



GLOBAL CLIMATE CHANGE WORKSHOP: BUILDING “CONSILIENCE” BETWEEN SCIENCE, SECURITY AND POLICY

14 JULY 2008
SINGAPORE



**S. RAJARATNAM SCHOOL
OF INTERNATIONAL STUDIES**
A Graduate School of Nanyang Technological University

NATIONAL SECURITY
COORDINATION SECRETARIAT

GLOBAL CLIMATE CHANGE WORKSHOP: BUILDING “CONSILIENCE” BETWEEN SCIENCE, SECURITY AND POLICY

ORGANISED BY
THE CENTRE OF EXCELLENCE FOR NATIONAL SECURITY
WITH THE SUPPORT OF
THE NATIONAL SECURITY COORDINATION SECRETARIAT

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EXECUTIVE SUMMARY

On 14 July 2008, the Centre of Excellence for National Security (CENS), with the support of the National Security Coordination Secretariat (NSCS), organised the Global Climate Change Workshop on the theme of “Building ‘Consilience’ Between Science, Security and Policy”. The term “consilience”, coined by Harvard biologist E.O. Wilson, refers to the “synthesis of knowledge from different fields of human endeavour”. It was this premise which underpinned the workshop’s focus, that in order to deal effectively with global climate change, there should be integrative convergence in the knowledge areas of science, security and policy. To this end, the workshop brought together a stellar cast of local and international thought-leaders to speak on and explore further these three facets of the climate change conundrum.

The first panel addressed the scientific dimensions of climate change. Professor Arnulf Grubler, who spoke first, presented on the importance of adopting a scenario-based approach in climate change assessment and management. Professor Grubler also gave his take on the hotly-debated and contentious question of “climate change responsibility”. The second speaker, Associate Professor Wong Poh Poh, focused his analysis on the geographical region of Asia-Pacific and lectured on the impact and implications that climate change would have on the coastal communities and ecosystems of that region. Professor Wong ended his talk with the stark reminder that climate change is no longer “the stuff of science fiction”.

Panel Two looked at the connections and inter-relationships between climate change and national

security. The first speaker of the panel, Professor Brahma Chellaney, gave a highly-illuminating talk on the strategic elements of climate change and highlighted the various security-related effects that climate change might potentially engender. The second speaker, Dr Tapani Vaahtoranta, added further to the richness of the discourse, by stressing the issue of “security’s ambiguity” and how this would impact the perception of climate change’s nexus with international security.

The last panel focused on the question of crafting effective policies for climate change. Speaking first, Dr Jurgen Kropp argued for a climate change policy that combined GHG (global greenhouse gas) emission mitigation in tandem with proactive and efficient adaptation strategies. Dr Peter Read, on the other hand, advocated for an alternative mitigation strategy which emphasised the removal of carbon from the atmosphere.

This workshop also had the privilege of hearing from Mr Philip Ong, Director (Climate Change) at the Ministry of the Environment and Water Resources, Singapore. Mr Ong, who spoke from the perspective of a practitioner, shared in great length about the “Singapore approach” towards environmental challenges.

The workshop closed with a Roundtable Discussion whereby further ideas and perspectives pertaining to the key theme of the workshop—building “consilience” among the fields of science, security and policy—were debated and canvassed.

OPENING REMARKS BY DEAN RSIS



Ambassador Barry Desker

Ambassador Barry Desker, Dean, S. Rajaratnam School of International Studies, warmly welcomed the speakers and participants of the CENS Global Climate Change Workshop.

Amb. Desker noted that there is growing recognition among the international community today that climate change is more than just a matter of environmental degradation and physical consequences: it is also a serious long-term challenge that threatens the security of states and their citizens. While climate change may not be the most pressing problem facing global society, it could well prove to be the most complex problem faced by the world. Three areas, in particular, call for attention.

First, climate change has the potential to generate humanitarian crises. Climate change can induce a greater frequency and intensity of natural disasters such as flooding and cyclones, and these extreme weather events can result in mass mortality and grave subsistence complications for the affected community,

as seen recently in Myanmar, where Cyclone Nargis hit. These extreme weather events can lead to the displacement of refugees, which may, in turn, destabilise the affected area and its surrounding neighbours.

Second, climate change has the potential to fundamentally modify the distribution of natural resources such as agricultural produce, fresh water and arable land. When that happens, competition for resources may provoke civil strife and conflicts. The violence in Darfur, for instance, other than being attributed to ethnic conflict, has also been linked to land resource problems caused by desertification. While climate change is unlikely to be the primary driving force behind any specific conflict, it can create the precipitating conditions in which conflict is more likely to take place.

