NTS ALERT

NTS Alert April 2011 (Issue 2)

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DEBATING GEOENGINEERING GOVERNANCE: HOW IT MATTERS TO THE ASIA-PACIFIC REGION

By Jochen Prantl

The debate on the risks and opportunities of geoengineering is currently gaining momentum. The Intergovernmental Panel on Climate Change is, for the first time, assessing the scientific basis as well as the potential impacts and side effects of geoengineering proposals in their Fifth Assessment Report, which is scheduled to be finalised in 2014. The Asia-Pacific region needs to participate in this debate. This NTS Alert highlights the climate change challenges in the Asia-Pacific and their likely impacts. It identifies three initial steps that may facilitate a discussion to investigate the potential role of geoengineering techniques in response to those challenges: regional consultations, scenario-building, and public and civil society engagement.

Dimming the sun. Solar radiation management methods such as the release of aerosols into the stratosphere are considered the most promising technology to reduce global temperatures rapidly in case of a climate emergency.

Credit: Eschipul/Flickr.com

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Introduction

This is the second NTS Alert in a two-part series aimed at introducing geoengineering to the Asia-Pacific discourse on climate change mitigation and adaptation.[1] Current discussions of geoengineering still tend to be relatively abstract, given its rather limited physical science basis. However, the debate is gaining momentum and may soon become part and parcel of international climate change negotiations.

Working Groups I (The Physical Science Basis), II (Impacts, Adaptation and Vulnerability) and III (Mitigation of Climate Change) of the Intergovernmental Panel on Climate Change (IPCC) will, for the first time, assess the scientific basis as well as the potential impacts and side effects of geoengineering proposals in their Fifth Assessment Report, which is scheduled to be finalised

- **Consortium of NTS Studies in Asia Website**
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Recommended Citation: Prantl, Jochen , 2 0 1 1 , 'Debating Geoengineering Governance: How It Matters to the Asia-Pacific Region', *NTS Alert*, April (Issue 2), Singapore: RSIS Centre for Non-Traditional Security (NTS) Studies for NTS-Asia.

in 2014. The geoengineering option is on the table.[2] As such, the Asia-Pacific region needs to participate in the debate, by identifying and assessing the risks and opportunities of geoengineering techniques.

This NTS Alert first briefly highlights the climate change challenges in the Asia-Pacific region and their likely impacts, as identified by the IPCC. It then points to a number of questions that may frame a discussion to investigate the potential role of geoengineering techniques in responding to those challenges.

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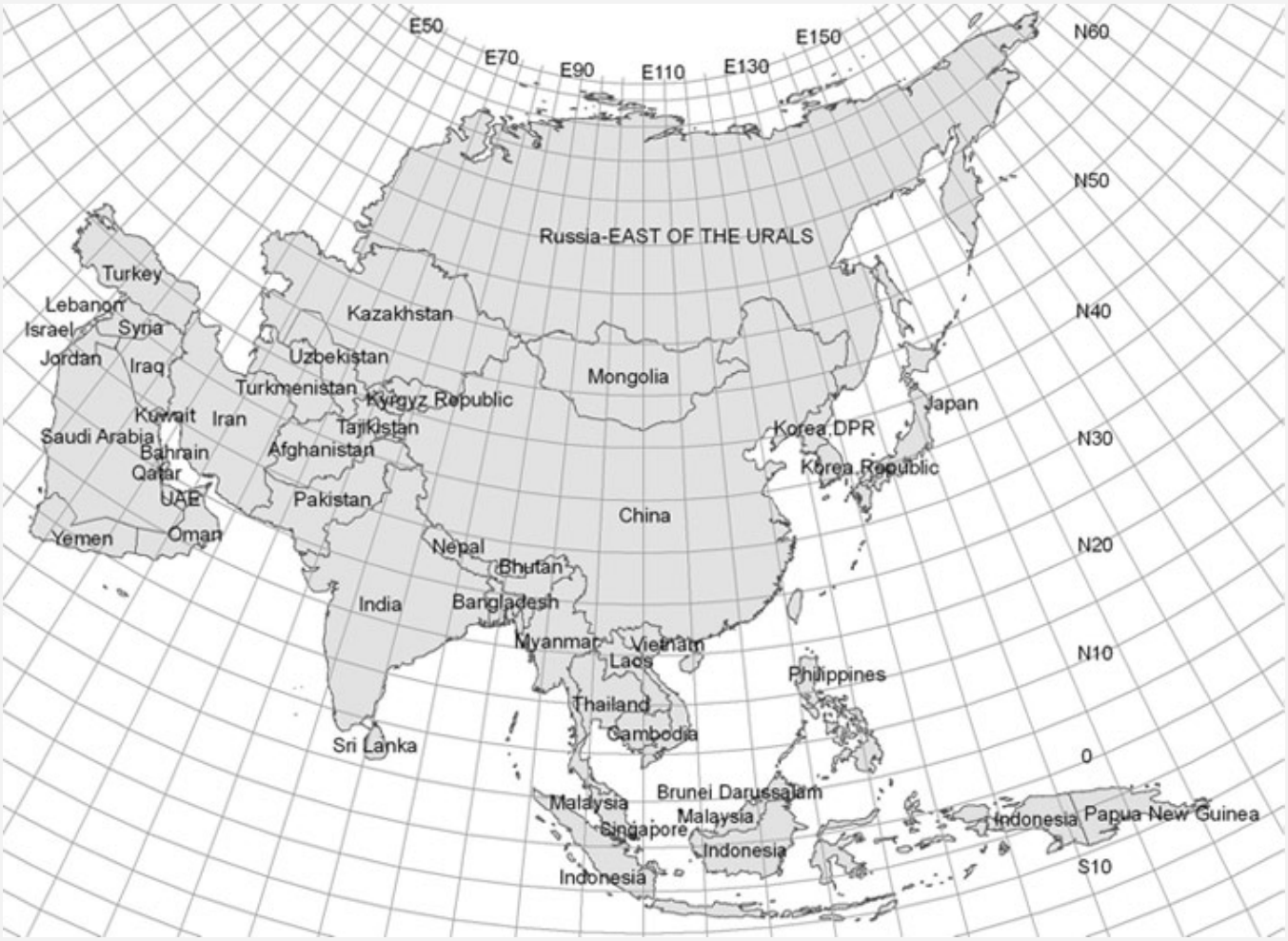
Climate Change Challenges and Potential Impacts in the Asia-Pacific Region

