related to climate change.

Prof. Fredolin stressed that at least one university in Malaysia should offer appropriate undergraduate academic program in atmospheric science which is necessary to train students for R&D work in climate and climate change at post-graduate level. On the R&D front, Prof. Fredolin remarked that there is a need to enhance R&D for regional climate change system and he also emphasised that there is a need for increased funding support from the government or other sources. Prof. Fredolin pointed out that more R&D groups should be established in Malaysian universities with a multi-disciplinary approach that addresses issues such as the role of oceans on climate, the impact on monsoon system and how climate change impacts various sectors such as water resources, ecosystem, biodiversity and etc.

### **Questions / Comments**

- 1) Comment by Mr. Manoharan Maniam (Environmental Protection Society of Malaysia): Climate change is multi-disciplinary. It requires inputs from almost every discipline and art. We should continue to harvest students in all fields and to seek funds continuously from the government and elsewhere to create more expertise, especially in climate modeling and awareness. The current UM, UKM and MOSTI initiatives are to be applauded and wish them well. If we do not have expertise today, we should bring in such experts from overseas for time being to set up institutes for climate change beyond universities and ministries.

### **SESSION 3: PLANNING AND COMMUNICATION DISASTER RISK REDUCTION**

Session 3 highlights approaches and tools for reducing the risks of disaster. After a keynote address, the session was followed by three short presentations.

#### **Keynote 3: Planning Responses for Natural Hazard and Climate Change Impact Reduction by Dr. Philipp Schmidt-Thome, Finland Geological Survey.**

The key topic that Dr. Schmidt-Thome addressed is the way cities and municipalities can adapt to natural hazards and climate change, through the showcase of water related challenges of natural hazards and climate change from the perspective of regional development and spatial planning as well as examples of cities and municipalities integrating natural hazards and climate change into planning practices.

As climate change adaptation has entered regional policy in Europe recently and is quickly growing in importance, it is certain that climate change assessments are to consider current extents of potential natural hazards and combine those with relevant scenarios. Projects related to natural hazards, climate change and regional development have supported the development of risk oriented policy recommendations and the territorial agenda of the European Union. Regional projects have been more concrete in stakeholder communication and have led to concrete decision making, including entry into the 4<sup>th</sup> IPCC report and the Green Paper of the European Commission on Adapting to Climate Change in Europe.

As a result, cities in Finland have now started to take concrete actions and decisions to mitigate the potential impacts of natural hazards and climate change. The project activities have shown that not only the careful selection of hazard and climate change impact scenarios, but especially the choices of communication channels are the most important factors in the science stakeholder dialogue. For example, misunderstandings in the definition and applicability of the terms natural hazard, vulnerability and risk can lead to hindrances in decision making processes. Risk concepts are many-fold and complicated and their application in spatial planning has to be analysed most carefully. In the presented cases it often proved to be sensible



to avoid a map-based risk analysis, but to rather assess potential risks by analysing hazards and climate change effects in simple overlays on land use maps.

Drawing on examples of other approaches on communicating vulnerabilities to support risk reduction in the perspective of natural hazards and climate change, he concluded that:

- Integration of financially reasonable natural hazard and climate change adaptation measures into territorial development is possible.
- There is no need to use horror scenarios to raise awareness on natural hazard and climate change impacts.
- Understand the problems we have now and mitigate those first. This will help in reducing future climate change impacts.
- There is no need for reinventing spatial planning; current practices should be further developed.
- The communication process is most important when geo-scientific data and knowledge shall be included into political and decision making practices.

**Management of Geohazards through Spatial Planning by Mr. Mohamed Jamil B. Ahmad, Federal Department of Town and Country Planning Peninsular Malaysia (JPBD).**

The presentation explained the role of the department and several principles applied in planning and designing the disaster risk reduction. Mr. Mohamed Jamil in his presentation also raised some pertinent issues related to the topic.

