



## WORKSHOP FINAL REPORT

### Towards an interdisciplinary knowledge community on the critical understanding of emergent climate system intervention technologies in Southeast Asia

Bali, Indonesia, 8 and 9 November 2019

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#### 1-Introduction

The Southeast Asian region has already been experiencing multiple severe impacts of the accelerating changes in the climate system. These extreme stresses and pressures to the natural, economic and social systems are not only impacting lives and livelihoods but are also raising awareness on climate change as a key public issue. While the region's knowledge communities have already been established to study climate science and governance for both adaptation and mitigation strategies (particularly on resiliency and energy transition), a knowledge community that looks at emergent climate system intervention technologies, such as carbon dioxide removal (CDR) and solar radiation management (SRM), is generally absent. With these technologies being introduced in normative policy documents (e.g. at the IPCC 1.5C Special Report where they were put into the spotlight) and floated at international events (e.g. at the 4<sup>th</sup> UN Environment Assembly in Nairobi in March 2019), studying them and their impacts (both harms and benefits) and envisaging how their systems could be justly and fairly governed, in case they are deployed—from and within the Southeast Asian region—is necessary.

Laurence L Delina of the Division of Environment and Sustainability at The Hong Kong University of Science and Technology (HKUST) and The Frederick S. Pardee Center for the Study of the Longer-Range Future at Boston University (BU) partnered with the Solar Radiation Management Governance Initiative<sup>1</sup> (SRMGI) to convene an interdisciplinary knowledge community to begin exploring the implications of CDR and SRM. The community comprised energy and climate modelers, climate and energy policy and governance analysts, and social scientists from and within the Southeast Asian region, with inputs from invited scholars who had already been working on the topic (See Section 2: List of participants).

Acknowledging that a siloed approach would limit our better grasp and understanding of CDR and SRM technologies, the workshop had attempted to establish an osmotic relationship across Southeast Asia's modelling, policy, governance and social science knowledge communities (See Section 3: Workshop program). While it is still too early to know whether this objective was achieved, this workshop can claim it has seeded scholars and analysts with an initial and broad understanding of the critical and multidimensional study and research of CDR and SRM, including: (1) their natural, physical, economic, security, policy, and social implications across multiple levels (i.e. regionally, nationally, and sub-nationally); (2) their risks/harms and benefits to natural, physical and social systems; and (3) the emergent discussions and proposals on how, if ever, their possible deployment could be fairly and justly governed. The workshop was conducted using the principles of deliberative democracy and the Chatham House Rule.

The participants produced research questions and research directions that scholars in the region can pursue as collaborations rather than as individual or institution-specific endeavours. They developed these into fundable interdisciplinary research proposals and identified ways to embed their future research outputs with policy (See Section 4: Summary of outputs). If these research projects are done, future research outputs are expected to not only contribute to closing some of the gaps in knowledge of emergent technologies for climate action (thus addressing the dearth of peer-reviewed scientific papers on these topics produced by Southeast Asian scholars, authors and academics) but will also be policy-relevant, regionally and nationally, even sub-nationally (such that Southeast Asian policymakers will have access to indigenously, Southeast Asian-produced/led scholarship on these issues). In the longer-term, this new knowledge community expects to bring the marginal voices of scholars from developing Southeast Asia front-and-centre into the largely European-North American discourses on CDR and SRM techniques.

## 2-List of participants

Sulfikar Amir, Nanyang Technological University, Singapore  
Hoy-yen Chan, ASEAN Centre for Energy, Indonesia  
Winton T.L. Chow, Singapore Management University, Singapore  
Pham Thi Dung, Vietnam Ministry of Agriculture and Rural Development, Vietnam  
Monamie Bhadra Haines, Nanyang Technological University, Singapore  
Arifah Handayani, The Climate Reality Project Indonesia, Indonesia  
Joni Jupesta, Sinarmas Agribusiness and Food Indonesia, Indonesia  
Heri Kuswanto, Institut Teknologi Sepuluh Nopember (ITS) Indonesia, Indonesia  
Shi Lin Loh, National University of Singapore, Singapore  
Melissa Low Yu Xing, National University of Singapore, Singapore  
Tu Anh Nguyen, Vietnam Ministry of Natural Resources and Environment, Vietnam  
Romeo Pacudan, Universiti Brunei Darussalam, Brunei Darussalam  
Yla Paras, Manila Observatory, Philippines  
Albert M Salamanca, Stockholm Environment Institute, Thailand  
Ahmad Agus Setiawan, Universitas Gadjah Mada, Indonesia  
Phoummixay Siharath, National University of Laos, Laos  
Mou Leong Tan, Universiti Sains Malaysia, Malaysia