Approximately two thirds of Asia's roughly 3.9 billion people live in rural areas and over one third within close distance (less than 100 km) of the coast (Cruz et al., 2007). Water and agriculture have been singled out as the two sectors most vulnerable to climate change.

Figure 1: Countries covered under Asia.



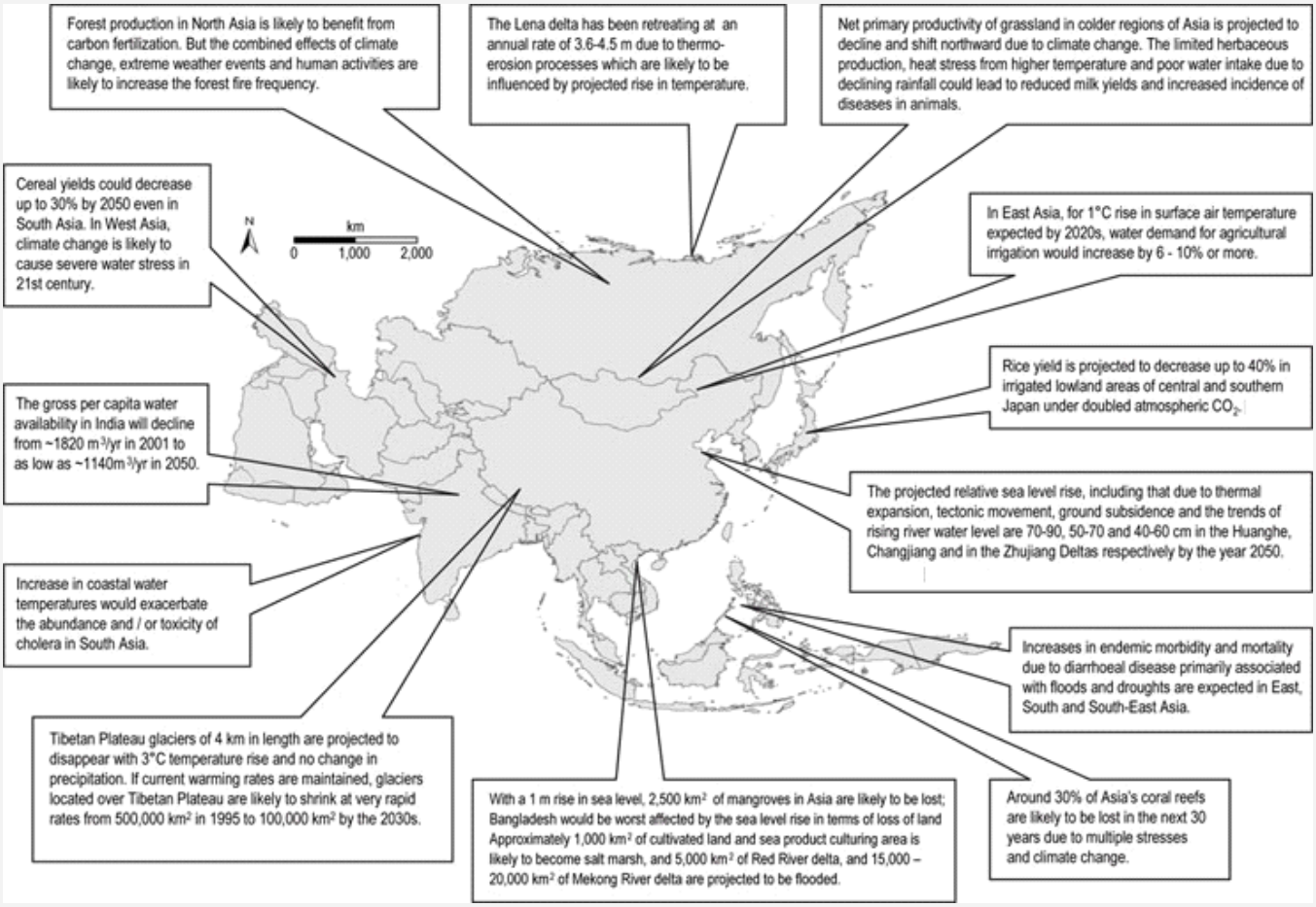
Source: Cruz et al. (2007: Figure 10.1).

