Climate Change Issues and Malaysian Initiatives

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Abstract The purpose of this paper is to describe Malaysian climate change experiences, to highlight the lack of Malaysian initiatives in drafting a national policy on climate change, the structures, activities and national agenda of climate change issues. A description of possible climate change impacts on Malaysia, some facts and figures together with activities, structures and the national agenda are provided in this study. This study emphasises that sustainable long-term economic policy requires a workable framework for climate change and vulnerabilities that have not yet been covered in the national economy. Malaysia must visualise appropriate futures and frameworks on climate change issues, potential changes and national initiatives for planning strategies to reduce vulnerabilities. This study draws attention to the fact that Malaysia ranked 52 out of 57 in the Climate Change Performance Index (CCPI) in 2009. Malaysian climate protection performance still lags behind other countries in the region. This study evaluates and discusses current information about on-going policy preparations on climate change issues, and provides a critical review to improve Malaysian climate change-related initiatives.

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1 Introduction

Current regional climatic trends, with an increase in average surface temperature, are now very evident in Malaysia (NAHRIM 2006). Past and present records of Malaysian climate data show evidence of climate change that has been voiced globally, having been established in the Intergovernmental Panel on Climate Change (IPCC) assessments report (IPCC 2007). Information on a considerable fluctuation of temperature has been published recently, showing a very strong correlation between climate change and a significant annual average temperature increase, where record fluctuation is simulated for Malaysia up to 2079 (MMD 2009). The highest and lowest projected seasonal average temperature towards the end of the century for Peninsular Malaysia was found to be during the months of December, January and February (3.7 °C) and September, October and November (3.3 °C) respectively (MMD 2009). Based on three emission scenarios, designated by the Malaysian Metrological Department (MMD) as A2, A1B and B2, the projected range of the highest temperature increase is between 2.3 °C and 3.6 °C for Peninsular Malaysia and 2.4 °C–3.7 °C for East Malaysia (MMD 2009).

NAHRIM (2006) revealed the possible vulnerable regions based on temperature fluctuations up to 2050 and severe impacts based on scenario projections. The initial simulated outcomes indicate uncertainty in rainfall (±30 %) in the surrounding sub-tropics, where an increase in temperature of 4.5 °C would be very noticeable (MMD 2009). If the current scenario projections turn out to be accurate, then the Malaysian economy would be more vulnerable due to its lack of adaptive capacity and proper policy-relevant technical foundations (Siwar et al. 2009). Results of modelling estimate that Malaysia may be warmer by the end of the century. A substantial amplification of climate change would make Malaysia a vulnerable economy. The impacts can be classified as: (a) food insecurity; (b) vulnerability of agriculture, biodiversity and the ecosystem; (c) costal and sea level rise; (d) vulnerability of human health due to vector-borne diseases; (e) natural disasters, such as landslides, cyclones, flash floods, tsunamis, severe drought and peat fires; and (f) political instability due to international conflicts of interest. Indeed, national research findings and outcomes are too real, too important, too far-reaching, and require an immediate response in terms of mitigation and adaptation options. Following the cumulative scientific evidence compiled by the IPCC in its series of assessment reports since 1990, together with the Stern Review's study looking at the economic impact of climate change, Malaysian has started to rethink the stark reality that, if left unchecked, climate change will pose a risk in the future.

Whilst already faced with multiple stressors, the onset of climate change factors impinges on sustainable development that relies on climate-sensitive sectors and

alters the distribution and quality of food, natural resources and the environment associated with urbanisation, industrialisation and economic development (Tan et al. 2009). Malaysia realises the importance of climate change efforts at a national and international level, and efforts are congruent with those of national interests. The current level of Malaysian development, national priorities, natural resources and its political structure influences whether the country will be able to implement climate change efforts. Since it is likely that climate change will occur over the next 50–100 years, following regional research findings on national climate change impacts, mitigation and adaptation options have primarily been suggested as the means to reduce the impact of climate change in Malaysia (MMD 2009; NAHRIM 2006). Insights into some potential implications were gained during the preparation of Malaysia's Initial National Communication (INC) and recent National Development Plans, where the sensitivity of several key economic and resource sectors was assessed against a range of plausible future climates. Some policies are currently under review, including 'The National Policy on the Environment, National Energy Policy, Third National Agricultural Policy, National Forest Policy, Biodiversity Policy and National Land Policy.'

