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Post-Cancun: A Green Renaissance?

Commitment to Post-Cancun Agreements: Strategic Compliance and Implementation

The Copenhagen Climate Change Conference held in December 2009 (COP-15) was perceived to be a general failure – a view shared by the majority of the 190 developing countries in the light of aggravating non-compliance by the developed bloc in fulfilling the Kyoto Protocol's pledges.

COP-16 proved to be a surprising re-freshener for almost all the country participants when they met again in Cancun, Mexico from 29 November 2010 to 10 December 2010 (COP-16). A sobering consensus was reached to get back on track with many compromises from Annex I and Annex II countries who emphasised the 'package deal' formulae approach.[1]

Cop-16 re-emphasised the overarching principles of the United Nations Framework Convention on Climate Change (UNFCCC) [2] and created a new set of mediated commitments known as the Cancun Agreements 2010.

Global Environmental Governance and Responsibility Ramification

The legally binding commitment [3] of Annex -1 countries to reduce greenhouse gas (GHG) emissions will expire in 2012 when the Kyoto Protocol (KP) term is over but many targets have not been achieved as anticipated due to severe global financial turmoil and economic malaise. Contrary to the sentiment prevalent during COP-15, COP-16 proved to be a 'green renaissance' to take GHG emission reduction to a new level of global co-operation.

At the outset of COP-16, provocative questions were raised by representative parties on whether the Kyoto Protocol 1997 will be replaced by a new agenda to be announced by the developed bloc, much to the chagrin of developing blocs who perhaps were open to an extension [4] of the Kyoto Protocol 1997.

The Evolution of Green Self-regulation

From a legal compliance analysis, the Copenhagen Accord, was not a legally binding document. Developed [5] and developing countries were given a free rein in proposing certain voluntary reduction pledges. What is most interesting is the self-regulation proposition consisting of provisions for monitoring, reporting and verification (MRV provision). MRV provisions were accepted in principal because they are basically a procedure to verify carbon emission reduction claims. The controversy lies, of course, in the details.

The Post-Cancun Agreements – An Overview

The Post-Cancun agreements are in fact a bundled agreement which incorporate both the Convention and the Kyoto Protocol conditions. However, they do not throw light on the future of the Kyoto Protocol itself and whether it will be replaced by the Post-Cancun Agreements.

What is made abundantly clear is the fact that participants officially recognise the emission reduction pledges for post-2012 period as per the submission by developed countries since COP-15 at Copenhagen.

The Three Core Consensus

1 A re-confirmation of the UNFCCC Pledge

The Cancun Agreements re-affirm the greenhouse gas (GHG) emissions reduction targets as per the requirements under UNFCCC.

2 Environment Reporting Standard

However, it is tied to a new transparency condition which compels all developing countries to adopt fair reporting standards in emissions reporting.

3 Green Climate Funding

The Cancun Agreements reaffirmed parties' intention to observe the principles of the Kyoto Protocol 1997 backed with a pledge by the developed bloc to grant relevant funding to developing countries to achieve emission reduction targets. [6] The 'Green Climate Fund' will be utilised to finance emission efforts in developing countries [7]. It was agreed that the Climate Fund will be composed of a board with equal representation of developed and developing countries, though many details still remain to

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From the desk of the Director General

Post-Cancun: A Green Renaissance?

Following on the heels of the 'near failure' at the 15th Conference of the Parties (COP) in December 2009 at Copenhagen, Denmark, the world watched with bated breath the proceedings of the 16th COP in Cancun, Mexico. Almost miraculously, the Parties crafted a set of modest strategic decisions with a view to making these decisions legally binding at the next COP in Durban, South Africa at the end of this year. So there we have it - the Post-Cancun era.

But is this cause for celebration? The fear is that this accord can lead to discord. As citizens of the world, we are all hopeful that the various country negotiators, officials and politicians at the next COP are high minded people who will do the right thing for Mother Earth and the future generations. Surely they are aware that unlike politics, in matters concerning the environment and climate, we are all either winners or we are all losers for no nation is an island. So what did the world agree to in Cancun and what are the setbacks to this agreement?

The 16th COP saw consensus in three core areas. Firstly, it reconfirmed the spirit of the United Nations Framework Convention on Climate Change (UNFCCC) particularly with regard to greenhouse gases (GHG) emission reduction targets. Secondly, the Parties agreed to an Environment Reporting Standard compelling all developing countries to adopt fair reporting standards in emission reporting. And thirdly, Cancun reaffirmed the Parties' intention to observe the principles of the Kyoto Protocol 1997, backed with a pledge by the developed bloc to grant relevant funding to developing countries to achieve emission reduction targets. This 'Green Climate Fund' will be utilised to finance emission reduction efforts in developing countries. Also included within this initiative is that developing countries will be beneficiaries of technology transfer.

However, while the negotiations in Cancun saw consensus in these three core areas, it also witnessed a disturbing trend with regard to three matters. First on the list is that a significant number of developed countries appear no longer keen to support a second commitment period post-2012 of the Kyoto Protocol with regard to carbon reduction targets. Second, there are signs that some countries are beginning to distance themselves from some principles of the Convention (UNFCCC) itself, indicating that the sceptics of climate change are gaining ground. And third, there is strong pressure for international carbon markets to play a greater role in future climate agreement regimes. Taken together, they point to a difficult future for international multi-lateral climate policy agreements because these trends reflect that there is a clear divide between the developing and developed countries with the Least Developed Countries(LDC) being caught in the middle.

Meanwhile, climate change and an obvious increase in extreme climate events continue to occur unabated. The frequency and intensity of storms, floods and droughts with accompanying fires plague the world. The fear is desertification, melting of polar ice caps and rising sea levels leading to ecosystem imbalances, extinction of marine species and social dislocation of communities that depend on these for their livelihood. Can we continue to hold the belief that global warming and climate change is not due to human activity?

Change we must. Sustainability has to take centre stage in all our development plans. Perhaps we have to re-look at our sustainability models and clearly the major challenge ahead is to move our economies on to more environmentally friendly paths. Lifestyle decisions must be made. The important role women play in nurturing the young towards sustainable resource practices must be a key element of all development plans.

Critically evaluating our energy options, a key carbon emitter, is a salient move. The key question is: 'How are we going to reduce our carbon footprint while the demand for energy is ever increasing?' Achieving energy efficiency using the 'carrot and stick' approach in our major industries and households could well be a start.

The deep divisions between the developed countries (led by USA) and the developing countries are quite obvious. The developed countries are expected to oppose any international treaty that would legally bind countries to reduce their GHG emissions. Some tough negotiations are expected in Durban unless every effort is made to compromise.

Even before the 17th COP slated for December 2011 in Durban, the UN is planning for a meeting on 8th April 2011 in Bangkok to get the parties to agree on an agenda! But the world cannot go on negotiating forever. What we need is a 'Green Renaissance' and not a stepping back into the 'Dark Ages'. Surely the Post-Cancun period can and must become a period of 'Environmental Enlightenment'!

Dato' Hajah Rosnani Ibarahim
Director General
Department of Environment, Malaysia

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be ironed out. Annex II countries also have a special obligation to provide financial resources and facilitate technology transfer to developing countries. Developing countries were also required to play their part by implementing pro-active actions within national boundaries to meet the emission reduction targets as well.

Legal Compliance Analysis of Malaysia's Commitment to the Three Core Consensus

A Re-confirmation of the UNFCCC's Pledge

In relation to Malaysia's commitment to the KP in its initial phase in 1997, the statement by the Malaysia Prime Minister at COP-15 followed by COP-16 remains unchanged within the global Environment Performance Analysis (EPA) perspective.

Malaysia supports the developing bloc's single voice for Annex 1 parties to put their pledge into real action. Malaysia confirms the Cancun decision for the establishment of a process "for international assessment of emissions and removals related to quantified economy-wide emission reductions targets" for Annex I Parties.

This has to be performed in such a manner that it will instil a sense of confidence in the eyes of developing countries. The process must be one that is carried out in a "rigorous, robust and transparent manner, with a view to promoting comparability and building confidence."