The Federal Department of Town and Country Planning Peninsular Malaysia begins to play an active role in disaster risk reduction after the strike of Tsunami in 2004. The planning mechanism is based on the Hyogo Framework for Action 2005 where land-use planning and other technical measures are incorporated with disaster risk assessments into the urban planning and management. As pointed by Mr. Mohamed Jamil the planning mechanism also takes into account the IPCC recommendation on adaptation measures through land use planning. Meanwhile land use planning appraisal in risk areas which is known as LUPAr is designed for creating awareness among planners and decision makers.

The department also carries out geo-hazards research on flood, landslide and forest fire. There are two local plans which have been taking into account geo-hazard in development. They are Kuala Muda District and Kota Tinggi District. Subsequently, Mr. Mohamed Jamil showcased the impacts of city development and the consequences of flood occurrences. He gave some examples of natural and non-natural factors cause to landslide and forest fires. Thus, he pointed out that planning mechanism is an instrument to prevent and reduce disaster risk. He suggested geo-hazard study in development plan. He then continued to show the determination method for geo-hazard risk mapping for flood, landslide and forest fires.

Mr. Mohamed Jamil took the conference opportunity to introduce 'Low Impact Development (LID)' to participants. The LID's objective is to control the rates surface run-off water and reduce pollutant collection to resource natural drainage. He then presented the differences in development between conventional development and LID.

There are seven principles for planning and designing against geo-hazards. Mr. Mohamed Jamil presented all the seven principles as below:

- Principle 1: Knowing the communities geo-hazards risk
- Principle 2: Avoiding new development in geo-hazards stricken area
- Principle 3: Locating and configuring new development in geo-hazards stricken areas to minimise future losses
- Principle 4: Designing and constructing new buildings to withstand damage against geo-hazards
- Principle 5: Protecting existing development from geo-hazards losses through redevelopment, retrofit, land reuse plans
- Principle 6: Taking special precautions in locating and designing infrastructure and critical facilities to minimise geo-hazards disasters
- Principle 7: Planning for evacuation

Mr. Mohamed Jamil raised several issues and challenges for the attention on planning for disaster risk reduction. The compliance to development plans and planning guidelines was first pointed out. Secondly, the data availability for detail

assessment was needed. Thirdly, ineffective implementation of development policies was another issue. The support and commitment from local, state and relevant authorities was the challenge faced. Lastly, Mr. Mohamed Jamil presented few proposals on incorporating climate change issues in development plans, expediting the preparation of risk and hazard maps, promoting data sharing, improving public involvement in disaster management plan and awareness on climate change issues and proposing insurance policy for development in risk areas.

**Enhancing Stakeholder Communication for Disaster Risk Reduction by Ms. Takako Izumi, MERCY Malaysia.**

Malaysian Medical Relief Society Malaysia (MERCY Malaysia) is a non-profit organisation whose focus on providing medical relief and sustainable health related development for vulnerable communities. The risk reduction is among the focus area of MERCY Malaysia where education programmes are conducted for communities and schools.

Ms. Takako Izumi presented an overview of the disaster risk management. The total disaster risk management consist of response, rehabilitation and reconstruction, reduction and preparedness. However, there is only a small percentage in annual humanitarian assistance is devoted to reduction. Ms. Takako Izumi commented the saving in economic losses from disasters are between USD 5 to USD 10 for every dollar spent on risk reduction. Furthermore, she pointed out climate change, rapid urbanisation and environmental degradation is making disasters more frequent and devastating.