This study describes Malaysian climate change experiences, several policies, its structures, activities and the national agenda on climate change. Our initiative in this study is to evaluate and discuss up-to-date information about on-going policy draft preparations and to provide a critical review.

2 National Policy on Climate Change

Since the Third Malaysia Plan (1976–1980), environmental concerns are progressively being emphasised in development plans (Hezri and Hasan 2006). Climate change is now on top of the agenda of national policy-makers worldwide, and also in multilateral institutions such as the United Nations. Following climate change research in Malaysia, the government has formulated several policies that have taken environmental concerns into account to different extents, as well as sectoral-specific contexts and needs, such as:

- building adaptation strategies to enhance the resilience of natural ecosystems against the impacts of climate change;
- working with business and industry to help reduce CO_2 emissions;
- reducing emissions from deforestation and degradation (REDD) through the WWF Forest-Based Carbon Network Initiative;
- the clean development mechanism (CDM);
- renewable energy power generation to offset CO_2 emissions.

Malaysia acknowledges that some level of climate change is inevitable irrespective of CO_2 emission reduction strategies. This is reflected in the conclusion of the IPCC in their 2001 Assessment Report (IPCC 2001). The Malaysian government is currently developing a national framework for climate change adaptation

strategies that will strive to embed appropriate strategies within its target (Azrina 2007). The Forest-Based Carbon Network Initiative is spearheading efforts to reduce forest-based emissions, recognising the long-term imperative to address the root causes of deforestation at the national level and to raise the value of all the ecosystem services that forests afford. Malaysia recognises the important role of industry as a catalyst for reducing CO_2 emissions and, under the national agenda, business and industry become part of the solution to reduce CO_2 by becoming engaged in working towards changing practices as a response to climate change (PTM 2007).

Among the key initiatives recently taken by the Malaysian government against global warming is renewable energy (RE), which is Malaysia's future energy source. The policy of RE aims to encourage a generation of energy using biomass by providing companies that undertake such activities with tax incentives, while promoting the usage of renewable energy for power production. The government has established a programme called the Small Renewable Energy Program (SREP). Some policies put forward in Malaysia do not directly address climate change issues; however, some reviews on current policies suggest indirectly addressing climate change matters which are currently ongoing within national development plans, such as the Ninth Malaysia Plan (2006–2010), showing that several national programmes contribute indirectly to managing issues of climate change (Pereira and Tan 2008).

Efforts to promote the development of biofuel using palm oil as a renewable source of energy have been undertaken by the Malaysian government in line with other climate change-reducing initiatives. Under the Kyoto Protocol, Malaysia supports the implementation of environmentally sound projects leading to the reduction of greenhouse gases (GHG) and is encouraging the participation of Malaysian companies in Clean Development Mechanism (CDM) projects. Malaysia is committed to the implementation of sustainable forest management (SFM), as enshrined in the resolution of the United Nations Conference on Environment and Development (UNCED). In collaboration with other research institutes, such as the MMD, the National Hydraulic Research Institute of Malaysia (NAHRIM) and the Institute for Environment and Development (LESTARI), the Ministry of Natural Resources and Environment is currently conducting a policy study on climate change, following the second National Communication (NC2). The aim of this study is to develop a national policy and strategies on climate change that foster sustainable development in Malaysia to meet the country's needs and to respond to the United Nations Framework Convention on Climate Change (UNFCCC) (Tan et al. 2009).

Some recommendations called 'Towards Policy Changes' are also considered in future climate change policy after the UNFCCC's 13th Conference of the Parties summit scheduled for December 2007 in Bali, Indonesia. Country-level adaptation and feasible mitigation solutions to support the Ministry's many proactive steps to manage the consequences of climate change have recently been highly acknowledged in Malaysia (Pereira and Tan 2008). The Natural Resources and Environment Ministry recently announced a cut of 50 million tonnes of carbon

dioxide equivalent per annum and a carbon emissions reduction from 187 million tonnes in 2005 to 74.8 million tonnes in 2020—a 40 % cut, with 20 % to be contributed by energy efficiency projects and renewable energy sources to offset future climate change (PTM 2007). Although the 40 % carbon emissions cut has attracted much attention in Malaysia following the COP-15 conference in December 2009, this dialogue requires enhanced interagency collaboration in addressing and adapting to climate change.