Third, there is a growing connection between climate change and the emergence and spread of diseases. In particular, the rise in global average temperatures has been identified as one of the primary reasons extending the ranges and seasons of various tropical disease carriers, pushing the geographical boundaries of these diseases into areas previously too cold for such diseases to survive. The West Nile virus, for example, had never been detected in North America until some eight years ago. Meanwhile, dengue fever and the Lyme disease have been observed to be heading northwards while malaria is occurring at much higher elevations than ever recorded before. Taken together, these signs suggest the far-reaching effect that climate change has on the diffusion of diseases.

Amb. Desker observed that, encouragingly enough, climate change has started to gain recognition among leaders and decision makers as a genuine non-traditional security issue. In April 2007, for example, the UN Security Council addressed the question of climate change for the first time, warning about its potential to be a “conflict catalyst”. In the United States, the recent National Intelligence Assessment also made it clear that “climate change will have sweeping consequences for U.S. national security”. In Singapore, this issue is clearly significant. Quoting remarks made by Singapore’s Prime Minister Lee Hsien Loong, Amb. Desker stressed that “climate change can undermine the stable and predictable environment that underpins the growth and prosperity of all countries, making it a serious long term threat to the security of the region, and the world”.

It is thus in the context of these issues that the CENS Global Climate Change Workshop comes as a timely and apposite forum. Amb. Desker pointed out that the key theme for the workshop is about building “consilience” between science, security and policy. The term “consilience” (coined by Harvard biologist E. O. Wilson) refers to the “synthesis of knowledge from different fields of human endeavour”. It is this premise that underpins the workshop’s focus because, in order to deal effectively with the issue of global climate change, Amb. Desker noted that there should be trans-disciplinary and integrative approaches in the areas of science, security and policy.

Amb. Desker ended his speech by affirming his confidence in the workshop’s capacity to promote the analytical frameworks, ideas, mindsets and knowledge needed for effective climate change management.

PANEL ONE

Addressing the Scientific Issues of Climate Change

Climate Change: The Scientific Basis



Professor Arnulf Grubler

Arnulf Grubler, Professor in the Field of Energy & Technology, Yale University, U.S., and Senior Research Scholar, International Institute for Applied Systems Analysis, Austria, presented on the scientific aspects of climate change.

Grubler noted that the influence of human activities on nature—the anthropogenic factor—is not a new phenomenon and has been a problem that is being studied since two decades ago. According to Grubler, current global warming monitoring models are not only capable of reconstructing historical climate records from as early as 1900 but also provide crucial data on the possible drivers of climate change. He observed that, for instance, based on the results provided by these models, it could be demonstrated that climatic anomalies are clearly attributable to human activities. The results also indicate that the planet is getting hotter, in which temperature increases around a mean of 1.5 degree Celsius are inevitable. Given this evidence, Grubler felt that it is almost too late to return to a state of having “no climate change” and that adaptation is now crucial.

Grubler highlighted that, through a scenario-based approach based on the results of studies conducted

by the Intergovernmental Panel on Climate Change (IPCC), it is possible to assess the potential trajectory of a number of climate change issues. Current global mean temperature and global economic carbon footprint, for example, could be used to work out or forecast the following:

- The extent of success that the various climate policies would have in reducing carbon emission and global warming.
- How much carbon is or potentially being emitted without creating any greater harm: climate stabilisation vis-à-vis carbon baseline.
- The availability of fossil carbon deposit for future use based on current economic carbon consumption or footprints.

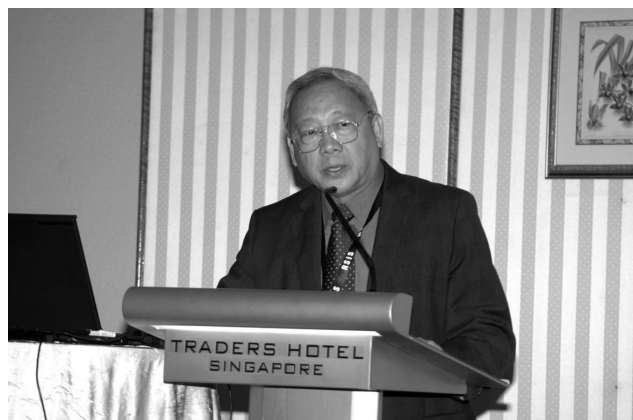
Similarly, the same scenario-envisioning approach could also be used to derive projections on water availability and its impact on—among the many other concerns—future crop production. Essentially, a scenario-based analysis would inform scientists and policymakers alike on the viable mitigation strategies, solutions and technologies needed to reduce or reach a given emission baseline.