According to the IPCC (2007), there are six ways in particular in which climate change may impact Asia (see Figure 2):

- Melting glaciers in the Himalayas are likely to increase incidents of flooding and affect water resources for the next 20 to 30 years. After this period, river flows are expected to decrease.
- Climate change, in combination with population growth and increasing demands arising from higher standards of living, is likely to reduce freshwater availability in Central, South, East and Southeast Asia. By 2050, this could affect more than a billion people.
- Densely populated mega-delta sub-regions in South, East and Southeast Asia are exposed to a high risk of flooding from the sea, and in some areas, flooding from the rivers.

- Rapid economic modernisation will be put at risk, since climate change is likely to compound pressures on natural resources and the environment in most Asian developing countries.
- By the mid-21st century, crop yields may increase up to 20 per cent in East and Southeast Asia, while it may decrease up to 30 per cent in Central and South Asia. Food insecurity therefore remains a significant risk.
- With incidents of floods and droughts projected to rise in East, South and Southeast Asia, there is likely to be an increase in mortality rates resulting from diarrhoeal disease. Rising coastal water temperatures may also lead to a higher incidence of cholera.

Figure 2: Climate change in Asia – future challenges and potential impacts.



Source: Cruz et al. (2007: Figure 10.4).

Small island states are especially vulnerable to sea level rise and extreme weather events (Mimura et al., 2007). It is highly likely that vital infrastructure for sustaining livelihoods in those islands will be threatened by inundation. The threats include a possible reduction in island size, storm surges, erosion and other coastal hazards. The availability of fresh water supplies is another concern, triggered by projected reductions in precipitation. Seawater intrusion into freshwater lenses may compound this problem, affecting subsistence and commercial agriculture in the small island states.

In the cases of Australia and New Zealand, which are examined separately by the IPCC (2007) and Hennessy et al. (2007), four potential consequences of climate change need to be highlighted:

- By 2030, water security problems are projected to intensify. This will potentially affect southern and eastern Australia, and in the case of New Zealand, Northland and some eastern regions.
- There is likely to be a significant loss of biodiversity by 2020, affecting the Great Barrier Reef and Queensland's Wet Tropics. The alpine areas of both countries will be at risk.
- By 2050, sea level rise, as well as greater severity and higher frequency of storms and coastal flooding may endanger coastal habitats in areas such as Cairns and South East Queensland (Australia) and the expanse from Northland to Bay of Plenty (New Zealand). The climate change impacts will also place at risk the population in those areas, which have increased significantly due to ongoing development projects.
- Agriculture and forestry may see significant production decline by 2030 as a result of increased drought and fire incidents.

In a nutshell, this brief survey of the climate change challenges in the Asia-Pacific and their likely impacts illustrates the truly differentiated

nature of the challenges that will face the region's respective sectors and, by extension, their polities. The assessment of the potential costs and benefits of geoengineering technologies may therefore vary significantly, as each stakeholder will have its own perspective.