Other national policy studies adopted to support the identification of national positions with regard to the UNFCCC and Kyoto Protocol proposal, include the formulation of Malaysian national policy on climate change issues and the preparation of effective action plans, as well as delineation and collaboration of state-level responses to climate change adaptation and mitigation (Fig. 1). In the first to fourth clusters of the UNFCCC and Kyoto Protocol proposal, several local, international and public documents, including the national policy on climate change of stakeholder viewpoints, were critically reviewed. These documents are related to post-2012 responses, decision documents of the UNFCCC and Kyoto Protocol for climate change impacts, direct and indirect Malaysian climate change-related documents, Malaysia's Third Outline Perspective Plan (OPP3), Malaysia's Initial National Communication (NC) and the Ninth Malaysia Plan (RMK9) of Malaysia (Tan et al. 2009).

Malaysian climate change-related policies aim to facilitate the integration of climate change considerations into economic development decision-making processes and to foster sustainable economic and human development as environmental conservation for future generations (Azlina et al. 2007; Pereira and Subramaniam 2007; Raja Zaharaton et al. 2008). Recent policies advocate formulating climate change policy to harmonise and provide guidance to existing policies. Other recent policies complement existing ones, and take cognisance of international conventions on global concerns (Pereira and Subramaniam 2007). The draft national policy on climate change issues in Malaysia consists of several key elements including objectives, principles, strategic thrusts and key actions, and is aimed at ensuring a climate-resilient development and low-carbon economy that fulfils national aspirations for sustainability (Pereira 2008).

Table 1 briefly summarises the objectives, principles and strategic thrusts of the draft policy for integrating responses into national policies and programmes to strengthen the resilience of development from future impacts of climate change for sustainable development. The draft national policy on climate change issues in Malaysia consists of several key elements, including the following key objectives:

- mainstreaming measures to address climate change challenges through strengthened economic competitiveness, environmental conservation, wise management of resources and enhanced quality of life for sustainable development;
- strengthening institutional capacity and capability for better implementation and to enhance opportunities in reducing the negative impacts of climate change;

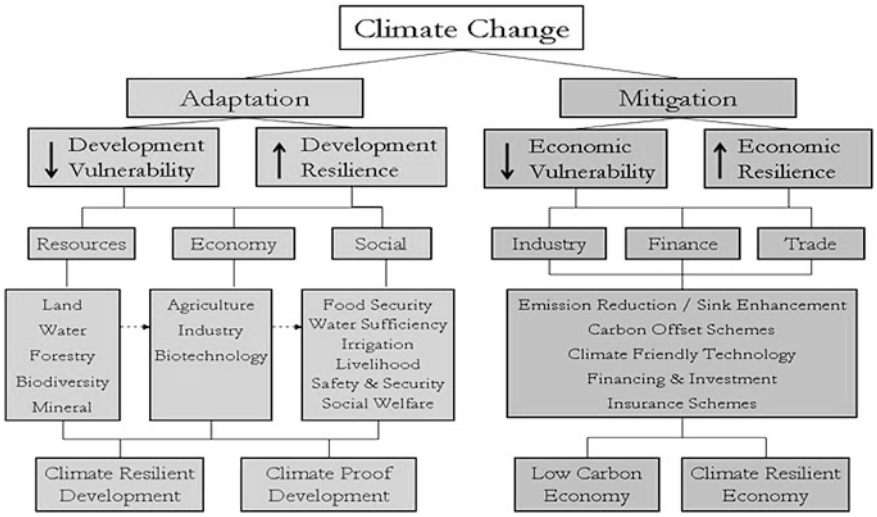

Fig. 1 Overall framework of a national climate change policy. Source: (Tan et al. 2009)

– integrating responses into national development plans and policy plans or programmes to strengthen the resilience of development from the future impacts of climate change.