On the mitigation and adaptive capabilities of countries worldwide, Grubler reminded the audience of the age-old dilemma of determining: “who owns responsibility over climate change?”. He explained that while the carbon emission levels of the developing countries have been steadily rising, reconstructed historical data has shown that industrialised countries are largely responsible for past carbon emissions. So, clearly, in order to have a successful reduction of carbon emission levels by the year 2010, it has to necessarily encompass actions and responses from both the industrialised and developing nations.

Grubler opined that the range of measures needed to address the problem of climate change would depend on several factors. Some important considerations, for example, would include the availability and accessibility of modern efficient energy technologies as well as the cost of climate stabilisation measures. Grubler concluded his presentation with the view that there is a need to address all climate change related challenges simultaneously.

Climate Change in the Asia-Pacific Region

Wong Poh Poh, Associate Professor in the Department of Geography, National University of Singapore, presented on the impact that climate change has on coastal communities and ecosystems found in the Asia-Pacific region as well as its consequential implications on human health, food and water supplies.



Associate Professor Wong Poh Poh

Wong began his talk by asserting that the global mean temperature has increased. Indeed, for the past 50 years, significant anthropogenic climate warming and related effects have been observed in almost all continents. Data collected over the period 1979–2005, for instance, evince that the levels of snow cover and sea ice have been progressively decreasing. Likewise, both reconstructed historical data from as early as the 1880s as well as current satellite recordings indicate that sea levels are increasing.

Wong attributed the rise in sea levels to, inter alia, factors such as thermal expansion, melting glaciers

and ice caps. On a more critical front, given the rate at which the Arctic ice is melting, Wong remarked that ice sheets found in that region might possibly even disintegrate by as early as 2013. If such a scenario was to happen, it would speed up global sea-level rises by as much as five metres.

On the Asia-Pacific front, temperature rises have been observed in countries from China to Sri Lanka. Wong noted that, based on current climatic conditions and the study of 21 climate change models, it has been projected that the Asia-Pacific might experience more frequent, longer and more intense heat waves in the future. In addition, East, Southeast and South Asia might also experience extreme rainfall and winds associated with tropical cyclones. This might prove to be catastrophic as it has been projected that regional sea levels would rise by 40 cm or more by the year 2100. The means that not only would the region encounter more floods—which is already evident in present times—it might also face climate change related problems such as decreased food production, lack of clean water supplies and degradation of human health.

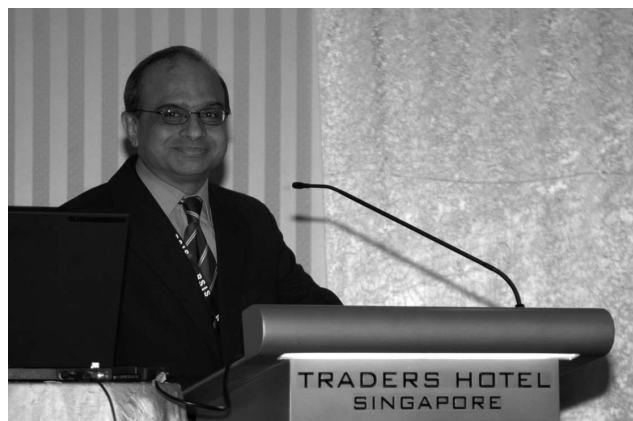
Wong pointed out that the impact of climate change would have dire consequences on the ecological systems and biodiversity of the Asia-Pacific region. It has been projected that up to 50 per cent of Asia-Pacific's ecological systems might be at risk. The loss of vegetation covers, mangroves and corals have already threatened the survival of several marine species, which, in turn, would have ineluctable repercussions on the livelihood of coastal communities dependent on the ecosystem for their subsistence. Wong added that severe water-related environmental conditions such as extreme floods and droughts would not only exacerbate a reduction in food supplies but also trigger health problems and lead to an increase in mortality rates.

In conclusion, Wong reminded the audience that climate change is no longer just the “the stuff of science fiction”. Climate change has already taken place, and human societies and communities will have to learn to survive it.

PANEL TWO

Climate Change and National Security

The Strategic Dimensions of Climate Change



Professor Brahma Chellaney

Brahma Chellaney, Professor at the Centre for Policy Research, India, spoke of the need to incorporate “climate security” as an important component of international and national security—much like how “energy security” has been conceived—given the security-related effects that climate change would have.

These effects would include an intensifying of inter-state and intra-state competition over natural resources, especially for energy and water resources. According to Chellaney, Asia is a prime example of a region that has the potential for inter-state conflicts over water resources, given that the bulk of the great rivers in Asia start in the Tibetan plateaus of China and affect water flows to farmers all the way in Southeast Asia.

Additionally, climate change has the potential to bring about an increased frequency of extreme weather events like hurricanes, droughts and flooding, which may spur larger amounts of inter- and intra-state migration from coastal regions to more secure lands.