A World Conference on Disaster Reduction was organised by UN International Strategy for Disaster Reduction and the Japanese Government in 2005. A major outcome of the conference was the adoption of Hyogo Framework which aims to substantially reduce disaster losses by 2015. The losses refer to lives, social, economic and environmental assets of communities and countries. The Framework as well provides guiding principles, priorities for action and practical means for achieving disaster resilience for vulnerable communities. Ms. Takako Izumi gave an overview of the priorities for action underlined by Hyogo Framework. The priorities

include making disaster risk reduction a priority, knowing the risks and taking action, building understanding and awareness, reducing risk and be prepared and ready to act. Ms. Takako Izumi then highlighted the importance of knowledge, innovation and education in building a culture of safety and resilience at all levels. She suggested strengthening the information-sharing system, networks and promoting dialogue and cooperation among scientists and practitioners. She also pointed the need to strengthen research capacity and engage the media in raising awareness. Lastly, it was to contextualise the local knowledge. One example given in her presentation was the translation of a Japanese tradition story on tsunami into different language. This is a post-tsunami awareness programme.

Lastly, Ms. Takako Izumi highlighted few examples of good initiative and partnership with local agencies. She informed at the conference on the 3<sup>rd</sup> Asian Ministerial Conference on Disaster Risk Reduction which will be held from 2 to 4 December 2008 in Kuala Lumpur, Malaysia. Meanwhile, also the Asian NGO network to promote coordination and collaboration among NGOs for effective and efficient disaster reduction and response in the Asia-Pacific region. The partnership with local agencies includes Universiti Kebangsaan Malaysia and Malaysian Meteorological Department focuses on humanitarian assistance and disaster reduction programmes.

**Malaysian Amateur Radio Emergency Service (MARES) Experience and Roles of Amateur Radio in Disaster Communication by Dr. Kamil Fikri, Malaysian Amateur Radio Emergency Service Society (MARES).**

The Malaysian Amateur Radio Emergency Service Society (MARES) is a non-governmental organization who provides emergency communication service and promotes Radio Science education to its members and general public. Currently, there are 600 members. They play an important role in providing disaster communications services and community action programmes. From the international perspective, United Nation views Amateur Radio Society an important network in disaster communication which has been overlooked though they have extensive stations world-wide. The society provides the first information about and only link to disaster. Dr. Kamil Fikri further pointed out the two distinct advantages of amateurs on independence of infrastructure and dedicated and skilled improvise operators.

The objectives and types of communication services provided by MARES are then presented by Dr. Kamil Fikri.

An overview of experiences gained by Amateur Radio through active participations was presented. The Amateur Radio involvement in disaster communication started from 1995. Besides, natural disaster such as hurricanes, tornadoes, earthquake, wildfires and floods, Amateur Radio also provided their services during the World Trade Centre and Pentagon terrorist attacks.

Dr. Kamil Fikri then presented the lesson learned from cases such as the Highland Tower incident in 1993 and Indonesia Tsunami in 2004. These incidents shared a common communication difficulty in accessing the cellular and satellite communication. This situation is due to the failure of conventional communication systems in the disaster region. Thus, there is a need to interconnect all communication systems to relevance participated agencies. Thus, the Amateur Radio should be considered as an important resource for disaster communications and relief effort. The challenge in addressing an integrated inter-agency communication system that is less dependence on basic infrastructure need to be resolved.

#### **Questions / Comments:**

1) Datin Susan Jalaluddin (Badan Warisan Malaysia): Is there any coordinator for civil defense systems in Malaysia? if not what is the plan?

A: Mr. Jamil: Yes. Majlis Keselamatan Negara under the Prime Ministers Department coordinates for responses and also preparedness.

A: Dr. Kamil: Malaysian Security Council (MKN) where they coordinate the relevant agencies during disaster.

2) Mr. Chen Shick Pei (Sarawak) – Regarding the data from other agencies such as JPA, NAHRIM, JMG, how useful this information for specifically planning

purposes (to Mr. Jamil)? What are the responses of house average of such maps (to Dr. Phillip)?

A. Mr. Jamil: Any data or information is useful. For planning purposes, communication scientist and planners are important to communicate together. In JPBD, inter-agency task force brings in all professionals for land use and spatial planning development.

A. Dr. Phillip: There is no appropriate answer because he doesn't know anybody living there. Yes there is distinguished between theoretical and the house builders aspects. For instance, the additional building systems, lifting up the house building, these are case by case issue that has to be addressed.