The draft national policy on climate change issues in Malaysia formulates strategic principles and directions on Development on a Sustainable Path: integrate climate change responses in national development plans to fulfil the country's aspiration for sustainable development; Sustainability of Environment and Natural Resources: initiate actions on climate change issues that contribute to environmental conservation and the sustainable use of natural resources while enhancing energy efficiency and sufficiency as well as water and food security; Integrated Planning and Implementation: integrate planning and implementation to climate-proof development; effective participation: improve participation of stakeholders and major groups to bring about the effective implementation of climate change responses; and, finally, Common but Differentiated Responsibility: international involvement in climate change will be based on the principle of common but differentiated responsibility (Pereira 2008; Tan et al. 2009).

3 Implementation of Malaysian Climate Change Initiatives:Some of Which are Lacking

Malaysia's obligations to the UNFCCC, national policy and action plans, in particular, are repeatedly judged, recognised and considered as functional and practical process to capitalise on, identifying the country's own concerns about climate

Table 1 The draft national policy on climate change—objectives, principles and strategic thrusts

Objectives
• Mainstreaming measures to address climate change challenges through strengthened economic competitiveness, wise management of resources, environmental conservation and enhanced quality of life for sustainable development
• Integrating responses into national policy plans and programmes to strengthen the resilience of development from future impacts of climate change
• Strengthening institutional and implementation capacity to better harness opportunities in reducing negative impacts of climate change
Principles/Strategic thrusts
Principle 1. Development on a Sustainable Path: Integrate climate change responses in national development plans to fulfil the country's aspiration for sustainable development.
• Strategic thrust 1: Facilitate the harmonisation of existing policies to address climate change adaptation and mitigation in a balanced manner
• Strategic thrust 2: Institute measures to make development climate-resilient through a low-carbon economy to enhance global competitiveness and attain environmentally sustainable socio-economic growth
• Strategic thrust 3: Support climate-resilient industrial development and investment in pursuit of sustainable socio-economic growth
Principle 2: Sustainability of Environment and Natural Resources: Initiate actions on climate change issues that contribute to environmental conservation and the sustainable use of natural resources while enhancing energy efficiency and sufficiency as well as water and food security.
• Strategic thrust 1: Adopt balanced adaptation and mitigation measures for climate-proof development, strengthen environmental conservation and promote the sustainability of natural resources
Principle 3: Integrated Planning and Implementation: Integrate planning and implementation to climate-proof development.
• Strategic thrust 1: Institute measures to integrate cross-cutting issues in policies, plans, programmes and projects to increase resilience to and minimise negative impacts of climate change
• Strategic thrust 2: Support knowledge-based decision-making through intensive climate-related research and development and capacity-building of human resources
Principle 4: Effective Participation: Improve participation of stakeholders and major groups for effective implementation of climate change responses.
• Strategic thrust 1: Improve collaboration through efficient communication and coordination among all stakeholders for the effective implementation of climate change responses
• Strategic thrust 2: Raise awareness and increase public participation to promote behavioural responses to climate change
Principle 5: Common but Differentiated Responsibility: International involvement in climate change will be based on the principle of common but differentiated responsibility.
• Strategic thrust 1: Strengthen involvement in international activities on climate change based on the principle of common but differentiated responsibility

[*Source* adapted from Pereira (2008)]

change, building capacity and formulating potential climate change policy (Tan et al. 2009; EPU 2006). Nevertheless, as climate change is a rather new issue in this country, shortcomings and technological barriers in the mainstreaming policy have been recognised (Anon 2007).

Many proposals have been formulated to ensure effective mechanism for the implementation of international conventions and national policies across the whole spectrum of government structures, from national to state and local levels. However, they suffer due to coordination and harmonisation (Anon 2007). Some research findings divulge conflict between national future energy policy and climate change issues and emission scenarios (Abdul Hamid et al. 2008). Some research findings reveal disharmony with existing policies when formulating climate change policy and guidance and in integrating planning and implementation with climate-proof development. Furthermore, there can be poor participation from stakeholders and major groups which obstruct the effective implementation of climate change responses. Some research findings disclose a conflict between efficient environmental conservation and sustainable use of natural resources while enhancing energy efficiency and sufficiency as well as water and food security (Raja Zaharaton et al. 2008), while others find disharmony with incorporating mainstream climate change into national policies, technical barriers, programmes and plans (Tan et al. 2009).