Chellaney stated his belief that such migration would upset existing “social balances”, which could undermine the political stability and internal cohesion of some nations. Coupled with the potential problems of economic disparities, the tasks of good governance and sustainable development in these “migration hotspots” would be made even more difficult. The net result might well be a massive failure in “human security”.

Chellaney noted that this spectre of resource conflicts, failed states, large-scale migrations and higher frequency and intensity of extreme weather events, underlines the security implications of climate change. Fundamentally, climate change can be seen as a “threat multiplier” that would create the conditions in which nations would be more vulnerable to social, political and economic stresses. Indeed, for many low-lying countries susceptible to flooding and sea-level rises, climate change means more than just “threat multiplication”—it is a real existential threat.

The key challenge, Chellaney asserted, is to build a coherent international response to the problem of climate change. That said, Chellaney lamented that current international institutions are inadequate to deal with this task. Many states are facing a “security-agenda overload”, making the task of “securitising” climate change and building a regional or international response much more difficult. At the same time, there is an overall lack of institutional and organisational capacity at the national and regional levels to deal with extreme weather events. Chellaney ended his presentation with the emphasis that it is imperative to start thinking ahead about how to manage the variety of security effects that climate change would have on the national, regional and international levels.

Climate Change and International Security Policy



Dr Tapani Vaahtoranta

Tapani Vaahtoranta, Programme Director (Environment and Natural Resources) at the Finnish Institute of International Affairs, discussed how the ambiguity of the idea of security affects the perception of climate change's connection with international security.

After the end of the Cold War, the idea of security has been continually broadened to include agents other than the state as well as threats other than inter-state conflicts. As the definition became increasingly broadened, Vaahtoranta noted the usefulness of the concept in distinguishing more pressing problems from less important ones and in policy prioritisation, diminished correspondingly. Vaahtoranta suggested for the adoption of a narrower perspective of security vis-à-vis the effects of climate change on international security, so as to better delineate some of the key security policy challenges that would arise. The security implications of climate change should preferably only be used to refer to those consequences of global warming that pose major threats to human life.

Vaahtoranta stated that climate change is a direct result of industrialisation. This implies that different states have differing levels of responsibilities for inducing climate change as well as different capabilities in being able to adapt to it. At the same time, while climate change is a matter of global concern, states tend to perceive their interests in differing ways when

it comes to mitigating climate change. These issues inevitably shape and affect the security policy challenges that states face in combating global warming.

To these issues, Vaahtoranta proposed the usage and synthesis of the IPAT Equation and the Environmental Kuznets Curve to examine the factors that shape the role of countries in producing, and responding to, climate change. The IPAT Equation hypothesises that adverse environmental impact is the result of the size of a nation's population, its affluence and the technologies used to obtain and transform resources into goods. As for the Environmental Kuznets Curve, it makes the argument that a reduction of adverse environmental impact is possible as long as there is further economic and technological development.

In examining where on the spectrum that different countries fall in relation to a combined IPAT Equation-Environmental Kuznets Curve, Vaahtoranta pointed out that there are a number of key policy facets that need to be addressed: (i) Is the industrialised world able to develop new energy technologies that can reduce the world's current dependence on oil? (ii) Will citizens be willing to change their behaviour (and, essentially, lifestyles) in order to decrease energy use and carbon emissions? (iii) How do the least developed countries strengthen their capacities to adapt to the consequences of climate change? (iv) How does one ensure that emerging economies with large and growing populations do not produce excessive emission levels in spite of the mitigating efforts from the developed world?

In sum, climate change poses a challenge to the current ways of conceptualising and understanding security. Extant concepts of security are still largely "anthropocentric", although climate change is already causing a mass extinction of animal and plant species. Therefore, as Vaahtoranta concluded, further and more nuanced developments in the way people think about security might be necessary.

Climate Change and its Implications



Mr Philip Ong

In his presentation, Phillip Ong, Director (Climate Change) at the Ministry of the Environment and Water Resources, Singapore, continued with the focus of the workshop by acknowledging the impending challenges and impact of climate change on the world and Singapore. In particular, he emphasised on the linkages between the unrelenting consumption of energy, the resultant production of harmful environmental gases and the combined impacts of these outcomes on weather patterns.

Stressing on the ways in which climate change would affect the development of an emerging Asia, Ong spoke about how worsening human conditions and the competition for natural resources would magnify the vulnerabilities and intra-regional stresses of Asian nations. Drawing from Singapore's policy response to climate-related challenges, Ong highlighted four key coping strategies for policymakers:

- Adaptation to change.
- Focus on engineering projects that will ensure state preparedness.
- Ensure civic preparedness in the event of an extreme weather occurrence.
- Coping strategies should be broad and "gentle".