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The Potential and Limits of Adaptive Capacity

A country's adaptive capacity with regard to climate change may be determined primarily by six factors: economic well-being, technology, information and skills, infrastructure, institutions and equity (WHO, 2003). While the ongoing modernisation of Asian economies may generate increases in income levels, education and technical skills, along with improvements in disaster preparedness and management, the challenges of effectively dealing with climate change impacts, especially sea level rise and potentially more extreme weather, are significant. As Cruz et al. (2007:492) have observed:

> Effective adaptation and adaptive capacity in Asia, particularly in developing countries, will continue to be limited by several ecological, social and economic, technical and political constraints including spatial and temporal uncertainties associated with forecasts of regional climate, low level of awareness among decision makers of the local and regional impacts of El Niño, limited national capacities in climate monitoring and forecasting, and lack of co-ordination in the formulation of responses.

In the case of Australia and New Zealand, both countries have well-advanced economies with significant scientific and technical capabilities, which will allow for a considerable degree of adaptation to climate change-induced impacts.

Despite the differentiated nature of the challenges being a significant issue, the greatest risk and uncertainty for the Asia-Pacific region will come from potential tipping points in the Earth's climate system and changes in the frequency of extreme events, which are very difficult to manage. The vulnerability of economies and societies in the region will most likely rise as a result of extreme weather, which perhaps constitutes the greatest challenge for adaptation.

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Conclusions: What's Next?

Geoengineering does not present an alternative to greenhouse gas emission reductions, but it may be needed to reduce global temperatures quickly in the event of a climate emergency (The Royal Society, 2009). This NTS Alert has highlighted the challenges and potential impacts of climate change for the Asia-Pacific region. The geoengineering option is now on the table and should be assessed carefully. In identifying the risks and opportunities of geoengineering, regional stakeholders need to engage in an open debate that is responsible and transparent. First steps may include but are not limited to:

- ***Regional consultations*** to map the main national positions on the different geoengineering approaches among those countries in the Asia-Pacific that are likely to be at the forefront of deployment and/or impact. The Centre for Non-Traditional Security (NTS) Studies, in cooperation with the Oxford Programme on Geoengineering, will facilitate such a dialogue by convening an exploratory workshop in July this year.

- ***Scenario-building*** in order to identify the governance demands of geoengineering, addressing in particular the following questions:
    - What processes do we need to govern geoengineering, from further research to potential deployment?
    - What are the existing legal and institutional mechanisms to govern geoengineering research, development and potential deployment? What would be the optimal regulatory framework?
    - How would we manage the uncontrolled use of geoengineering for peaceful purposes, for example, the pre-emptive use of solar radiation management techniques by a consortium of countries with threatened coastlines? How would we deal with intended or unintended negative effects?
    - How would we define 'climate emergency' for the purpose of triggering the deployment of geoengineering technology?
    - What are the criteria that would define the success and failure of geoengineering deployment? For example, how would we determine at what level of carbon dioxide (CO2) the deployment of geoengineering technologies should cease?

- ***Public and civil society engagement*** to facilitate a regional dialogue on the known and unknown consequences of geoengineering.

The Asia-Pacific needs to find its voice in this debate. Let's argue.

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Notes

1. See Prantl (2011) for the first of this two-part series.
2. For a detailed account of the history of weather and climate control, see Fleming (2006, 2010).

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About the Centre:

The Centre for Non-Traditional Security (NTS) Studies of the S. Rajaratnam School of International Studies was inaugurated by the Association of Southeast Asian Nations (ASEAN) Secretary-General Dr Surin Pitsuwan in May 2008. The Centre maintains research in the fields of Food Security, Climate Change, Energy Security, Health Security as well as Internal and Cross-Border Conflict. It produces policy-relevant analyses aimed at furthering awareness and building capacity to address NTS issues and challenges in the Asia-Pacific region and beyond. The Centre also provides a platform for scholars and policymakers within and outside Asia to discuss and analyse NTS issues in the region.

In 2009, the Centre was chosen by the MacArthur Foundation as a lead institution for the MacArthur Asia Security Initiative, to

develop policy research capacity and recommend policies on the critical security challenges facing the Asia-Pacific.

The Centre is also a founding member and the Secretariat for the Consortium of Non-Traditional Security (NTS) Studies in Asia (NTS-Asia). More information on the Centre can be found at www.rsis.edu.sg/nts.