Despite the national initiatives and following the Kyoto Protocol, Malaysia ranked 52 out of 57 in the CCPI table of climate protection performances of the 57 countries that are responsible for more than 90 % of global energy-related carbon emissions (CCPI 2010). Malaysian GHG emissions have been increasing over the years, with the industrial and transport sectors being the biggest emitters. Efforts have been made to reduce GHG emissions through CDM, even though the intention may not be noble or altruistic (PTM 2008). Recently, Malaysia has been applying climate change research to mitigate impacts at the national level. The field of renewable energy has been among the key initiatives taken by the Malaysian government in the fight against global warming (Tick Hui 2010). However, per capita, energy use in Malaysia surpasses that of other ASEAN countries such as Vietnam, Philippines, Indonesia and Thailand. As Malaysia continues to develop and grow economically, it will be expected to make a greater commitment to global mitigation actions (Tan et al. 2009). The industrial sector, which is the main implementer of most such mitigation efforts, needs to be engaged continuously to ensure awareness is raised, and capacity building is required for climate change issues and challenges.

4 What Should Malaysia Do?

Climate change is a timely issue. The scientific evidence is now striking, based on a recently published report by the IPCC and national documents. A current concern is to strike a healthy balance between achieving sustainable economic growth and managing climate change issues. The failure to adopt an appropriate long-term climate policy regime would signify the imbalance of a delicate ecosystem, rich biodiversity and economic potential. Over the years, the Malaysian economy has inevitably been linked closely to its unique natural resources, such as land,

forestry, water, biodiversity, marine and coastal resources. The failure of appropriate climate change-related issues concerning socio-economic development activities would severely impact on Malaysia. A proper, relevant policy with an adaptive framework to climate change, networking and communication among stakeholders and policy-makers is vital to help shape nationally appropriate policies, which are apparently absent in Malaysia.

Sustainable long-term economic policy requires a workable framework for climate change and the highlighting of vulnerabilities still uncovered in the national economy. There is a need to visualise futures and frameworks on Malaysian climate change vulnerability issues, potential changes, uncertainties and national initiatives for planning strategies to reduce vulnerabilities and promote sustainable development. Beyond principles, however, the post-Kyoto or COP-15 framework can only be successful if Malaysia works speedily with many decentralised groupings to generate momentum. As climate change is a global issue, decentralised groupings, such as the Asia–Pacific Partnership on Clean Development and Climate, the Asia Pacific Economic Cooperation (APEC) and a gathering of major emitters which involve only a handful of countries around the world, can meet and elaborate proposals on climate change. Although country-specific adaptation or mitigation would not be a solution for climate change issues, environmental concerns are progressively being emphasised in national development plans. Country-specific adaptation and mitigation proposals would then have to be brought to the UNFCCC for agreement or partner countries notified. Such a process can help speed up the development of concrete proposals for the consideration of global climate change for next generations.

5 Conclusion

Malaysia is one of the few developing countries in the world that recognised at an early stage the positive contribution of a clean environment on economic development. Malaysia began to place an emphasis on environmental concerns in its development plans as long ago as the mid 1970s. In 1994, Malaysia ratified the United Nations Framework Convention on Climate Change, or UNFCCC. Subsequent to the ratification, Malaysia also put into place emission mitigation strategies, such as working with businesses and industries to help reduce carbon emissions, reducing emissions from deforestation and degradation through the WWF Forest-based Carbon Network Initiative, participating in clean development mechanisms, carbon trading, and renewable energy power generation.

In spite of all the aforementioned initiatives, in terms of the Climate Change Performance Index, Malaysia still ranks 52 out of 57 countries, which are responsible for more than 90 % of global energy-related carbon emissions. The main contributing factor to this lies in the fact that Malaysian's largest emitters are the industrial and transportation sectors, whose activities are linked directly to economic activities. As such, two future directions are essential in Malaysian

sustainable economic development. First, there must be a move towards a low-carbon economy; second, economic growth must be decoupled from energy consumption. To conclude this paper, we stress that as an immediate step after the National Policy on Climate Change, Malaysia needs to develop a realistic roadmap for moving towards a low-carbon economy and to devise strategies that will lead to the decoupling of energy consumption from economic growth.