To further illustrate his points on the "Singapore approach", Ong highlighted two policy examples: (i) the national response to energy demands and supply scarcity; and (ii) national strategies adopted to ensure the security of Singapore's water supply.

With regards to energy security, Ong described Singapore's national energy policy framework and elaborated its six key strategic prongs:

- Singapore maintains a competitive market among suppliers to keep prices low and affordable.
- The need for diversifying supply sources.
- Continued investments in research and development.
- Remain open to alternative energy options and experimentation.
- Emphasise on technological efficiency.
- A coordinated national effort to use energy efficiently.

In terms of water security, Singapore prides itself on an active and robust water management resource system. It is actively involved in every stage of the water cycle in order to harvest and maximise all available sources of water within the cycle. In particular, Singapore relies on four diversified national “taps”: (i) broad local catchment areas; (ii) imported water from Malaysia; (iii) NEWater (water recycling) plants; and (iv) desalinated water.

Ong went on to describe Singapore’s approach in coping with the potential problems of rising water levels or abnormal weather events. Fundamentally,

such an approach would involve key mitigating measures such as constant improvements to the nation’s drainage system as well as mandatory guidelines on the minimum height (above sea level) of local infrastructures and buildings.

Ong summed up his talk by reiterating the importance of having a comprehensive and multi-pronged approach towards the management of climate change effects.

PANEL THREE

Crafting Effective Policies for Climate Change

Climate Change: Is it Only a Management Problem?



Dr Jurgen Kropp

In his analysis of current trends in climate change, Jurgen Kropp, Theme Coordinator (North-South) at the Potsdam Institute for Climate Impact Research, Germany, stressed that the development of the earth’s climate in the twenty-first century depended on decisions made in the present. He pointed out that if

global warming is allowed to continue at its current pace, the degradation of the natural environment would in turn compromise human security in the form of water and food shortages. In order to avert such an eventuality, the mitigation challenge faced by the international community is for the absolute global greenhouse gas (GHG) emissions to be halved by 2050 (relative to 1990), keeping within the target of no more than a two per cent increase in per capita GHG emissions. To this end, Kropp argued for a two-pronged approach to achieve this goal: more focus on GHG mitigation in tandem with proactive and efficient strategies to deal with inevitable consequences.

First, on mitigating anthropogenic greenhouse gases, Kropp noted that there is more debate than action despite a general consensus among policymakers that timely measures need to be taken to address accelerating climate change. Although GHG emissions can be reduced in principle, the economic cost of mitigation has often meant perennial political impasses.

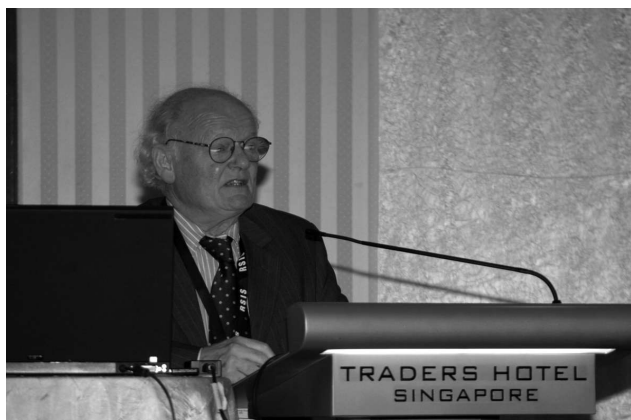
Kropp questioned the “wisdom” of having such a narrow and silo-minded perspective of costs by pointing out that damages incurred from inaction are likely to be far higher in comparison to GHG mitigation solutions. Kropp also stated that the European Union (EU) target to contain temperature increases within a level of two per cent (until 2100) is an achievable goal with concerted action among member states. One possible strategy, Kropp proffered, is to improve the efficiency of the energy sector, through measures such as encouraging the use of electric cars, technological innovation and exploring possibilities for renewable energy production.

Second, although sustainable development calls for the adoption of adaptation strategies to deal with climate change, it is still not a priority for most developing countries—which are, incidentally, the worst affected. For the agenda to move beyond mere political rhetoric, Kropp argued that a number of salient elements would be required: greater foresight thinking, more precise resolutions, stronger commitment of stakeholders, clarity on the specific undesirable outcomes to prevent, and, finally, systematic vulnerability analysis to identify risk-prone areas.

Concerning the potential threats to Singapore’s security in the twenty-first century, Kropp highlighted the disconcerting implications of rising sea levels as a result of warmer temperatures. He projected that the sea levels in the region could rise by up to one metre by the year 2100. Left unmitigated, the potential environmental aftermath, such as sea floods and losses of land, as well as the accompanying migrational consequences, would result in crippling economic costs.