Strategic Implementation

In this regard, Malaysia has in fact taken concrete action pursuant to the KP's vision since 1997 and the recent Post-Cancun agreement:

1 Establishment of Energy Efficiency Products (EEPs)

Under the EEPs, energy efficient products approved by the Energy Commission are :

- Domestic refrigerators
- Domestic fans
- Television
- Air conditioners (Single split wall mounted type)
- Lamps
- Ballasts for fluorescent lamps
  These ballasts must now be approved by the Energy Commission of Malaysia subject to the minimum energy performance requirements for ballast losses in watt.
- Insulation materials
- High efficiency motors

In meeting with the Post-Cancun agreement, Malaysia has already taken nationally appropriate mitigation actions (NAMAs) through the various components of the National Transformation Program (NTP) from the environmental perspective.

2 National Green Technology Policy (GTP)

Under the GTP, four pillars have been identified: energy, environment, economy and social perspective. *(Details have been stated in previous issues of Impak)*

3 Showcase Example in Green Building Index (GBI)

The construction of the Pusat Tenaga Malaysia's building (Diamond Building) as the Green Energy Office (GEO) has been acknowledged to be the first Green Building Index (GBI) rated building in Malaysia.

4 Green Technology Financing Scheme (GTFS)

This scheme provides for green financing for green technology investment and projects which are geared towards emission reduction objectives.

The budget speech for the year 2010 provides for the establishment of a Green Technology Financing Scheme amounting to RM1.5 billion to energise R&D in the supply and utilisation of Green Technology. The scheme will benefit R&D developers who are actual producers and users of such green technology in Malaysia.

5 Establishment of the National Biofuels Policy (NBP)

As a major producer of palm oil, the establishment of the NBP 2006 was timely and most relevant in view of growing concern for global warming in the context of the Kyoto Protocol 1997 underpinnings.

The annual biofuel conference is a major event which is seeing growing participation from global bio-players [8] around the world who share Malaysia's dedication to the Kyoto Protocol 1997 and COP-16's core agreements.

The NBP 2006 advocates an environmental-friendly approach towards fulfilling Malaysia's on-going pledges at COP-16. The production of biofuels, i.e. biofuels from palm oil for export, complies with international environmental requirements.

Biomass from the oil palm industry will be recycled to produce energy or used as feedstock to produce second-generation biofuel and as a catalyst for on-going R&D in the area of renewable energy. These efforts demonstrate Malaysia aspirations to achieve concrete carbon reduction emission targets under the COP-16 purview.

Unresolved Issues

The Cancun Agreements did not address the controversial question of a second commitment period after 2012. There is a need to chart a new compliance roadmap notwithstanding the fact that there were positive agreements demonstrated based on the three Core Consensus and a common aspiration to be optimistic about mutual compliance.

Annex I Parties include the industrialised countries that were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.

Annex II Parties consist of the OECD members of Annex I, but not the EIT Parties.

Non-Annex I Parties are mostly developing countries.

Least Developed Countries (LDCs) The 49 Parties classified as LDCs by the United Nations are given special consideration under the Convention on account of their limited capacity to respond to climate change and adapt to its adverse effects. Parties are urged to take full account of the special situation of LDCs when considering funding and technology-transfer activities.

CDM and CCS

Unresolved issues include: the legal binding issues of the COP decisions on Clean Development Mechanism (CDM) and carbon dioxide capture and storage (CCS).

LULUCF Rules

The quantitative implications of the current land-use, land-use change and forestry issues (LULUCF) rules pose several open questions. The agreement emphasises the need for a change in LULUCF and the implementation of carbon credits from market-based mechanisms.

The Legal Form

The issue of the legal form of the COP agreement was not resolved in Cancun and will be discussed in Durban, South Africa next year. This remains an open verdict. Parties must decided whether to adopt a legally binding agreement that complements the Kyoto Protocol 1997, or another new binding treaty or agreement to replace the Kyoto Protocol, or to abide by the COP decision route.

Conclusion

Economy-wide emissions reduction targets can be achieved only if the developing bloc can accept the new commitment pledges by the developed bloc, mainly the US and China. However, it would be futile to commit to emission reduction targets with no concrete plan of action to achieve those targets at domestic level.

The way forward at all times is the "common but differentiated responsibilities" approach.

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Doing 'Double Duty Mitigation'?
Hidden Economic Implications of Carbon Markets

Introduction

In response to the demand by developed countries, many developing countries are generating carbon credits for sale through the existing market mechanisms. However, these developing countries may unknowingly be selling their low-cost emissions reduction options and locking themselves into having to use higher cost options to accomplish their own emission reductions pledges in the future. This article explores the role of the carbon markets in the context of current trends in multilateral climate negotiations and highlights the risk of rushing to cash-in on low-cost emission reduction credits.

Following the failure of the climate talks at the 15th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in December 2009, Parties began the arduous process of rebuilding trust in 2010. Through patient and delicate negotiations, Parties have managed to agree on a process that would take Parties through the crafting of a strategic set of COP decisions at Cancun, Mexico, with a view to achieving a legally binding agreement at Durban, South Africa at the 17th COP in 2011.

However, several disturbing trends have emerged in the negotiations. First, there are unambiguous signs that a significant number of developed country Parties no longer support a second commitment period (post-2012) to the Protocol. There are also signs that developed countries are distancing themselves from the principles of the Convention. Finally, there is a strong pressure for international carbon markets to play a greater role in future climate agreement regimes. These factors in combination paint a bleak picture of the future of international multilateral climate policy as driven and influenced by developed countries.

A Protocol in Peril

With two years remaining in the first commitment period (2008-2012) of the Protocol, it is evident that developed countries have had mixed success in achieving their emission reduction targets. This has occurred in spite of the established flexibility mechanisms and the accounting loopholes in Land Use, Land Use Change and Forestry (LULUCF).

It is not surprising, therefore, that negotiations for the second commitment period of the Kyoto Protocol have been fraught with difficulty. The US, having unfairly evaded commitments during the first commitment period, has maintained that it will have no part of the Kyoto Protocol, and that without a Congressional mandate, it will be unable to declare any more than a token emissions reduction pledge in any new legally binding agreement. Other developed countries, taking the cue from the US, are distancing themselves from the second commitment period of the Protocol and shifting the mitigation burden to developing countries. These collective positions and demands not only impact the functionality of the Protocol by decreasing the level of ambition of other developed countries, but also profoundly undermine the principles of the Convention.

A Convention in Crisis

Also distressing is the developed countries' gradual dissociation from the UNFCCC itself. This is because the principles of the Convention affirm the historical role of the developed countries as the primary emitters of greenhouse gases (GHGs) and differentiates countries according to common but different responsibilities. Furthermore, the Convention appreciates the priorities of developing countries to eradicate poverty and to raise the living standards of their people.

Ultimately, the primary basis of the Convention is the link between development, wealth creation and the generation of GHGs, coupled with the fact that GHG emissions by the developed countries since the beginning of the industrial revolution are now affecting global climate and adversely impacting the lives of all peoples, particularly those least able to protect themselves from it. Some developed countries are now demanding that all Parties should have emission reductions commitments, in effect, de-linking historical emissions of developed countries from our current climate predicament and shifting the emissions reduction burden to developing countries even while their per capita emissions remain far below those of the developed countries. This will most certainly retard development, which, as mentioned above, is recognised as a priority under the Convention. Once again, these collective positions taken by the developed countries are unprecedented and clearly an attempt to subvert the principles of the Convention.

The Current State of Negotiations

In Cancun, the EU and the Environmental Integrity coalitions agreed to move firmly toward a second commitment period of the Kyoto Protocol, but only if the US and the rest of the Umbrella Group take on comparable reductions targets, and the major emitting developing countries implement emission reduction actions. These collective positions are generally in line with the Bali Roadmap agreed to at the 13th Conference of the Parties.

Regrettably, while developing countries were making major concessions on the Longterm Cooperative Action (LCA) track, Japan and Russia, in a blatantly retrogressive move, announced that they would not be making emission reduction pledges for the second

commitment period of the Kyoto Protocol. These positions clearly oppose ambitious top-down emission reduction commitments in favour of voluntary, bottom up emission reduction pledges of the kind already being implemented by developing countries. In fact, they represent a step backward from the dismal pledges in the Copenhagen Accord, which, from a scientific standpoint, would already allow the increase in average global temperatures to exceed 2°C. Ultimately, the reason for this wish to dissociate from the Protocol and from the principles of the Convention stems from the link between emissions and wealth generation as discussed below.