### *Convenors*

Laurence Delina, Hong Kong University of Science and Technology  
Andy Parker, SRM Governance Initiative  
François Pougel, SRM Governance Initiative

## 3-Workshop program

7 November	Participants arrival
730PM	Welcome reception and introductions
8 November	
830AM	<i>Pre-workshop survey summary: The state of knowledge on and towards CDR and SRM</i>
900AM	<i>Briefings: Beyond adaptation and mitigation: towards engaging with CDR and SRM research Briefings</i>
	<ul style="list-style-type: none"><li>○ Coleen Golja, Harvard University: introduction to SRM</li><li>○ Gregory Nemet, University of Wisconsin-Madison: introduction to CDR</li><li>○ David Morrow, American University: interactions between CDR and SRM</li><li>○ Shuchi Talati, Union of Concerned Scientists: public engagement on geoengineering</li><li>○ Christopher Trisos: geoengineering and biodiversity</li><li>○ Jennie Stephens, Northeastern University: critiquing geoengineering</li><li>○ Andy Parker: geoengineering and the developing world</li><li>○ Jeffrey McGee, University of Tasmania: ocean intervention</li><li>○ Joshua Horton, Harvard University: governing geoengineering</li><li>○ Masahiro Sugiyama, University of Tokyo: scenarios &amp; their role in policy debate</li></ul>
1200PM	Lunch
130PM	<i>Identifying and charting research priorities</i>
	<ul style="list-style-type: none"><li>○ Heri Kuswanto: ongoing work on geoengineering modeling in Indonesia</li></ul> <p><i>Workshop on the following questions:</i> How we, as an epistemic/research/knowledge-producing community, should/could move forward? What are the imperatives for an (indigenously) Southeast Asian-produced knowledge on these technologies? Shall we chart a Southeast Asian (regional) and/or national research agenda on these technologies? If so, what are the key knowledge gaps in/and for these countries and the region? What could be the key (modeling, governance, policy, security, economics, cooperation, etc.) research questions? How could we as knowledge producers could and should respond to these questions? What needs to be modelled? What risk, policy and governance-related questions need to be asked? How could quantitative models inform policy and governance strategies and vice versa? What other key social considerations need to be included in the study?</p>
700PM	Dinner

9 November  
830AM

*Briefings: Towards an impactful research on CDR and SRM in Southeast Asia.*

○ Pablo Suarez: geoengineering and humanitarian action

*Workshop on the following questions:* How are we, as Southeast Asian scholars, going to produce new knowledge on CDR and SRM, their risks/benefits, and their implications to policy/governance/social ordering? What research proposals can be collectively developed? Who could be included in this research? Beyond Southeast Asia, how could we collaborate internationally – and with whom? What resources are available for funding this kind of research? How do we ensure that our research outputs are relevant to policymaking and the public at large? What follow-up activities for this epistemic/knowledge/research community can be envisaged?