In conclusion, Kropp underscored that GHG emission reduction was a manageable task and advocated the adoption of the following measures: (i) reduce approximately 70 per cent of GHG emissions by 2050, a responsibility that has to be shared between developed and developing countries; (ii) devise local solutions in tandem with global partnership; (iii) provide financial support for poorer countries to boost their adaptation policies and infrastructures; (iv) raise greater public awareness; and (v) develop an appropriate framework for innovation and technological transfer.

Policy to Address the Security Aspects of Climate Change



Dr Peter Read

Acknowledging the pragmatic challenges of emissions reduction, Peter Read, Senior Lecturer at Massey University, New Zealand, advocated an alternative mitigation strategy to climate change: the removal of carbon from the atmosphere to be stored and harnessed in a more constructive manner. Read began by stressing that, fundamentally, security is not about efficient performance under expected conditions but, rather, about robustness in the face of threats, including the threat of a climatic tipping point. This essentially behoves policymakers to prepare for worst-case scenarios and, where possible, at a low cost.

According to Read, a key limitation of high-profile reports—like the Stern Report—is their assumption that the effects of climate change are gradual—when they are more likely to be abrupt and hence require workable mitigation measures to be implemented immediately. As the requisite reduction of carbon emissions needed to effectively contain the problem

is not realistic in the foreseeable future, Read suggested that efforts be put into the removal of carbon from the atmosphere and storing it in a “safer locality”. Based on a concept of “global gardening” that advocates the careful treatment and management of soil, farmland and plantation forestry, the key advantage of carbon removal lie in its ease of implementation.

Elaborating further, Read outlined the strategies of using “Biochar” soil amendment and composted organic wastes to raise soil organic carbon levels and soil productivity. The potential advantages of this approach include better soil quality with reduced fertilizer use, better water and nutrient management, better rural livelihoods, more secure food supplies, and a geographically diversified energy supply. While some have pointed to the problem of land shortages as an obstacle to its implementation, Read argued that the real issue lay with the lack of investment in lands—especially concerning their productivities—rather than land shortages *per se*.

On practical measures for implementation, Read suggested that it should be obligatory that energy companies fund such projects rather than through financial incentives from governments. In this manner, bureaucratic red tape would be reduced and the obligatory cost would be factored into the price of the energy, thereby increasing the incentive for internalising the “learning externality”. With specific reference to Singapore, Read proposed identifying a suitable partner to negotiate a bilateral carbon management partnership as well as pushing oil refiners to invest in sustainable plantation forestry in partner countries.

ROUNDTABLE DISCUSSION

Chair: Associate Professor Kumar Ramakrishna

Panel: Professor Arnulf Grubler, Associate Professor Wong Poh Poh, Dr Tapani Vaahakoranta, Dr Jurgen Kropp and Dr Peter Read

The discussion started with a reiteration of the key theme of the workshop: the notion of building “consilience” among the fields of science, security and policy in order to come up with more effective mitigating and adaptation strategies for climate change.



Roundtable Panel

On this note, the panel began by addressing the question of how much scientific knowledge is needed in order to deal with the challenges of climate change. One concern was that while knowledge today is freely available and perhaps more than sufficient, policymakers might sometimes be perceived to be over-reliant and guided by only a select pool of information. It was thus emphasised that a more holistic involvement of all relevant fields of knowledge would better guide policymaking.

Another concern expressed by the panel was the misconception that having more knowledge necessarily translated to better solutions. In the case of climate change, the issue is more than just about acquiring scientific knowledge. More than that, the deep asymmetries in perspectives between and within countries—in terms of how they perceive and prioritise climate change—pose an even more severe challenge

to global mitigation efforts. For example, certain countries tend to conceive climate change as a “lesser” threat or would rather focus on development priorities as compared to environmental issues. Broad speaking, there appears to be a perceptual disjuncture between countries divided loosely along the geographical lines of “North” (representing the richer, developed nations) and the “South” (the poorer, less developed nations).

A number of the panellists share the view that, instead of having a burden-sharing, consensual platform that would be realistically difficult to achieve, it might be better to engage both the “North” and the “South” via mutually beneficial solutions. One potential suggestion along this line, proposed a panellist, might be to get the “North” more involved in aiding the “South” in terms of bio-fuels and carbon management investments.

One participant brought up the question of carbon baselines and wondered about the impetus that prevented countries from setting artificially low baselines to evince their environmental “efficiencies”. The panel responded that countries actually have little incentive to depress baselines. In fact, it would be more beneficial—and indeed make for sense—for countries to inflate baselines so as to capitalise from the existing international emission credit systems. With inflated baselines, reductions in carbon emission levels—even if they are technically insubstantial—would be made to look as if they are huge improvements.

Note: “Chatham House” rules were applied so as to encourage a free-spirited, frank and creative dialogue. Specific discussants are thus not named in this segment.