The Link Between Emissions and Wealth Generation

Unless we derive our energy from low-carbon fuel sources such as hydroelectric or nuclear power, productivity will most certainly be linked to emissions from the burning of fossil fuels. Even where stationary power sources are non-carbon related, we still use large amounts of fossil fuels for transportation. Therefore, granting a country emission rights is tantamount to granting increased productivity while restricting emissions will restrict productivity. From this standpoint the Protocol, with its legally binding commitments, imposes a significant burden on developed countries.

Faced with this prospect, developed countries would initially reduce non Gross Domestic Product (GDP)-linked emissions, followed by emissions marginally related to GDP, leaving emissions closely tied to GDP to the end. Further reduction in emissions would imply not just the specific cost of emissions reduction but also, the opportunity cost, a reduction in GDP, which would impact their economies. For this reason, developed countries have insisted on being allowed to accomplish further emissions reductions offshore, that is, through emission reductions in developing countries. This, in effect, allows wealth generation to proceed unhampered in the developed countries while the emissions reduction is accomplished at a much lower cost through emission reduction credits that are generated in developing countries and purchased through the markets. If developing countries were not called to reduce emissions themselves, this situation would not be problematic, but the developed countries are already beginning to insist that developing countries should have emission reduction commitments of their own.

As in developed countries, emission reductions in developing countries also vary widely in cost. Ideally, developing countries should be implementing the lowest cost options for their own emission reductions while assigning the higher cost emission reduction options to be accomplished through financial assistance and technology transfer from developed countries as envisioned under the Convention. Instead, the allure of the carbon market is leading developing countries to use their low-cost mitigation options to generate low-cost emission reductions for sale on the market when they might actually need these low-cost reductions to meet their own emission reductions commitments now or in the future. Once these low-cost emission reductions are sold, they are no longer available to the country to accomplish its own emission reductions. The developing country will then have to rely on its higher cost emission reduction options to reduce its own present and future emissions, almost certainly retarding economic growth and adversely affecting development. Meanwhile, the developed countries continue to generate wealth and economic prosperity through the unabated emissions of GHGs.

Avoiding 'Double Duty Mitigation'

This 'double duty mitigation' by developing countries should be a concern to all developing country governments that are currently looking to 'market mechanisms' as a means of financing domestic emission reductions. These market mechanisms represent the most efficient way of ensuring that economic growth remains robust in developed countries while taking advantage of market competition and the already lower cost of emissions abatement in developing countries.

In view of the aggressive marketing strategies of carbon credit brokers and buyers, developing countries, especially those that are already making voluntary emission reduction pledges, need to be particularly concerned that their low emissions growth strategies take into account the need to ensure that sufficient low-cost mitigation options exist to achieve their own, self-financed emission reduction pledges before embarking on the development of large-scale emission reduction projects designed to generate voluminous carbon credits for sale in the competitive carbon markets. Enhancing awareness concerning this issue at all levels of both the public and private sectors will help governments avoid the negative impacts on development in a carbon constrained global economic environment.

Source
Dr Gary William Theseira
Email: gtheseira@nre.gov.my

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Developing countries must take cognisance of domestic political realities and economic sensitivities at home and abroad to reach common goals at a consensus level. This is more practical than taking an adamant stance which will snuff out any opportunities for a global mediation effort in emission reduction objectives.

What is of crucial importance is the operational details of the Post-Cancun Agreements and decisions to effectuate real implementation and a transparent accountability for all stakeholders. It is hoped that the shortcomings and uncertainties in Post-Cancun Agreements can be thrashed out in the next round of climate talks in Durban, South Africa in 2011.

References

1 "In this package, we can agree to launch the establishment of a Green Fund to serve as the centerpiece of an enhanced financial architecture for climate change. We can also move forward on substantial new arrangements for technology, adaptation, and REDD… Press Statement by Todd Stern, Special Envoy for Climate Change at COP-16, 9 December 2010, Cancun, Mexico.

2 The UNFCCC is an international environmental treaty which was adopted at the Earth Summit in Rio de Janeiro in 1992. Its primary goal is to stabilise, manage and reduce greenhouse gas emission concentrations.

3 The Kyoto Protocol 1997(KP) set binding GHG emission reduction targets and compelled responsible reduction exercise by 40 industrialised countries to share the tasks by reducing current high levels of GHG emissions in the global atmosphere.

4 Interestingly, on the first day of COP-16, the Japanese representative declared that Japan would not support any ideas pertaining to the extension of the Kyoto Protocol 1977.

5 Both the US and Canada submitted identical targets of a 17% reduction below 2005 levels by the year 2020.

6 Funding to the tune of USD100 billion was promised for mitigation purpose and adaptation measures for the most vulnerable developing nations.

7 The effectiveness of the Green Climate Fund remains a challenge because critics have on the other hand argued that COPs' carbon methodologies consisting of carbon tax, carbon credit, carbon capture, carbon tagging, carbon off-set,etc will not provide any concrete reduction in carbon emission reduction.

8 The "International Conference on Biofuels in Malaysia" saw participation from 26 countries, representatives from a cross section of the industry-growers, refiners, traders, investment promotion agencies, bankers, researchers, biofuel manufacturers, NGOs and trade promotion agencies from Asia and Africa. *http://www.unido.org/index.php?id=o710110*

Source
Dr Jeong Chun Phuoc
Email: jeongphu@azmilaw.com

Climate Change and Global Warming

A very general definition of Climate Change is 'a change in the statistical properties of the Earth's climate system when considered over timescales that match several decades or longer, regardless of cause'. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change a little differently as 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. In the latter sense, climate change is synonymous with Global Warming. [1]

Global climate change is caused by the accumulation of greenhouse gases (GHGs) such as carbon dioxide, methane, nitrous oxide, ozone, sulfur hexafluoride, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), in the lower atmosphere. The global concentration of these gases is increasing, mainly due to human activities such as the combustion of fossil fuels (which release carbon dioxide) and deforestation (because forests remove carbon from the atmosphere). The atmospheric concentration of carbon dioxide, the main greenhouse gas, has increased by 30% since pre-industrial times.

Climate Change Denial and Skepticism

Climate change, because of human activities, is one of the most important global environmental concerns of our generation. Such changes can potentially lead to desertification, more intense storms, melting of the polar ice caps, and rising sea levels, thus changing the physical face of the Earth and the pattern of our everyday lives. However, political and public debates continue regarding the reality and extent of global warming and what actions to take in response.

"Climate change skepticism" has been on the rise after leaked letters from the University of East Anglia were used as evidence that top scientists had conspired to manipulate data to dramatise the effect in key reports from the Intergovernmental Panel on Climate Change (IPCC). The incident, dubbed 'Climategate', erupted shortly before the Copenhagen climate conference, which then failed to come to an agreement on a new global climate treaty. [2]

While skeptics tend to challenge a particular technical point or approach in the IPCC reports – for instance, that there is global warming but it is not due to human activity – others have engaged in deliberate denial of the science of climate change since the 1990s. These 'climate change deniers' attempt to downplay or blatantly dismiss the scientific consensus on the extent of global warming, its significance, and its connection to human behaviour, especially for commercial or ideological reasons.

In an attempt to rebalance the debate on global warming, the German research branch of Deutsche Bank had, in September 2010, commissioned a report that refutes the claims of climate skeptics. The skeptics' arguments fall into three general categories:

1. **Earth is not warming**
2. **Earth may be warming but human activity is not responsible**
3. **Earth may be warming and humans may be responsible, but we don't need to act to stop it.**

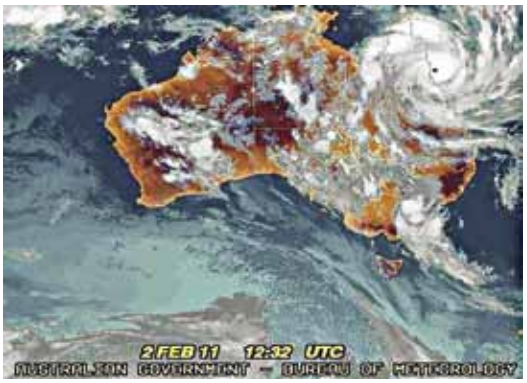
The report concludes that the primary claims of the skeptics do not undermine the assertion that human-made climate change is already happening and is a serious long-term threat. The IPCC and the national science academies of countries worldwide have concluded that the increasing body of observations is consistent with the physical principles by which the GHGs affect climate; the planet is warming and it will likely continue to warm due to GHG emissions. [3]

Natural Climate Variations or Global Warming-Induced Occurrences?