3) Dr. Abdul Rahim Nik (FRIM): With respect to planning responses, how accurate is your GIS or flood prone map as to real occurrence on ground?

A. Dr. Phillip: Accuracy of the map was done a couple of years ago. This map is not for the entire country but parts of it due to morphology of Finland. The maps for flood prone areas in the metropolitan areas are very accurate. Many of the flood prone areas have been studied extensively. So far the plan serve the occupants of the flood prone area, it helps cleared decisions to city services. It is not allowed any future building of houses on flood prone area.

## **SESSION 4: POLICIES RESPONSES AND STRATEGIES**

### **Keynote 4: Communication & Stakeholder Participation in Climate Change Adaptation by Prof. Dr. Juan M. Pulhin, University of Philippines Los Banos.**

In his paper Prof. Pulhin shared the Philippine's experience on the first integrated climate change assessment research that aimed to analyse climate change impacts, vulnerability and adaptation in selected watershed area and upland communities through stakeholders' participation. The challenges and opportunities associated with

communication and stakeholder participation in promoting climate change adaptation at different levels were also discussed.

The adverse impacts associated with climate-related events have started to be felt in many parts of the world including Asia and have thwarted efforts of some countries towards promoting sustainable development. Despite this, recent studies including those from the developing world indicate that among the general public, few people understand what is actually causing climate change. Recent survey in UK indicates that barely half of the population think they will be directly affected and that climate change was ranked bottom of a list of key challenges facing the country. It may therefore be assumed that understanding about climate change may even be more limited in many developing countries such as in Southeast Asia where priorities of people and the government are generally short-term and focused on immediate economic survival.

Prof. Pulhin then provided an overview on the Philippines's vulnerability to the impacts of climate related events, including typhoons, ENSO events, and those related to the rising in sea levels, temperature and rainfall. The most vulnerable groups in the country are the upland farmers in upper watersheds and a total of 20-24 million people with very limited capital assets who live in marginal areas and mostly dependent on rain and favourable climate.

An AIACC-funded project, namely "Integrated Assessment of Climate Change Impacts, Vulnerability, and Adaptation in Watershed Areas and Communities in Southeast Asia", was then elaborated. The whole project cycle engaged actively various stakeholders, particularly the local ones, in determining the impacts and vulnerable groups and locations, which were used for generating the map of biophysical and social vulnerability, as well as in formulating the adaptation strategies. Findings of the project were published in books and national communications, and served as input to the formulation of regulation. He then summarised the following challenges and opportunities learnt as a result of the project:

- Promoting more responsive research to meet multiple objectives/interests of different stakeholders;
- Advancing the science of climate change to inform planned adaptation;

- Empowering stakeholders;
- Quantifying adaptation costs and benefits;
- Promoting best adaptation practices; and
- Institutionalising multi-stakeholder processes and long-term support system.

Prof. Pulhin concluded that it is critical to advance knowledge and change the way people think about climate change, and then try to change their behaviour by promoting individual and multi-stakeholder action. Essentially the future depends largely on reducing vulnerability and enhancing adaptation now.

**Forest Ecosystem Services and Productivity by Dr. Gary W. Theseira, Forest Research Institute Malaysia (FRIM).**

Dr. Gary remarked that the IPCC has provided a range of possible climatic and oceanographic scenarios which is left to policymakers to decide on what (if any) action is required and how and when it should be implemented. All response measures involve costs and need to be prioritised and implemented in a progressive manner as warranted:

- Mild impacts may be ignored or action deferred;
- Moderate impacts should be addressed if technologically and financially feasible; and
- Severe impacts should be addressed immediately (unless outcomes are inevitable).