References

Abdul Hamid, J., Al-Amin, A. Q., & Chamhuri, S. (2008). Environmental impact of alternative fuel mix in electricity generation in Malaysia. *Renewable Energy*, 33, 2229–2235.

Anon. (2007). *Summary report of NCSA Inception Workshop*. National Capacity Needs Self-Assessment for Global Environmental Management (NCSA), Malaysia: In the Government of Malaysia and United Nations Development Programme.

Azlina, A., Gan, P. C., Koh, F. Pin, Maizura, I. & Tan, C. T. (2007). Report on east coast stakeholder consultation session on NCSA for biodiversity, Climate Change and Land Degradation, 4–5 September 2007, Kuantan.

Azrina, A. (2007). *Rapporteur Report for the Forum on Cities and Climate Change: Adaptation and Planning Responses*. Malaysia: Putrajaya.

CCPI. (2010). *The Climate Change Performance Index: Results 2010*. Belgium: Germanwatch.

EPU (Economic Planning Unit) (2006). Ninth Malaysia Plan 2006–2010. Prime Minister's Department, Malaysia.

Hezri, A. A., & Hasan, M. N. (2006). Towards sustainable development? the evolution of environmental policy in Malaysia. *Natural Resources Forum*, 30, 37–50.

IPCC. (2001). *IPCC third assessment report: Impacts, adaptation and Vulnerabilty*. Cambridge: Cambridge University Press.

IPCC. (2007). *The Physical Science Basis*., Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

MMD (2009). Scientific report: climate change scenarios for Malaysia 2001–2009. Malaysian Metrological Department, Malaysia.

NAHRIM (2006). Final Report: Study of the Impact of Climate Change on the Hydrologic Regime and Water Resources of Peninsular Malaysia. Kuala Lumpur, Malaysia: National Hydraulic Research Institute of Malaysia (NAHRIM) and California Hydrologic Research Laboratory (CHRL), Ministry of Natural resources and Environment.

Pereira, J. J. (2008). *National policy on climate change (Draft 1–10 September 2008) in the consultation workshop on the draft national policy on climate change*. Malaysia: Putrajaya.

Pereira, J. J., & Subramaniam, M. (2007). *Rapporteurs report for the national seminar on socio-economic impacts of extreme weather and climate change*. Putrajaya, Malaysia: Ministry of Science, Technology and Innovation.

Pereira, J. J., & Tan, C. T. (2008). *Initial findings of the Policy Study on Climate Change (NRE-RMK9), International Seminar on Climate Variability, Change and Extreme Weather Events, 26–27 February 2008.*. Malaysia: Bangi.

PTM (Pusat Tenaga Malaysia) (2007). Report on Second National Communication Inception Workshop. NRE and UNDP, Malaysia.

PTM (Pusat Tenaga Malaysia) (2008). National Energy Balance Malaysia 2008. Ministry of Energy, Communications and Multimedia, Malaysia.

Siwar, C., Alam, M., Murad, W., & Al-Amin, A. Q. (2009). Climate change, agricultural sustainability, food security and poverty in Malaysia. *IRBRP*, 5(6), 309–321.

Tan, C. T., Pereira J. J., & Koh, F. P. (2009). Stakeholder consultation in the development of climate change policy: Malaysia's approach. Proceedings on environmental policy: a multinational conference on policy analysis and teaching methods, 11–13 June 2009. Seoul, South Korea: KDI School of Public Policy and Management.

Tick Hui, O., Shen Yee, P., & Shing Chyi, C. (2010). Energy policy and alternative energy in Malaysia: issues and challenges for sustainable growth. *Renewable and Sustainable Energy Reviews*, 14, 1241–1252.

Zaharaton, R., Pereira, J. J., Koh, F. P., & Tan, C. T. (2008). *A new approach to climate change: balancing adaptation and mitigation*. Malaysia: Institute for Environment and Development.

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