Climate-related changes have already been observed globally. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, the lengthening of the growing season and increased water vapour in the atmosphere have also been observed.

The number of extraordinarily severe floods, storms, and other weather calamities that have occurred within the past 15 to 20 years would seem to suggest that such events are becoming more common. Australia, Sri Lanka, Brazil and Pakistan have all been recently ravaged by massive flooding, raising questions as to whether these types of meteorological phenomena are more common in a greenhouse-warmed world. Likewise, the recent severe snow storm in Canada and the US and the intense drought in China raise some serious questions about the extent of perturbations of the climate system by GHGs and if global warming was at least partly to blame.

The severe tropical cyclone, Yasi, that made landfall in northern Queensland near Mission Beach on 3rd February 2011, produced wind gusts estimated as high as 285 km/hr and rainfall upwards of 200 mm reaching as high as 471 mm. Media reports claim that up to 90% of structures in the towns, where the eye of the storm made landfall, were damaged or destroyed. The remnants of the cyclone quickly raced across Queensland and stalled out across the south-eastern Australian state of Victoria, causing floods from 4 - 6 February. Estimates by Tropical Storm Risk, Inc. placed damages near USD3.5 billion, which made Yasi the second most costly tropical cyclone to ever affect Australia. [4]



Tropical Cyclone Yasi *Image Credit:* Australian BOM

On 10th January 2011, the eastern coast of Sri Lanka was hit by the worst floods in over 50 years. Heavy rains led to severe flooding in several communities near lagoon waters. Roads were washed out and numerous villages were forced to evacuate. Torrential rains caused the million-plus people in Sri Lanka to become flood victims that left nearly 40 people dead and devastated farmland in the island's rice bowl. The destruction of water channels – a lifeline for paddy rice farmers – has been felt hardest in the country's eastern districts. The government described this as the worst natural

disaster since the 2004 tsunami and said it would cover the estimated USD50 million in damage to the region's reservoir and irrigation network. Climate scientists and weather experts warn that more extreme weather, such as the heavy rains Sri Lanka received over the last two months – a year's worth of rain fell between December and February – are likely to become even more common in the future. [5]

Flood-affected Sri Lankan children having a meal at a relief camp in the eastern town of Batticaloa.

In Brazil, nearly a month's worth of rain - 26 centimeters – fell on 12th January 2011 in the Serra do Mar mountain region and the nearby cities of Teresópolis and Nova Friburgo. The downpours provoked flash floods and sent rivers of mud flowing down steep hillsides, killing 860 people and leaving at least 8,700 homeless. A total of 429 people have not been accounted for. The unusually heavy rains were attributed by some meteorologists to La Niña, but human activity likely exacerbated the scale of the disaster.

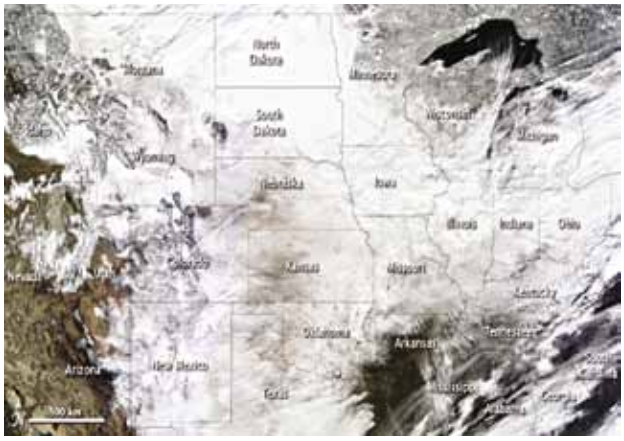
Heavy downpours caused mudslides and severe flooding in Brazil.

In the wake of the floods and mudslides, the Brazilian government is now planning a nationwide disaster-prevention and early-warning system. The government also will spend USD4 billion through 2014 on water-drainage and hillside-recovery projects across the country.

More immediately, the Rio de Janeiro state highway department has estimated it will cost at least USD170 million to repair roads.[6]

In 2010, heavier than usual monsoon rains provoked inundations not seen in Pakistan in 80 years – or, by some accounts, ever. Floodwaters covered 20% of the country, a land mass greater than the size of England. Nearly 1.9 million homes, 400 medical facilities, and 7,000 schools were damaged or destroyed in the disaster. Some 5,000 miles of roads and railways were wiped out, and 5 million acres of farmland were lost. In all, the flooding affected nearly 20 million people and provoked material losses estimated at more than USD7 billion.

Between February 1 and 3 of this year, a very large and strong winter storm hit the central and northeastern U.S. and southern Canada and was dubbed the 'Groundhog's Day Blizzard of 2011'. Impacts of this historic winter storm were also felt from New Mexico northward to Wisconsin and eastward into Maine. Reports of snowfall of over 50 cm were widespread. At one point, the storm stretched over 3,200 km and 22 states had snowfall accumulations greater than 12.7 cm.



Central U.S. Snow Cover 2nd February 2011
Image Credit: NASA

The storm, accompanied by strong winds and gusts, also brought heavy amounts of freezing rain and ice to several parts of the U.S. An estimated 375,000 households in the U.S. and southern Canada were without power for a day. Across the U.S., 6,300 flights were cancelled. Highways and rail systems were also closed. In total, at least 24 deaths were reported to be related to the storm, many of them in shoveling or auto-related incidents. The total damages from the ice storm alone may exceed USD1 billion. [4]

In China, relentless droughts that started to dry out winter wheat-producing areas such as Shandong and Henan provinces in late last year, continue affecting several million hectares of cropland. Rainfall is down by between 20 to 90% compared with the same period last year in the provinces of Henan, Shanxi, Hebei, Shandong, Jiangsu, Anhui and Shaanxi.

Several million people in southern and eastern China are facing a shortage of drinking water due to a severe drought.

In the hardest-hit province of Yunnan, about 8.1 million people faced drinking water shortage. The drought has affected 3.1 million hectares of crops and caused direct agricultural economic losses of about ¥17 billion (USD2.5 billion). In the main sugar cane production region of Guangxi, large swathes of the crop have withered and output of white sugar is set to decline this year.

In total, the drought has left about 18 million residents and 11.7 million heads of livestock with drinking water shortages and caused direct economic losses of ¥23.7billion. [7]

Though the changes in climate that we have been witnessing are hard to predict as a result of the eccentricity they hold, it is reasonable to conclude that the observed increase in extreme events is partially a climate response to global warming, and that global warming has increased the risk of such extreme events. Clearly, these changes are seriously affecting various sectors of our society that cross regional boundaries.

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Source
Dr Satish Kumaran
Email: skumaran@ap.ansell.com

Climate Change and Impact on Human Lives

The global concentration of greenhouse gases is increasing, mainly due to human activities such as the combustion of fossil fuels (which release carbon dioxide) and deforestation (because forests remove carbon from the atmosphere). The atmospheric concentration of carbon dioxide, the main greenhouse gas, has increased by 30% since pre-industrial times.

Impacts of Climate Change

Though the changes in climate that we have been witnessing are hard to predict as a result of unpredictability, it is reasonable to conclude that the observed increase in extreme events is partially a climate response to global warming, and that global warming has increased the risk of such extreme events. Clearly, these changes are seriously affecting various sectors of our society that cross regional boundaries. Some of these effects are discussed below [2-5]:

Strong Heat Waves

As temperatures rise, so do the risks of heat-related illnesses and even death for the most vulnerable human populations. In 2003, for example, extreme heat waves caused more than 20,000 deaths in Europe and more than 1,500 deaths in India. Scientists have linked the deadly heat waves to climate change and warn of more to come.