So, policy objectives should focus on: i) maintaining ecosystem integrity as biodiversity conservation and ii) maintaining local community livelihoods as sustainable resource use. The speaker described direct and indirect effects of climate change on ecological systems. Some of the direct effects are elevated temperature, seawater inundation, substrate erosion and sedimentation. Indirect effects and compensatory phenomena include interspecific competition e.g. faster growing, shorter life cycle and compensatory growth such as increased photosynthetic efficiency due to higher atmospheric CO<sub>2</sub> concentrations, age dependent, best under ample water and nutrient conditions and so on.



Dr. Gary provided a comprehensive overview of mangrove ecosystems, lowland and hill dipterocarp ecosystems, and sub-montane and montane ecosystems with details of their importance that are characterised by specific vulnerabilities, potential solutions (rate dependent, dependent-decision ladder) and prognosis.

Dr. Gary summarised that, because of the uncertainty in climate scenarios, contingency plans for adapting to climate change need to be flexible. Solutions should be applied progressively as the situation warrants. Decision ladders may prove useful as the available options vary by situation and prognosis may likewise vary. Therefore, innovative solutions (such as programmatic CDM or Payments for Ecosystem Services) are needed.

### **Responding on Climate Change Adaptation – A Corporate Sector Perspective by Mr. Ralph Justin Dixon, YTL Corporation Berhad.**

Mr. Ralph provided an overview of YTL Group in Malaysia which is a leading infrastructure conglomerate with investments in power, utilities, cement manufacturing, property development, technology, transportation, hotels and leisure. The combined market capitalisation is over RM30 billion on Bursa Securities Malaysia Berhad.

Mr. Ralph explained details of responding to climate change in the business units of YTL Group. He mentioned the following measures taken to reduce the impact of their utilities on the environment:

- Working with the Malaysian Government to implement a policy of using clean fuels (e.g. natural gas) rather than coal and crude oil;
- Power stations designed to minimise impact of emissions, particularly nitrogen dioxide;
- Water cooling systems – submarine pipes extended 10% further than required by engineering by-laws (to maintain the ambient temperature of marine environments);
- ISO14001 Certification (Environmental Management Systems) for both power stations obtained in September 2007; and
- Wessex Water – comprehensive environmental policy.

The key messages of his presentation are summarised below:

- Cement manufacturing operations – fully integrated operations across the complete manufacturing value chain from quarry operations to clinker and cement production, sales and distribution, logistics and ready-mixed concrete with comparative performance in safety & manpower productivity, energy efficiency and environmental performance;
- In-house development of the Group's property development projects which focus on innovative, environmentally friendly and energy-efficient design features;
- YTL's Wessex Water has taken great strides to find sources of renewable energy to meet its zero carbon target by 2020, and already exceeding 10% of energy needs from renewable energy;
- YTL-SV Carbon Sdn. Bhd. that commits to carbon mitigation – the largest CDM Project Developer in Malaysia and third largest in Southeast Asia. Focus on biomass, biogas, other clean energy from agricultural waste and municipal solid waste, cement & industrial waste. Working with plantation companies to develop clean energy from waste biomass and effluent plants;
- YTL expanded the Environmental Investment Division that supports funding for the environmental organisations in Malaysia; and
- YTL plays a role to advocacy of climate change by organising and sponsoring Climate Change Week 2008 in Kuala Lumpur, Malaysia, for the second year running.

In conclusion, Mr. Ralph mentioned the following initiatives that are undertaken to energy and CO2 mitigation within the group.

- Change from diesel to natural gas boilers for hotels
- Composting equipment for Pangkor Laut Resort kitchen waste
- Recycling of water used to clean KLIA ERL carriages
- LED lighting fitted in LOT10 ambient lighting areas
- Tent over Starhill's atrium glass dome reducing chiller requirement
- Air-conditioning & lighting energy saving devices fitted for common areas
- Air-conditioning temperatures raised in common areas
- Energy saving bulbs phased-in throughout properties

- Efficiency improvements for fleet of 700 trucks in YTL Cement
- Upgrade of Pangkor Laut Resort vessels 2-stroke engines.

