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Vulnerability of Climate Change and Hardcore Poverty in Malaysia

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ABSTRACT

Malaysia is also experiencing adverse effects of climate change that lead to impacts on water resources, food supply, coastal zone, public health, human settlement and others and necessitate national and international responses to face climate change. The economic resilience of nations to weather the climate change effects differ between countries. To further compound this, within a particular country there are different levels of vulnerability resilience reflecting differences in location, socio-economic circumstances and level of preparedness. As resources are limited, particularly in developing countries, there is a need to prioritise which vulnerable groups should receive the assistance to increase their level of preparedness. This study briefly highlights an overview of GHG emissions and incidence of poverty and hardcore poverty in Malaysia. The study also identifies the risk and vulnerable factors and demonstrate the possible vulnerable states based on present and future climate projection undertaken by National Hydraulic Research Institute of Malaysia (NAHRIM) and hardcore poverty in Malaysia.

Key words: GHG emissions, vulnerability, climate change, poverty

INTRODUCTION

Malaysia is experiencing a warming trend for the past few decades. In the southern areas of peninsular Malaysia, the frequency of long dry periods tended to be higher with a significant increase in the mean and variability of the length of the dry spells whereas, all the indices of wet spells in these areas show a decreasing trend (Deni *et al*., 2008). Increasing temperatures would result in more extreme weather and climate variability. In Malaysia, the temperature and rainfall are projected to increase between +0.6 to 3.4°C and -1 to +32% in 60 years respectively (INC, 2000). The rise in sea level is about 13-94 cm in 100 years (INC, 2000). These can lead to impacts on water resources, food supply, coastal zone, public health and others and necessitate national and international responses to face climate change. To address the climate change issues, government has taken many initiatives including promoting utilisation of renewable energy, energy efficiency in industry, building and transport sector, restructuring public transport system, cleaner fuel, stringent emission standards and alternative industrial processes technique. In 2008, a cabinet committee on climate change has been instituted which chaired by the Prime Minister of Malaysia. Establishment of this committee exhibits Malaysia's higher commitment in addressing climate change and is important to integrate the issue of national development planning. This study briefly highlights an overview of GHG emissions and incidence of poverty and hardcore poverty in Malaysia. The study also identifies the risk and vulnerable factors and demonstrates the possible

vulnerable states based on present and future climate projection undertaken by National Hydraulic Research Institute of Malaysia (NAHRIM) and hardcore poverty in Malaysia.

GHG EMISSIONS IN MALAYSIA

Malaysia has been classified as a transition economy and there is no longer traditional approaches (donor support) as an option for the development activities. This rapid development has brought about significant impacts to the natural environment (Begum and Pereira, 2009). In Malaysia, the primary energy supply and demand have been increasing in tandem with economic growth from 1990 to 2005 (Ninth Malaysia Plan, 2006), showing the economic development and energy consumption have yet to be de-coupled. Final energy demand, which was 14,560 and 29,996 ktoe in 1991 and 2000, respectively, increased to 34,586 ktoe in 2003 (Jaafar *et al.*, 2008). Begum *et al.* (2009) also demonstrated energy consumption as one of the largest contributor to the ecological footprint for each Malaysian. The escalating consumption of energy that heavily relied on fossil fuels had resultant significant increment in emission of greenhouse gas (GHG) mainly carbon dioxide from the sector (Begum and Pereira, 2009). Over the years, GHG emissions have been increasing in Malaysia. In 2000, the total CO_2 emission from energy sector is 118,806 kilotonne. Per capita emission rose from 4.21 tonnes in 1994 to 6.29 tonnes in 2001 (Tiong *et al.*, 2007). Figure 1 shows the sectoral CO_2 emissions from energy sector in 2000. Industrial and transport sectors are the biggest CO_2 emitters in Malaysia.

INCIDENCE OF POVERTY AND HARDCORE POVERTY IN MALAYSIA

During the Eighth Malaysia Plan period (2000-2005), the concept and measurement of poverty were reviewed to take into account the social and economic changes that have taken place in Malaysia since 1977 when the Poverty Line Income (PLI) was first formulated. The PLI was substantially revised in 2005 and made up of two components, i.e., the food PLI and the non-food PLI. The PLI is defined separately for each household in the Household Income Survey (HIS) based on its size, demographic composition and its location (state and stratum). A household is considered poor if its income is less than its own PLI, that is, it lacks the resources to meet the basic needs of its individual members. A household is considered hardcore poor if its monthly household income is less than the food PLI. The food component of the revised PLI is based on the advice of nutritionists, dieticians and medical professionals (Ninth Malaysia Plan, 2006). Table 1 shows the incidence of poverty and hardcore poverty by state using the 2005 methodology. The incidence of poverty and hardcore poverty among Malaysians decreased from 8.5 and 1.9% in 1999 to 5.7 and 1.2% in 2004, respectively, due to the successful implementation of poverty eradication programmes and favourable economic growth. In Malaysia, the incidence of hardcore poverty shows higher for the states of Sabah, Terengganu, Perlis, Kedah and Kelantan compared to the other states.