Infectious Diseases

In addition to heat-related illness, climate change may increase the spread of infectious diseases, mainly because warmer temperatures allow disease-carrying insects, animals and microbes to survive in areas where they were once thwarted by cold weather. Diseases and pests that were once limited to the tropics – such as mosquitoes that carry malaria – may find hospitable conditions in new areas that were once too cold to support them.

The World Health Organization (WHO) estimates that climate change may have caused more than 150,000 deaths in the year 2000 alone, with an increase in deaths likely in the future.

Frequent Storms, Floods and Droughts

Climate change is very likely to affect the frequency and intensity of weather events, such as storms, floods and droughts, around the world. Higher global temperatures will increase the amount of moisture that evaporates from land and water, leading to drought in many areas. Lands affected by drought will become more vulnerable to flooding once rain falls.

Coastal Flooding

Climate change will also cause sea levels to rise due to the thermal expansion of the oceans and the melting of the mountain glaciers. Global mean sea levels are anticipated to rise by 15 to 95 cm by 2100. A sea level rise will increase vulnerability to coastal flooding and storm surges.

Air Pollution

The air is full of particles and gases that may affect human health, such as pollen, fungal spores, and pollutants from fossil fuel emissions. Weather conditions influence air pollution via pollutants (or pollutant precursors) transport and/or formation. Exposure to air pollutants has serious public health consequences. Climate change, by changing pollen production, may affect timing and duration of seasonal allergies.

Social Dislocation

Climate change disasters are becoming a bigger cause of population displacement than war and persecution. Large-scale migration is likely in response to flooding, drought and other natural disasters.

Because displaced persons generally represent very vulnerable sections of the population with significant health problems, such circumstances of population displacement and resettlement would affect the risk of infectious disease outbreaks. Added to this, are issues of international security.

Ecosystem Imbalances

The faster the climate change, the greater will be the risk of damage to the environment. Climatic zones (and thus ecosystems and agricultural zones) could shift toward the poles by 150 to 550 km by 2100. Many ecosystems may decline or fragment and individual species may become extinct.

Rising global temperatures will also adversely impact the stratification of the ocean's surface, causing changes to the surface water light regime and nutrient input from deeper layers of the ocean. These changes have far-reaching implications for the whole ecosystem and food chain.

Threatened Wildlife

One of the deadliest impacts of climate change is upon wildlife. Experts believe that by 2050, one-fourth of the animal species on earth will head towards extinction as a result of this perpetual global warming. Changes in temperature, weather and vegetation are forcing animals to move towards cooler regions of the earth for survival, which is likely to affect their existence as a whole.

Extinction of Marine Species

The effect of global warming will certainly be seen on some marine species. It is expected that many species will die off or become extinct due to the increase in water temperatures whereas various other species, which prefer warmer waters, will increase tremendously. Perhaps the most disturbing changes are expected in the coral reefs because corals are extremely sensitive to temperature changes and can undergo mass coral bleaching under heat stress.

Forest Fires

Hot temperatures and dry conditions will also increase

the likelihood of forest fires. In the conifer forests of the western United States, earlier snowmelts, longer summers and an increase in spring and summer temperatures have increased fire frequency by 400% and have increased the amount of land burnt by 650% since 1970.

Water Security

Climate change is likely to reduce water available for drinking and washing. Poor countries that have always faced hydrologic variability and have not yet achieved water security, will find water security even more difficult and costly to achieve. Climate change may also reintroduce water security challenges in countries that for a hundred years have enjoyed reliable water supplies and few, if any, water shocks.

Agriculture and Food Security

Agriculture is extremely vulnerable to climate change. Current assessments of the impact of climate change indicate that some regions are likely to benefit from increased agricultural productivity while others may suffer reductions, according to their location and dependence on the agricultural sector. Although there will be gains in some crops in some regions of the world, the overall impacts of climate change on agriculture are expected to be negative, threatening global food security. Populations in isolated areas with poor access to markets will be the ones vulnerable to locally important decreases or disruptions in food supply.

Economic Catastrophes

Climate change can have some utterly damaging effects on world property. Increasing global average temperatures, rising sea levels, changes in rainfall and more frequent storms and droughts linked to climate change are already taking a heavy toll on government finances and poor rural communities across the globe. As a result, billions of dollars in property damage repairs and infrastructure is spent every year.

Other economic effects of climate change may be in the form of costs to fight wildfires, water conservation costs, public health costs, costs associated with tourism and recreational losses, strained energy and water resources, and impaired transportation infrastructure.

Escalating Infrastructure Costs

Preparing for projected climate changes will be costly. Though the impacts of climate change will vary from region to region, it is certain they will be widespread and costly in human and economic terms, because significant changes in the planning, design, construction, operation and maintenance will be required.

The response measures to protect against the adverse impacts of climate change range from rehabilitating and retrofitting infrastructure, to making major additions to constructing entirely new infrastructure. For instance, airport runways, railway lines and pipelines, (including oil pipelines, sewers, water mains etc.) may require increased maintenance and renewal as they become subject to greater temperature variation and are exposed to weather that they were not designed for.

Limited Insurance Cover

Hurricanes, wildfires and floods attributed to climate change have damaged and destroyed peoples' homes, cars and other belongings – leading to more insurance claims. With a greater frequency of climate related disasters, some insurance companies have stopped offering coverage, and those that do offer coverage often limit what they cover. This also means higher insurance premiums that many people cannot afford, leaving them uninsured or underinsured.

Vulnerable Insurance Industry

Weather and climate change are of interest to the insurance industry because they inflict damage on people's property, crops or health. Through the pooling of funds, insurance companies are able to help individuals and commercial companies recover from their losses. This is especially important where the losses are too great to be absorbed by these individuals and companies. If climate catastrophes were to escalate to the degree that the global insurance industry was to collapse, due to increasing claims and payouts, it would have ramifications for individuals, the economy as a whole, and financial markets too. Individuals would have to bear the entire financial burden of recovery, local economies would take longer to recover than usual and world financial markets would collapse since insurance companies invest heavily in them. In this sense, the impact of climate change will hit harder than the recent financial crisis.

While the various possible consequences of climate change discussed above are alarming, there are many measures that a country can take in preventing these consequences from reaching their most dangerous potential.

Quite clearly, the poorest countries and people will suffer earliest and most, by virtue of their locations, low incomes, and limited institutional capacity, as well as their greater reliance on climate-sensitive sectors.

Skepticism should not be allowed to delay action on global warming. Rather than argue endlessly about climate change causes and effects, governments and the international community in general, must focus on how vulnerable some of us are when exposed to these types of events and think about how they can minimise the damage and costs of the risk of similar events in the future.

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Source
Dr Satish Kumaran
Email: skumaran@ap.ansell.com

Redefining Sustainable Development Models

Over the last century, nations around the globe fuelled their economic growth using their abundance in natural resources. Indeed, we mined our way to growth and development at a pace where natural regeneration was not possible. In short, we burned our way to prosperity. No thought was put on the consequences of over consumption. But we have to snap out of those good times as those days are gone. We are now in a critical twenty-first century. Our resources and supplies are running short and the global thermostat is indeed running high. How do we regain the balance? All of these require rethinking on the various models of sustainable development that should have worked in theory but have failed in reality. How do you see the world progressing by 2050 if a more successful model is not developed?

After the failed summit in Copenhagen, the hopeful Cancun conference and maybe the ultimate Durban summit (in 2012), mankind has to face the following reality as outlined by Chambers *et al.* (2000) a decade ago:

1. Feeding a global population predicted to be half as big again as at the turn of this century.
2. Eliminating poverty and inequality whilst providing an acceptable quality of life for all.
3. Harnessing sufficient energy to power our economies without damaging environmental consequences.
4. Halting the decline in biodiversity and learning to leave in harmony with other species.

Under the umbrella term of 'sustainable development', these four big questions raised by Chambers *et al* are indeed relevant today. As further added by Goore (2000), living beyond our ecological means will surely lead to the degradation of our home; human well-being will suffer.

Over the decade, many scholars have tried in vain to measure the ecological impact due to intense development. Datschefski (1999) outlined the "Six S's of Sustainability to Save the World" (Figure 1).