Rapporteurs:
Yolanda Chin, Greg Dalziel, Joanna Phua and Ng Sue Chia

Edited by:
Hoo Tiang Boon and Kumar Ramakrishna

The conference adheres to a variation of the Chatham House rules. Accordingly, beyond the points expressed in the prepared papers, no attributions have been included in this conference report.

This report summarizes the proceedings of the conference as interpreted by the assigned rapporteurs and editor of the S. Rajaratnam School of International Studies, Nanyang Technological University. Participants neither reviewed nor approved this report.

WORKSHOP PROGRAMME 14 JULY 2008

0900	Opening Remarks <i>by Ambassador Barry Desker, Dean, S. Rajaratnam School of International Studies,</i>	1200	Panel 2 Q&A
0915	Panel 1—Addressing the Scientific Issues of Climate Change, <i>chaired by Assistant Professor Chang Youngho, S. Rajaratnam School of International Studies</i> Presenters: <i>Climate Change: The Scientific Basis by Professor Arnulf Grubler, Yale University, USA, and the International Institute for Applied Systems Analysis, Austria</i> <i>Climate Change in the Asia-Pacific Region by Associate Professor Wong Poh Poh, National University of Singapore</i>	1220	The Practitioner's Perspective, <i>chaired by Associate Professor Kumar Ramakrishna, S. Rajaratnam School of International Studies</i> <i>Climate Change and Its Implications by Mr Philip Ong, Director (Climate Change), Ministry of the Environment and Water Resources, Singapore</i>
1015	Panel 1 Q&A	1310	Lunch
1035	Coffee/Tea Break	1420	Panel 3—Crafting Effective Policies for Climate Change, <i>chaired by Associate Professor Kumar Ramakrishna, S. Rajaratnam School of International Studies</i> Presenters: <i>Climate Change: Is it Only a Management Problem? by Dr Jurgen Kropp, Potsdam Institute for Climate Impact Research, Germany</i> <i>Policy to Address the Security Aspects of Climate Change by Dr Peter Read, Massey University, New Zealand</i>
1100	Panel 2—Climate Change and National Security, <i>chaired by Associate Professor Mely Caballero-Anthony, S. Rajaratnam School of International Studies</i> Presenters: <i>The Strategic Dimensions of Climate Change by Professor Brahma Chellaney, Centre for Policy Research, India</i> <i>Climate Change and International Security Policy by Dr Tapani Vahtoranta, Finnish Institute of International Affairs</i>	1520	Panel 3 Q&A
		1540	Coffee/Tea Break
		1600	Roundtable Discussion
		1700	End of Workshop

ABOUT CENS

The Centre of Excellence for National Security (CENS) is a research unit of the S. Rajaratnam School of International Studies (RSIS) at Nanyang Technological University, Singapore. Established on 1 April 2006, CENS is devoted to rigorous policy-relevant analysis of a range of national security issues. The CENS team is multinational in composition, comprising both Singaporean and foreign analysts who are specialists in various aspects of national and homeland security affairs.

Why CENS?

In August 2004 the Strategic Framework for National Security outlined the key structures, security measures and capability development programmes that would help Singapore deal with transnational terrorism in the near and long term.

However, strategising national security policies requires greater research and understanding of the evolving security landscape. This is why CENS was established to increase the intellectual capital invested in strategising national security. To this end, CENS works closely with not just other RSIS research programmes, but also national security agencies such as the National Security Coordination Secretariat within the Prime Minister's Office.

What Research Does CENS Do?

CENS currently conducts research in three key areas of national security:

- Risk Assessment/Horizon Scanning
 - The art and science of detecting “weak signals” emanating from the total security

environment so as to forewarn policymakers, the private sector and the public about approaching “shocks” such as terrorism, pandemics, energy crises and other easy-to-miss trends and ostensibly distant events.

- Social Resilience
 - The capacity of globalised, multicultural societies to hold together in the face of systemic shocks such as diseases and terrorist strikes.
- Homeland Defence Programme
 - The security of land-based, aviation and maritime transport networks and increasingly, the total supply chain vital to Singapore's economic vitality.
 - Health, water and food security.
 - Crisis communications and management.

How Does CENS Help Influence National Security Policy?

Through policy-oriented analytical commentaries and other research output directed at the national security policy community in Singapore and beyond, CENS staff members promote greater awareness of emerging threats as well as global best practices in responding to those threats. In addition, CENS organises courses, seminars and workshops for local and foreign national security officials to facilitate networking and exposure to leading-edge thinking on the prevention of, and response to, national and homeland security threats.

How Does CENS Help Raise Public Awareness of National Security Issues?