### **Questions / Comments**

1) Dr. Jean Palutikof to Prof. Dr. Juan M. Pulhin: Small farmers may not adapt in an efficient manner. These small farmers might go to the money lenders in order to resolve their problems. The question begets as to whether the farmers choose to do so, or do they have any options at all. What are the measures that can be taken by the government to improve the situation of these small farmers?

A: Prof. Dr. Juan replied that it had been the choice or adaptation of the small farmers in certain cases. However, in other cases, it has been an impact. He indicated that he has recommended the engagement of local stakeholders. For example, the research assistants are part of the analysis and at the same time, there are representatives from the local government and other agencies who can respond to these issues right there and then at the local level. An existing project of the Municipal planning level in collaboration with Prof. Dr. Juan aims to identify these local issues.

2) Assoc. Prof. Dr. Zelina Zaiton Ibrahim (Universiti Putra Malaysia) to Dr. Gary Theiseira: She indicated that the assessment in the changes of forest land is expected due to sea level rise. For instance, most of the agricultural lands in Malaysia were previously mangrove swamps. Land use changes have thus encroached into the forest areas. She wondered if there was any scenario analysis that has been carried out to assess the amount of land lost as a result of sea level rise.

A. Dr. Gary responded to this interesting question by citing an example in Sekinchan, whereby rice is grown on former mangrove systems. However, these areas are non-productive due to sea level rise and thus have been replaced by agricultural land. However, in the National Forest Act, land is gazetted as Permanent Forest Area for protection or selective harvesting. In certain states, such as in Sarawak and some other areas in Peninsular Malaysia, land is being traded as

commodities due to lucrative prices. However, the prices of commodities are subject to fluctuations in the market. Thus, commodity crops may not always be the best option. Dr. Gary acknowledged the fact that the amount of land inundated and loss due to sea level rise is happening. Even though it is so, no study has been carried out to assess land lost due to sea level rise.

3) Ms. Ivy (WWF) to Mr. Ralph Dixon: as to whether YTL Corp. being a corporate company, has carried out the assessment of emissions from its power and cement plants. In addition, her question also pertained to the various measures implemented by YTL to improve efficiency.

A. Mr. Dixon indicated that YTL has assessed its carbon footprint as reported in the Sustainability Report (published for YTL Corp), such as the carbon emission levels for the past 5 years and also annually. For instance, Wessex Water has published a detailed Sustainability Report. Currently, YTL Corp. is collaborating with the government in the Ninth Malaysia Plan to achieve 300 MGW of energy from alternative sources such as biogas, biomass as well as alternative energy cellulose wastes.

## **PANEL DISCUSSION: POLICY REQUIREMENT FOR CLIMATE CHANGE**

Main points discussed in the panel discussion session are as follow:

1. We have heard from the sessions that there is a high level of uncertainty in modeling future climate scenarios. We have skeptics about this whole issue of climate change.
2. As a result, in the climate change discourse among policy makers, you have two somewhat confrontational viewpoints:
  - Limitations view which focus on action to reduce GHG emission (mitigation);
  - Adaptationist view where no explicit action is required for mitigation, natural selection and market forces will ensure that societies will adjust to the changes.