Figure 1: Six S's to save the world

Figure 2: IPAT Model

Ehrlich & Holdren (1995) in their earlier publication introduced the IPAT Model (see Figure 2). In this model, the relationship between environmental impact, the number of consumers, the affluence (or level of consumption) of each consumer and the technological efficiency in delivering a particular product/service, where consumption is the product of affluence and technology, is outlined. In short, the amount of fuel used to travel a certain distance depends on both the mode of transport and the efficiency of that form of travel. Many aspects of human quality of life are also a function of this consumption as indicated in Figure 3 by Chambers *et al.* (2000).

Figure 3: Human quality of life is a function of consumption

Many models of sustainable development tend to focus on the economy being treated as the sole 'bottom line' priority, in the belief that society and the environment exist to serve the economy rather than the other way around (see Figure 4a). On the contrary, the 'Russian Dolls' model of sustainability (O'Riordan, 1998), places the economy in a more supportive position with social and environmental factors taking a more leading role (see Figure 4b). This model upholds the basic principle that all economic activity should be bent towards social progress and that this must be achieved within environmental limits.

Figure 4: Environment, society and economy
(a) The Traditional Model versus (b) The 'Russian Dolls' Model

Sustainability is basically the capacity to endure. All progress can only be sustainable, if we can understand the state we are in at present, the direction that we should move and how we will know when we have arrived. Figure 5 represents four possible situations in achieving quality of life within the means of nature.

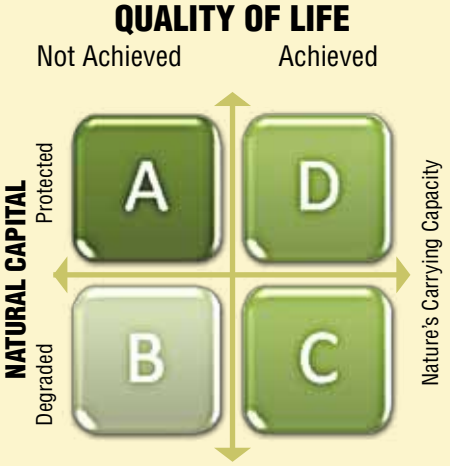

Figure 5: Quality of life versus natural capital

Zone A is depicted when conservation projects are off-limits to the local community. It may be ecologically sustainable but it is unlikely to be socially sustainable. Zone B on the other hand is where poverty results in further degradation. Over deforestation will lead to the loss of groundwater supplies on which the communities rely. Many rich nations fall in Zone C whereby a high standard of living is achieved but the natural capital and the environment are being degraded. Finally, Zone D is the equilibrium where a high quality of life is achieved without degrading the environment. In summary, developing sustainability is any move from Zone A, B or C towards Zone D.

Hence, the equilibrium of Zone D basically ensures that the scale of the economy does not exceed the scale of the biosphere. How much nature do we have compared to how much nature we used? We need to ensure our use does not overshoot the regeneration capacity of nature. Having a tool to measure the overall use of nature and people's impact on environment will be useful to gauge the overheating earth. Based on these aspirations, the ecological footprint was introduced.

Despite all these well-thought models of sustainability, the world has actually moved backwards in terms of sustainable development.

In conclusion, despite the evolution of various sustainable models across the globe and in spite of the mounting investments and awareness in the protection of the environment, pressures on the ecosystem and world's natural resources continue to increase rapidly. The indiscriminate exploitation of nature by human activities has reached into every corner of the natural world. The intense development has indeed brought unquestionable benefits to human welfare. Despite that, the upshot of this growing human domination of the planet is that no ecosystem on earth is free from pervasive human influence.

There are many challenges facing developing countries in moving their economies to more environmentally friendly paths.

As highlighted by UN Secretary-General Ban Ki-Moon at the World Economic Forum in Davos, Switzerland, early last year, "It is easy to mouth the words 'sustainable development', but to make it happen, we have to be prepared to make major changes – in our lifestyles, our economic models, our social organisations and our political life".

All our activities have an impact on the surrounding environment. If we continue to deplete all resources that are finite, eventually we will have nothing to draw upon. No model in the world can save Mother Earth once we cross that tipping point.

Change is vital if the future generation of the human race is to experience the environment as we do today. Mahatma Gandhi once quoted, "You must be the change you wish to see in the world."

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The following alarming statistics on the status of the earth were reported in *World Revolution* (2011):

- Half of the forests that originally covered 46% of the earth's land surface are gone. Only one-fifth of the earth's original forests remain pristine and undisturbed.
- Between 10 and 20% of all species will be driven to extinction in the next 20 to 50 years. Based on current trends, an estimated 34,000 plant and 5,200 animal species - including one in eight of the world's bird species - face extinction. Almost a quarter of the world's mammal species will face extinction within 30 years. Up to 47% of the world's plant species are at risk of extinction.
- 60% of the world's coral reefs, which contain up to one-fourth of all marine species, could be lost in the next 20 to 40 years.
- Hundreds of thousands of sea turtles and marine mammals are entangled and drowned by irresponsible fishing practices every year.
- More than 20% of the world's known 10,000 freshwater fish species have become extinct, been threatened, or endangered in recent decades. 60% of the world's important fish stocks are threatened from overfishing.
- Desertification and land degradation threaten nearly one-quarter of the land surface of the globe. Over 250 million people are directly affected by desertification, and one billion people are at risk.
- Global warming is expected to increase the earth's temperature by 3°C in the next 100 years, resulting in multiple adverse effects on the environment and human society, including widespread species loss, ecosystem damage, flooding of populated human settlements, and increased natural disasters.
- An estimated 40 to 80 million people have been forcibly evicted and displaced from their lands to make way for the construction of large dams, resulting in economic and social devastation for these people.
- Between one third and one half of the earth's land surface has been substantially transformed by agriculture, urbanisation, and commercial activities of various kinds.
- About one quarter of all bird species have been driven to extinction.
- More than one half of all accessible surface water, as well as an enormous quantity of groundwater, is diverted for human uses.

Source
Assoc Prof Dr Vikneswaran Nair
Email: vicky.nair@taylors.edu.my

Securing a Clean Energy Deal? Renewable versus Nuclear

Energy Demand

World energy demand is ever increasing with the growing population of the world. Energy is the key driver of economies around the world. According to the International Energy Agency, in 1973, total primary energy amounted to 6115 million tonnes of oil equivalent (Mtoe), increasing to 12,267 Mtoe in 2008. This records a doubling in demand for energy in 35 years. Table 1 shows the primary energy supply mix for 1973 and 2008.

Based on British Petroleum's (BP) *Energy Outlook 2030*, historically, a common pattern emerges. BP has concluded that energy intensity increases as countries industrialise and the share of energy intensive industry in Gross Domestic Product (GDP) rises relative to other sectors. Its peak usually coincides with a peak in the share of the industrial sector in GDP. Also the nature of industry changes (from heavy and energy intensive to lighter and high value added) as industry becomes more energy efficient. The report also states that the pattern converges across countries where it is driven by energy trade, the use of common technologies, and similarities in consumption patterns.

Table 1. Total primary energy supply (%)

Type of total primary energy supply	1973	2008
Oil	46.1	33.2
Coal / Peat	24.5	27.0
Gas	16.0	21.1
Combustible renewables and wastes	10.6	10.0
Hydro	1.8	2.2
Nuclear	0.9	5.8
Others (geothermal, solar, wind, heat etc.)	0.1	0.7

(*Source*: Key World Energy Statistics 2010, International Energy Agency)

Table 2. Greenhouse gas emission based on electrical energy generation technology

Technology	Greenhouse gas intensity (g CO^2-e/kWhel)
Brown coal (new subcritical)	1175 (1011 – 1506)
Black coal (new subcritical)	941 (843 – 1171)
Black coal (supercritical)	863 (774 – 1046)
Natural gas (open cycle)	751 (627 – 891)
Natural gas (combined cycle)	577 (491 – 655)
Photovoltaics (PV)	106 (53 – 217)
Light water nuclear reactors	60 (10 – 130)
Heavy water nuclear reactors	65 (10 – 120)
Wind turbines	21 (13 – 40)
Hydroelectricity (run-of-river)	15 (6.5 – 44)

(*Source*: Lenzen M (2008) Life cycle energy and greenhouse gas emissions of nuclear energy: a review. *Energy Conversion and Management* 49: 2178-2199.)