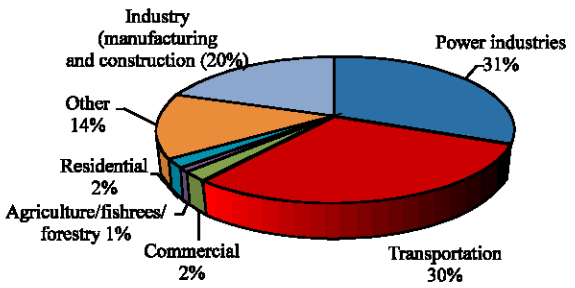

Fig. 1: Sectoral CO_2 emissions (Energy-2000), (Azman, 2007)

Table 1: Per capita Poverty Line Income (PLI), incidence of poverty and hardcore poverty, 2004

		Overall poverty[2]			Hardcore poverty[2]		
State	Household size	Gross PLI (RM)	Per capita PLI (RM)	Incidence of poverty (%)[3]	Gross food PLI (RM)	Per capita PLI (RM)	Incidence of hardcore poverty (%)[4]
Johor	4.3	634	151	2.0	384	91	0.3
Kedah	4.6	654	143	7.0	402	88	1.3
Kelantan	5.2	675	130	10.6	438	84	1.3
Melaka	4.4	650	151	1.8	385	89	0.2
Negeri sembilan	4.2	598	146	1.4	371	90	0.2
Pahang	4.2	609	147	4.0	392	94	1.0
Pulau pinang	4.1	615	152	0.3	373	91	neg.[5]
Perak	4.1	589	144	4.9	371	90	1.1
Perlis	4.2	587	140	6.3	367	87	1.7
Selangor	4.6	728	159	1.0	420	92	neg.[5]
Terengganu	5.0	734	148	15.4	469	94	4.4
W.P. Kuala Lumpur	3.9	713	189	1.5	398	91	0.2
Peninsular Malasysia	4.4	661	152	3.6	373	98	0.7
Sabah[1]	5.2	888	173	23.0	503	97	6.5
Sarawak	4.6	765	167	7.5	482	105	1.1
Malaysia	4.5	691	155	5.7	415	93	1.2

[1]Includes Wilayah Persekutuan Labuan, [2]Based on 2005 methodology, [3]Based on gross PLI, [4]Based on gross food PLI and [5]Less than 0.05%. Ninth Malaysia Plan (2006)

VULNERABILITY TO CLIMATE CHANGE AND HARDCORE POVERTY

The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as the degree to which a system is susceptible to and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system (IPCC, 2007). Abidin and Begum (2008) emphasised that within a particular country there are differing levels of vulnerability and resilience reflecting differences in location, socio-economic circumstances and level of preparedness. Literature shows that population's vulnerability to climate change depends on various factors (WHO, 2003; Lemmen and Warren, 2004; Ebi *et al*., 2006; Haines *et al*., 2006; Confalonieri *et al*., 2007) such as; age distribution; population density; income level and distribution; food availability; local environmental condition; geographical position; economic development; pre-existing health status; and quality and availability of public health care.

Among and across the communities and demographic subgroups, the most affected and risk groups are children, elderly people, indigenous populations and native peoples, nomadic populations, chronically ill people, people with a low income, homeless people and coastal communities (Lemmen and Warren, 2004; Ebi *et al*., 2006; Confalonieri *et al*., 2007). Table 2 shows the future climate change projections in Peninsular Malaysia based on the study undertaken by the National Hydraulic Research Institute of Malaysia (NAHRIM). The data represent the maximum monthly values of two climate factors i.e., temperature and precipitation (rainfall). Table 2 reveals that in the future, there is a substantial increase in temperature and rainfall over the North East region compared to the other regions of Peninsular Malaysia.

Table 2: Future climate change projections in peninsular Malaysia

Regions/Sub-regions/states	Projected change* in maximum monthly value	
	Temperature (°C)	Rainfall (%)
North East Region-Terengganu, Kelantan, Northeast-coast	+1.88	+ 32.8
North West Region-Perlis (west coast), Perak, Kedah	+1.80	+ 6.2
Central Region-Klang, Selangor, Pahang	+1.38	+ 8.0
Southern Region-Johor, Southern Peninsula	+1.74	+ 2.9

*Difference = Average 2025-2034 and 2041-2050 minus Average 1984-1993. NAHRIM (2006)

Table 3: Most vulnerable states: Hardcore poverty and climate change

States	Household size	Incidence of hardcore poverty (%)	Projected temperature change (°C)	Projected rainfall change (%)
Terengganu	5.0	4.4	+1.88	+ 32.8
Perlis	4.2	1.7	+1.80	+ 6.2
Kelantan	5.2	1.3	+1.88	+ 32.8
Kedah	4.6	1.3	+1.80	+ 6.2
Perak	4.1	1.1	+1.80	+ 6.2

NAHRIM (2006) and Ninth Malaysia Plan (2006)

Table 3 demonstrates the possible vulnerable states based on climate change projection undertaken by NAHRIM and hardcore poverty in Malaysia that is basically drawn from the Table 1 and 2. It can be assumed from Table 3 that Terengganu, Kelantan, Perlis, Kedah and Perak are the most possible vulnerable states in terms of hardcore poverty and projected temperature and rainfall changes. It also shows that the most vulnerable peoples due to climate change are the poor and hardcore poor who have relatively larger household members.

CONCLUSIONS

The economic resilience of nations to weather the climate change effects differ between countries. To further compound this, within a particular country there are different levels of vulnerability and resilience reflecting differences in location, socio-economic circumstances and level of preparedness. Coincidentally, it shows that Terengganu, Kelantan, Perlis, Kedah and Perak are the most possible vulnerable states based on present and future climate projection undertaken by NAHRIM and hardcore poverty in Malaysia. The most vulnerable peoples due to climate change are the poor and hardcore poor. As resources are limited, particularly in developing countries, there is a need to prioritise which vulnerable groups should receive the assistance to increase their level of preparedness.

In Malaysia, there is lack of comprehensive research to determine the most vulnerable areas and groups due to the climate change and poverty. So, this can be a future research to be undertaken by the Climate Change Research Group in Universiti Kebangsaan Malaysia (UKM). Furthermore, immediate responses through adaptation and mitigation approaches are necessary to reduce current vulnerability to the climate change that has already occurred.

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