3. Despite this uncertainty, climate change is now a reality. Adaptation is a necessity, we cannot have adaptation pitted against mitigation.
4. We, in Malaysia have to be realists, we accept that climate change is happening, we acknowledge that there is a high level of uncertainty, and that adaptation is a crucial, realistic response along with mitigation.
5. Climate change policy should be based on national needs, for a 'climate resilient development'. Cost effective adaptation and mitigation strategies that integrate considerations of current and future two aspects:
  - Physical manifestations of climate change (including climate variability); and
  - International socio-political demands on sovereign states (to limit GHG emissions), both of which may undermine the economy and threaten development.
6. We need to balance adaptation and mitigation to ensure climate resilient development in this context, we will deliver climate-proof development and a low carbon economy.
7. For this to happen, we need to mainstream climate change considerations into policy and decision-making. We are optimistic that the cabinet committee on climate change chaired by the Prime Minister will serve to strengthen both horizontal (between various ministries and agencies at the Federal level) and vertical connections (Federal, State and Local Levels) within government. Perhaps this new institutional arrangement will serve to mainstream climate change. Perhaps, like the example from Phillip, we could move towards legislation at some point in the future.
8. Notwithstanding this, we must acknowledge that the carbon footprint of Malaysia is large, we are listed 26th. In this context, there is a need to have behavioral responses, and this is where the NGOs and business sector can take a lead. We need a mechanism to ensure that NGOs/CBOs and other major groups have adequate resources for this purpose, because they are the ones who work on the ground, and they should be encourage to collaborate with local authorities. For the business sector, for example, higher energy efficiency leads to higher cost savings.
9. Research and strategic thinking is much needed in years to come, to balance adaptation and mitigation, which is the core priority area within UKM:

- Balance adaptation and mitigation;
- Mainstreaming climate change policy in policy and decision-making; and
- Mechanisms for adequate and sustainable stakeholder participation and collaboration.

**CONFERENCE PROGRAMME**

**Day 1 (14 October 2008)**

08:30 – 09:30 Registration

**Session 1: Vulnerability and Adaptation**

Chairman: Dr. Yap Kok Seng, Director General, MMD

09:30 – 10:15 **Keynote 1:** Climate Change Impacts, Adaptation and Vulnerability: the IPCC Working Group II Fourth Assessment – Dr. Jean Palutikof, Hadley Centre, Met Office, UK

10:15 – 10:35 **Speaker 1:** Climate Change and Water Resources Management in Malaysia – Dr. Salmah Zakaria, NAHRIM

10:35 – 10:55 **Speaker 2:** Impacts of Climate Change on Agriculture Production and Food Security – Dr. Mohd Yusoff Abdullah, MARDI

10:55 – 11:25 Tea Break

11:25 – 11:45 **Speaker 3:** Coastal Vulnerability – Ir. Zainal Akamar Bin Harun, DID

11:45 – 12:05 **Speaker 4:** Climate Vulnerability Impact Assessment of Malaysian Oil and Gas Industry – Dr. Foo Say Moo, PETRONAS

12:05 – 12:20 **Q&A**

12:20 – 14:00 Lunch Break

**Session 2: Science of Climate Change**

Chairman: Prof. Dato' Dr. Azizan Abu Samah, University of Malaya

14:00 – 14:45 **Keynote 2 :** The Science of Climate Change – Dr. David Wratt, National Institute of Water and Atmospheric Research (NIWA), New Zealand

14:45 – 15:05 **Speaker 5:** Climate Variability/Extreme Weather – Prof. Dr. Fredolin Tangang, UKM

|               |   |
|---------------|---|
| 15:05 – 15:25 | <b>Speaker 6:</b> Climate Change Scenario for Malaysia – Ir. Haji Ahmad Jamaluddin b. Shaaban, NAHRIM                       |
| 15:25 – 15:45 | <b>Speaker 7:</b> Climate Change Scenario and Impact of Global Warming on the Winter Monsoon – Dr. Wan Azli Wan Hassan, MMD |
| 15:45 – 16:00 | <b>Q&amp;A</b>  |
| 16:00 – 16:25 | Tea Break   |
| 16:25 – 17:25 | <b>Panel Discussion:</b><br>Science & Technology Requirement for Climate Change   |
|               | Chairman: Dr. Yap Kok Seng, Director General, MMD   |
|               | Panelist: i. Prof. Dato' Dr. Azizan Abu Samah, UM   |
|               | ii. Prof. Dr. Nor Aieni Hj. Mokhtar, NOD  |
|               | iii. Prof. Dr. Fredolin Tangang, UKM  |

## **Day 2 (15 October 2008)**

|               |                              |
|---------------|------------------------------|
| 09:00 – 10:10 | Opening Session              |
| 10:10 – 10:40 | Tea Break & Press Conference |