According to the Malaysia Energy Balance 2008 report, primary energy supply in Malaysia in 1990 was estimated at 21,471 kilo tonne oil equivalent (ktoe), increasing to 75,490 ktoe in 2008, a 3.5-fold increase over the 18 years. Meanwhile, the GDP was RM189,059 million in 1990, increasing to RM528,311 million in 2008, an increase of only 2.8 times within the same 18 years. With increasing demand for energy resources and depleting local resources, Malaysia will have to find sustainable, cheap and reliable energy resources. The question: 'how is Malaysia going to reduce its carbon footprint while the demand is ever increasing'?

Carbon Emission from Energy Usage

Combusting fossil fuel is seen as one of the main culprits of greenhouse gas emissions. This can be seen in the form of energy resources usage in electricity generation and the transportation, industrial, commercial and domestic sectors. Carbon compounds are combusted to release energy stored in them. This reaction in return releases a mixture of carbon dioxide, water vapour and other compounds based on the chemical content of energy resources.

Table 2 describes the greenhouse gases emission (carbon dioxide equivalent) based on electrical energy generation technology. Crude energy resources need direct combustion and heat energy is extracted to convert it into electrical energy. There are a few ways to convert renewable energy resources into electricity. These resources create distinctive differences in carbon emission due to their operational condition. Some renewable energy resources are of the combustible type while others use potential energy available naturally to generate electricity.

From Table 2, we can see that the selection of technology is vital in curbing greenhouse gas emission. This shift to 'greener' and 'cleaner' energy generation must also be coupled with economic sense. Therefore governments, businesses and public at large are left with a few options that appear feasible.

Status of Renewable Energy in Malaysia

The 10th Malaysia Plan (10MP) has outlined stronger incentives for investment in the Renewable Energy (RE) sector. Malaysia has identified the development of biomass, biogas, mini-hydro and solar as the main renewable energy resources. The 9th Malaysia Plan failed to achieve the targets set for RE. Therefore, the Ministry of Energy, Green Technology and Water (KeTTHA) has outlined additional steps such as a feed-in tariff and Renewable Energy Fund to promote a more rapid growth of the RE sector. The statistics show that only 41.5 Mega Watt (MW) RE electricity production capacity was achieved in 2009. This is less than 1% of total electricity production in Malaysia.

The 10MP targets to achieve 5.5% RE generated electricity by 2015 from the total electricity generation. This means a total of 985 MW of electricity generated from RE is projected to be achieved by 2015. From this projected 985 MW of electricity generated from RE, biomass is expected

to contribute 330 MW, biogas 100 MW, mini-hydro 290 MW, solar PV 65 MW, and solid waste 200 MW. If the targets are achieved by 2015, annual carbon dioxide avoidance would amount to 3.2 million tonnes.

However, RE has its pros and cons. To support a system, we need to test it out in full force at least at an operational scale. It is also inevitable that RE resources cannot be depended on for a stable supply to the electricity grid. This issue must be recognised as a major stumbling block in RE development. However, in-depth research and development can definitely resolve problems such as this as it is a problem of process stabilisation. Centralisation of RE plants to an operational scale that supports stable power output to the grid is seen as a key solution.

Alternative fuels such as biogas, biofuel, ethanol and others must be developed in stages and on a sustainable basis. The sustainability issue is actually to prevent 'food or fuel' rivalry in future as palm oil is a good biofuel source.

The major stumbling block to solar energy development is its cost. If Malaysia were to move towards full scale solar extraction, we would need to use a lot of non-renewable resources such as sand to develop it. Therefore, solar should only be seen as a peaking load solution if the country lacks a stable base load electricity supply to the grid in the future.

Nuclear Energy for Malaysia?

Uranium, plutonium and thorium are non-renewable resources which may be totally depleted. The sudden announcement by oil rich countries to go for nuclear energy places a heavy stress in the supply and demand of nuclear energy resources. On the other hand, Germany is phasing out nuclear use and has pledged to support renewable energy.

Going nuclear is not a long term solution. It may assist Malaysia in the short term energy mix management, but in the long term, we will face more pressing issues such as dealing with depleting non-renewable energy resources. What next then?

The location of a nuclear plant is one major issue while dealing with the nuclear waste is another. We must always remember that nuclear waste has to be maintained for a long time and there is the possibility of leakages which is a serious problem. We hear from 'experts' that nuclear is safe and that there have been only 150 incidents of leakages in a year in France. If it is safe, why does it leak? There should only be one answer: either it is safe or not safe!

Local human capital development in nuclear energy in Malaysia has an extremely important role in safe nuclear energy development. Dedicated and capable human resources are vital to ensure incident-free nuclear energy development.

When considering nuclear energy, we cannot detach ourselves from the massive earthquake and the ensuing tsunami in Fukushima, Japan, on 11th March 2011. The nuclear reactors of the Dai-ichi plant should serve as a grim reminder that when nuclear reactors fail (due to natural disasters or human error), we cannot control what is unleashed!

Sewerage – a Forgotten Resource?

Sewerage is produced in large volumes but is a disintegrated and wasted resource in Malaysia. Methane from sewerage is a greenhouse gas while ammonia and other forms of pollution are linked to it. It is envisaged that the sewerage industry will be restructured to accommodate the restructuring of the water industry.

There are projects in India that focus on the extraction of methane gas from septic tanks which are directed to houses for cooking purposes. Anaerobic digestion (fermentation) of sewerage can convert 75% of the Biochemical Oxygen Demand (BOD) to methane and this can be collected through pipes using processes that minimise water contamination.

Yokohama City with 3.6 million inhabitants produces a total of 16,000 m^3 of sewage sludge daily. For more effective eco-friendly treatment, this sewage treatment plant has been converted into a power generator, where 70% of the methane gas extracted produces 30 million kilowatt hours of electricity that is used to power their treatment process. The balance 30% of methane is used to incinerate the waste resulting in ash which is used for soil improvement and in the production of cement.

In addition, organic waste from solid waste can be treated with sewerage. A number of such projects are already operational worldwide. While the mixture increases the BOD, it also increases the methane extraction levels. In the long run, we may not need landfills if much of the organic waste are treated with the sewerage system and the remaining solid wastes are recycled. Landfills contribute to a large amount of greenhouse gases as well.

The Solution for Malaysia?

Energy efficiency can be defined as using lesser energy to do more or similar work compared to a normal condition. By doing this, there is optimal energy use.

There is an existing government policy in Malaysia which promotes industries that consume a lot of electricity by giving them a discount or 'special industry tariff'. This will actually promote wastage as it is cheaper to waste electricity than being energy efficient.

The industry that reduces its energy consumption while maximising output should be rewarded, as their energy footprint (or carbon footprint) per unit product or service rendered is reduced. Industries that support 'true' energy efficiency approaches through real engineering solutions must also be rewarded.

The power factor requirement must be enforced by providing industrial and commercial consumers proper guidance on how to improve the power factor through use of capacitor banks or through effective engineering design. The power factor requirement should also be extended to households to ensure houses have proper electrical designs.

Energy intensive industries such as smelting plants should be phased out to saveguard our energy security. Smelters that use both electric arcs and direct raw material combustion, emit much more greenhouse gases. Many of these industries are lining up in Sarawak to offset their carbon emissions via the Bakun hydroelectric project. This could be seen as a form of green washing.

Malaysia still lacks energy efficiency labeling for electrical and electronic goods. Although the Energy Commission (EC) has introduced labelling for various different categories of equipment over the past three years, EC still has to further strengthen itself in terms of labeling and enforcement to ensure consumers can make a right choice to reduce their energy consumption and achieve a low carbon footprint during operation of electrical and electronic equipment.

In essence, being energy efficient is a good, cost effective quick step to take for an immediate solution towards a reduction in carbon emissions.

Source
Lim Shok Hong
Email: christinelim82@yahoo.com

SHE Sustains:
The Gender Journey in Biodiversity Management

Introduction

The Malaysian Common Vision on Biodiversity drawn up by the Ministry of Natural Resources and Environment states that success lies in the implementation and commitment to achieve biodiversity conservation. One important link in this Common Vision is the importance of gender. Gender is significant because the values and strategies for biodiversity and its conservation would be based on an individual's needs and roles based on gender (Bisan & Selvaratnam, 2009).