To educate the wider public, CENS staff members regularly author articles in a number of security and intelligence related publications, as well as write op-ed analyses in leading newspapers. Radio and television interviews have allowed CENS staff to participate in and shape the public debate on critical issues such as risk assessment and horizon scanning, multiculturalism and social resilience, intelligence reform and defending critical infrastructure against mass-casualty terrorist attacks.

How Does CENS Keep Abreast of Cutting Edge National Security Research?

The lean organisational structure of CENS permits a constant and regular influx of Visiting Fellows of international calibre through the Distinguished CENS Visitors Programme. This enables CENS to keep abreast of cutting edge global trends in national security research.

For More on CENS

Log on to <http://www.rsis.edu.sg> and follow the links to “Centre of Excellence for National Security”.

ABOUT RSIS

The S. Rajaratnam School of International Studies (RSIS) was established in January 2007 as an autonomous School within the Nanyang Technological University. RSIS' mission is to be a leading research and graduate teaching institution in strategic and international affairs in the Asia-Pacific. To accomplish this mission, RSIS will:

- Provide a rigorous professional graduate education in international affairs with a strong practical and area emphasis
- Conduct policy-relevant research in national security, defence and strategic studies, diplomacy and international relations
- Collaborate with like-minded schools of international affairs to form a global network of excellence

Graduate Training in International Affairs

RSIS offers an exacting graduate education in international affairs, taught by an international faculty of leading thinkers and practitioners. The teaching programme consists of the Master of Science (MSc) degrees in Strategic Studies, International Relations, International Political Economy and Asian Studies as well as the Nanyang MBA (International Studies) offered jointly with the Nanyang Business School. The graduate teaching is distinguished by their focus on the Asia-Pacific region, the professional practice of international affairs and the cultivation of academic depth. Over 150 students, the majority from abroad, are enrolled with the School. A small and select Ph.D. programme caters to students whose interests match those of specific faculty members.

Research

Research at RSIS is conducted by five constituent Institutes and Centres: the Institute of Defence and Strategic Studies (IDSS), the International Centre for Political Violence and Terrorism Research (ICPVTR), the Centre of Excellence for National Security (CENS), the Centre for Non-Traditional Security Studies, and the Temasek Foundation Centre for Trade and Negotiations (TFCTN). The focus of research is on issues relating to the security and stability of the Asia-Pacific region and their implications for Singapore and other countries in the region. The School has three professorships that bring distinguished scholars and practitioners to teach and do research at the School. They are the S. Rajaratnam Professorship in Strategic Studies, the Ngee Ann Kongsi Professorship in International Relations, and the NTUC Professorship in International Economic Relations.

International Collaboration

Collaboration with other Professional Schools of international affairs to form a global network of excellence is a RSIS priority. RSIS will initiate links with other like-minded schools so as to enrich its research and teaching activities as well as adopt the best practices of successful schools

For more information on the School, visit www.rsis.edu.sg

ABOUT NSCS

The National Security Coordination Secretariat (NSCS) was set up in the Prime Minister's Office in Jul 2004 to facilitate national security policy coordination from a Whole-Of-Government perspective. NSCS reports to the Prime Minister through the Coordinating Minister for National Security (CMNS). The current CMNS is the Deputy Prime Minister Professor S. Jayakumar, who is also Minister for Law.

NSCS is headed by Permanent Secretary (National Security and Intelligence Coordination). The current PS(NSIC) is Mr Peter Ho, who is concurrently Head of Civil Service and Permanent Secretary for Foreign Affairs.

NSCS provides support to the ministerial-level Security Policy Review Committee (SPRC) and Senior official-level National Security Coordination Committee (NSCCom) and Intelligence Coordinating Committee (ICC). It organises and manages national security programmes, one example being the Asia-Pacific Programme for National Security Officers. NSCS also funds experimental, research or start-up projects that contribute to our national security.

NSCS is made up of two components: the National Security Coordination Centre (NSCC) and the Joint Counter-Terrorism Centre (JCTC). Each centre is headed by a director.

NSCC performs three vital roles in Singapore's national security: national security planning, policy coordination, and anticipating strategic threats. As a coordinating body, NSCC ensures that government agencies complement each other, and do not duplicate or perform competing tasks.

JCTC is a strategic analysis unit that compiles a holistic picture of terrorist threat. It studies the levels of preparedness in areas such as maritime terrorism and chemical, biological and radiological terrorist threats. It also maps out the consequences should an attack in that domain take place.

More information on NSCS can be found at www.nscs.gov.sg

S. Rajaratnam School Of International Studies, Nanyang Technological University,
Block S4, Level B4, Nanyang Avenue, Singapore 639798

TEL 65-6790-6982 | FAX 65-6793-2991 | EMAIL wwwrsis@ntu.edu.sg | WEBSITE www.rsis.edu.sg