### **Session 3: Planning and Communication for Disaster Risk Reduction**

Chairman: Prof. Dr. Joy Jacqueline Pereira, Institute for Environment & Development (LESTARI), Universiti Kebangsaan Malaysia (UKM)

|               |   |
|---------------|---|
| 10:40 – 11:25 | <b>Keynote 3:</b> Planning Responses for Natural Hazard and Climate Change Impact Reduction – Dr. Phillip Schmidt-Thome, Geological Survey of Finland                         |
| 11:25 – 11:45 | <b>Speaker 8:</b> Management of Geohazards Through Spatial Planning – Mr. Mohamed Jamil b. Ahmad, Federal Department of Town and Country Planning, Peninsular Malaysia (JPBD) |
| 11:45 – 12:05 | <b>Speaker 9:</b> Enhancing Stakeholders Communication for Disaster Risk Reduction – Ms. Takako Izumi, Mercy Malaysia   |
| 12:05 – 12:25 | <b>Speaker 10:</b> MARES Experience and Role of Amateur Radio in Disaster Communication – Dr. Kamil Fikri, Malaysian Amateur Radio Emergency Service Society (MARES)          |
| 12:25 – 12:40 | <b>Q&amp;A</b>  |



12:40 – 14:00 Lunch Break

#### **Session 4: Policy Responses and Strategies**

Chairman: Dr. Loi Kheng Min, Chairman, Sub-committee on Climate Change, Malaysian International Chamber of Commerce and Industry (MICCI)

14:00 – 14:45 **Keynote 4:** Communication and Stakeholder Participation in Climate Change Adaptation – Prof. Dr. Juan M. Pulhin, University of the Philippines Los Baños

14:45 – 15:05 **Speaker 11:** Forest Ecosystem, Services and Productivity – Dr. Gary Theseira, Forest Research Institute Malaysia (FRIM)

15:05 – 15:25 **Speaker 12:** Responding on Climate Change Adaptation - A Corporate Sector Perspective – Mr. Ralph Dixon, YTL Corporation Berhad

15:25 – 15:40 **Q&A**

15:40 – 16:05 Tea Break

16:05 – 17:20 **Panel Discussion:**  
Policy Requirements for Climate Change

Chairman: Datuk Suboh bin Mohd Yassin, NRE

- Panelist:
- i. Y.B. Dato' Dr. James Dawos Mamit, MP Mambong
  - ii. Mr. Gurmit Singh, CETDEM
  - iii. Prof. Dr. Joy Jacqueline Pereira, LESTARI-UKM
  - iv. Dr. Loi Kheng Min, MICCI

17:20 – 17:30 Closing Session

**LIST OF CHAIRS, KEYNOTE & SESSION SPEAKERS AND PANELISTS**

Session Chairs

1. Dr. Yap Kok Seng (Chair S1, Chair PD1)  
Director General  
Malaysia Meteorological Department  
Jalan Sultan  
46667 Petaling Jaya, Selangor Darul Ehsan.
  
2. Prof. Dato' Dr. Azizan Bin Abu Samah (Chair S2, Panelist PD1 i)  
Deputy Dean  
Faculty of Arts and Social Sciences  
Universiti Malaya  
50603 Kuala Lumpur.
  
3. Prof. Dr. Joy Jacqueline Pereira (Chair S3, Panelist PD2 iii)  
Principal Fellow  
Institute for Environment and Development (LESTARI)  
Universiti Kebangsaan Malaysia  
43600 Bangi  
Selangor Darul Ehsan.
  
4. Dr. Loi Kheng Min (Chair S4, Panelist PD2 iv)  
Managing Director  
KM Loi & Associates Sdn. Bhd.  
No. 27-3, Jalan USJ 9/5Q  
47620 UEP-Subang Jaya  
Selangor.

## Keynote Speakers

1. Dr. Jean Palutikof (Keynote 1)  
Head  
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