Source: The Nairobi Work Programme - Making a Difference on the Ground

For a local community that lives near a forest, and whose livelihood is dependent on such an environment, the concepts of the forest and biodiversity are based on their cultural and livelihood contexts. Even society's priorities in preserving a site or conserving biodiversity are based on these gendered views. The strategies employed by the community would be further varied because men and women have different needs based on how gender is constructed in that community. If a programme in biodiversity conservation does not recognise these different needs, its effectiveness may be reduced or the rights of the community might be infringed.

In its third objective, the Convention on Biological Diversity asks for the 'fair and equitable sharing of the benefits' from the use of biological diversity. This cannot be addressed without considering the importance of women and gender relations in biodiversity management at the local level and the presence of gender inequalities and gender bias in local, national, regional and international systems that develop norms and regulations around biodiversity conservation.

The solution has been to mainstream gender. The United Nations Economic and Social Council (ECOSOC) 1997, Chapter IV defines this as:

> Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes in all areas and all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality.

Gender mainstreaming is a recent international initiative to progress gender equality and equity in society (Giridharan & Gribble, 2011).

Global Trends and Examples

Caiazza & Barret (2011) suggest surveys often find strong interest in environmentalism among women and a gender gap in environmental attitudes. Some interesting findings indicate that most men and women support increased government spending for the environment. Women though are less likely than men to support environmental spending cuts. Women have less trust that the institutions responsible for protecting the environment are actually doing their jobs. Additionally, women's higher levels of empathy, altruism, and personal responsibility make them more interested in environmentalism as a way to protect not only themselves and their families, but also others.

Aguilar's (2011) findings show, amongst others, that across the globe, women predominate as wild plant gatherers, home gardeners and plant domesticators, herbalists and seed custodians. Research on 60 home gardens in Thailand revealed 230 different

species, many of which had been rescued by women from neighbouring forests before being cleared. In spite of the fact that an increasing number of experiences are highlighting the sustainable manner in which women use biological diversity, it is often true that women do so without equitable participation in the access and control of such resources. There is a tendency to ignore the natural spaces predominantly used by women in favour of those used by men, and to undervalue non-commercial (mostly female) production spaces in favour of commercial (mostly male) production spaces.

It is essential to recognise that women and men have particular needs, interests and aspirations, and that they make different contributions to the conservation and sustainable management of biodiversity. These roles should be valued in their broader scope. Special attention should be given to the significance of women's ancestral knowledge of biodiversity. Some countries are taking advantage of their compliance with the Convention on Biological Diversity's provisions to create policies and legislation that safeguard the human rights of men and women, as well as indigenous and local communities. This is a great opportunity to achieve equality and equity between men and women in their access to resources, control of their traditional knowledge, and benefits from sound management and participation in governance and decision-making.

Gender Impact on Development Issues

Current trends and development practices in Malaysia show a keen interest in adopting and implementing gender issues within project or programme interventions. Most of the interventions can be seen as responding to the needs of women. However, the more prevalent assumption is that 'adding' women into project activities are an indicator of implementing gender concerns in a given intervention. Hence, Bisan & Selvaratnam (2009) suggest that from planning to intervention, gender must not be seen as separate

to avoid the disjointed application of 'add-ons'. Organisations need to begin accepting gender as a process. This is particularly important in addressing environmental management issues and concerns as various communities with different backgrounds, economically and or politically, would have different interests and rationales to promote environmental sustainability.

The beneficial impact of women's presence on conservation outcomes is attributable especially to women's contributions to improved forest protection and rule compliance (Ramakrishna, 2011). Increased opportunities for women to use their knowledge of plant species and methods of product extraction, as well as greater cooperation among women, are also likely contributory factors. As women are predominantly managers of plant biodiversity, it would be best for research to consider the ways in which they specifically may be affected by diffusion of modern plant varieties and increasing commercialisation of plant resources such as conversion of sugarcane into ethanol and palm oil into biofuel, decreasing access to common land, and changing consumption patterns (Howard, 2001). Gender relations are also changing and with them, women's incentives and management practices, which in turn affect biodiversity management. For example, when men turn to cash cropping, women may lose access to gardens or fallow fields where they manage traditional varieties.

A fascinating local example is that of the indigenous community in Malaysia. Historically, many indigenous women in Sarawak have had a close association with the land through their farming activities and through forest resources. In the villages and the long houses, the indigenous women enjoy access to social support systems for childcare and the knowledge needed to keep their families healthy. Giridharan & Gribble (2011) postulate that ethnographic documentation has clearly established that women have played an integral role in bringing together communities and providing nourishment and sustenance to their families. Women are regarded as the custodians of traditional practices and knowledge. The common narrative, storytelling, has been a communal diary that has disclosed the link between story telling and tradition. The traditional roles of indigenous women in Sarawak has been historically as revered and respected leaders in agricultural practices, as providers of sustenance and nourishment of family units, and as healthcare providers and child carers.

They warn us, however that the sustainability of traditional agricultural practices and resource management, of which women have been key custodians, is at stake. The restoration of their voices, in unity and sustainability, in agricultural matters and natural resource management is necessary to mitigate the deprivation resulting from social patriarchal models. There is a need for equal representation of women in decision making and policy making for ecological and social harmony. Giridharan & Gribble (2011) documented the need for increasing women's involvement in sustainable resource practices through equal access to land endowments and access to training and educational facilities to re-establish their position as guardians of the land.

Source: The Nairobi Work Programme - Making a Difference on the Ground

Conclusion

The impact women have in sustainability has been traditionally important. Much has been lost along the way, but there is always hope for greater prominence. Urbanites in Malaysia are also beginning to realise that the success of any sustainability endeavour should include a gender perspective. A recent urban river rehabilitation project has been an eye-opener for the NGO involved with regard to gender issues and perspectives. The lack of gender mainstreaming has been recognised as a key factor for not achieving the ideal goal of the programme. Due to the gender imbalance in the project, women and children were marginalised (Kailasam & Shahabudin, 2011). Whether one wants to subscribe to eco-feminism or at least a gendered lens to managing biodiversity and sustainability, we all need to be more inclusive in our approach to the Earth.

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Source
Dr Ratna Malar Selvaratnam
Email: Ratna.Malar@taylors.edu.my

Event Highlights
Department of Environment, Malaysia

February 2011

The Rakan Alam Sekitar (RAS) Programme 2011: Coordination and Enhancement Workshop

The Rakan Alam Sekitar (RAS) Programme 2011: Coordination and Enhancement Workshop was held on 16-18th February 2011 in Melaka. The workshop was organised by the Department of Environment (DOE) headquarters for DOE State Officers who are directly involved in implementing the Rakan Alam Sekitar activities. The workshop was aimed at providing detailed information on the implementation of the Rakan Alam Sekitar (RAS) Programme as well as gathering participant feedback for the improvement of the programme.

March 2011

Seminar Pre-school Sustainable Environmental Awareness Module Series 1/2011

The Strategic Communications Division, Department of Environment in collaboration with the Department of Environment Kedah conducted the Pre-school Sustainable Environmental Awareness Module Series Seminar 1/2011 for the Northern Zone. This took place on 21st March at Youth and Sports Complex, Kedah.

Launched by the Director of the Department of Environment Kedah, the seminar was attended by 100 participants who were mainly DOE officers and pre-school teachers from the Ministry of Education (KPM), Department of National Unity (JPNIN), Department of Community Development (KEMAS) and also from private kindergartens.

The seminar aimed to educate pre-school teachers on the use of the Pre-school Sustainable Environmental Awareness Module drawn up by the department for the pre-school education system as well as expose officers and pre-school teachers to environmental aspects that can be applied in the education of children at pre-school level.

Correspondence address:
Chief Editor, IMPAK
Department of Environment
Ministry of Natural Resources and Environment
Level 1 - 4, Podium Block 2 & 3
Wisma Sumber Asli
No.25, Persiaran Perdana
Precinct 4
62574 Putrajaya

Article contributions and comments are welcomed. They are to be directed to : lingchui@doe.gov.my
Tel: 603 8871 2083
Fax: 603 8889 1042

Views and opinions expressed by the contributors do not necessarily reflect the official stand of DOE.

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