1200PM

Lunch and adjournment

#### 4-Summary of outputs

- The participants decided to break out into four groups based on four disciplinary focus: modeling, policy/governance, social studies, and engineering/technologies. While the convenors stressed that there should be interactions across these groups—following the workshop’s objective, the participants, during 9 November workshop, decided to move forward following this grouping.
- The modeling group developed/produced the following:
  - A replication study of the DECIMALS research project in Indonesia but covering more of the southeast Asian region, followed by a second phase to perform a water impact assessment, including drought and flood analyses, using Water Assessment Tools.
  - Of key interest are cross-border impacts such as in Malaysia and Singapore where water resources are shared from the same hydrologic basin. What are the implications for the Johor River?
  - The key challenge is with regards to data access. In contrast to Singapore where data is freely accessible, for instance, data have to be bought from the Malaysian government. A participant suggests using Japanese open data.
  - Cross country comparisons would be necessary and can be done through an existing network of modelers. Teams can meet once every two years. To become sustainable, funding is required.
  - The social dimensions in modelling have to be included in the design and analyses.
- The policy/governance group developed/produced the following:
  - At the national level, how do/could we include geoengineering in future Nationally Determined Contributions (NDCs) with regards to CDR?
  - With regards to the ASEAN, what are the regional implications of SRM and how we can respond as a regional body? How can we engage with stakeholders and policymakers?
  - How should the ASEAN engage with the global community on SRM?
  - How do we engage civil society, academia, governments and the private sector in communicating the benefits and potential consequences of SRM or CDR?
  - With regards to CDR, which can fall under energy policy, how do we respond as ASEAN member countries? Which legal agencies will look after the implications for developing regulations/actions, all of it in relation to SRM?
  - What are the prospects for transboundary liability? What legal mechanism can be thought about it? Can compensation or liability in treaties be called upon to address this issue? How about domestic legislation? How about arbitration? How do you find evidence since causality is difficult to prove? With environmental class suits, things take a very long time from filing the cases to proving causality, how can we prevent these things from happening, or at least minimize the risk?
- The social studies group developed/produced the following:
  - Dimensions addressed by the group: political economy, public understanding, governance & policy, technocratic and epistemic system.
  - Meta-themes to be considered: Engagement, risk and safety, justice and framings.
  - What is geoengineering? What is or what is not part of that discourse? Participants attended the workshop to create an epistemic community in the group, but it appears that there are already such groups within the group. There are assumptions that these groups share, but that is not always the case.

- What is the history of geoengineering? How we can discursively separate weather modification techniques from geoengineering?
- How do we consider the intra-regional impact of SRM at the global, national and regional levels?
- How about the politics of modelling? How can we explain the fact that the conditions of production of the data itself are political to people outside this community?
- What are the possibilities of democratization? How we can answer the questions of “for whom” and “with whom”? Can we imagine different kinds of “engagement” exercises in “authoritarian” non-liberal settings such as those present in many Southeast Asian polities? The group suggested that engagement might look very different in different countries e.g. India ran an engagement campaign on genetically modified eggplants. Everybody had a voice, but the government ultimately made certain decisions. How are these representations working? The actual implementation of engagement activities is therefore critical.
- What is the “proper” technological analog to geoengineering? Nuclear? Why not transboundary pollution, water, etc.? The group suggests there can be parallels with nuclear power? How legitimacy is obtained? In nuclear power, legitimacy emerged from the military and utopian vision was sold on the possibilities offered by these technologies.
- Do we have adequate epistemological resources to comprehend the level of uncertainties of geoengineering on climate change? If so, who has these resources?
- Militarization or marketisation of geoengineering? Given the scope of digitalization and financialization, we do not have the capacity to imagine and visualize how the market is going to be? What are other ways in which these technologies are being used to gather data? How might they interfere with SRM?
- How to communicate and speak up on geoengineering/CDR/SRM to common people to raise awareness? Since there will always be power asymmetries, how can we bring non-elites in the discussion? What kind of political work needs to be done? Also consider the neutrality question: elites or even you are not always the best actors to represent people in these discussions.
- How can we disaggregate the “Global South” to better understand/measure the impact of geoengineering? Can we somehow think of the Global South not as a large homogeneous entity, but to see it in its local context?
- The engineering/technology group developed/produced the following:
  - The group suggests that SRM is “not appropriate” for developing countries; hence, they focused their discussion on CDR.
  - The group saw biomass, which has high potential in Southeast Asia, as connecting well with CDR. To them, the best way, thus, could be to focus on CDR, for instance through forestry, biochar.
  - The group suggests three options for moving forward:
    - An assessment of the ASEAN CDR potential: What could be developed over a certain period of time? What could be added to the NDCs of ASEAN countries?
    - A study on biochar: How much emission can be reduced by biochar? What are the other benefits in terms of cost reductions in the agriculture sector? What are the best available biochar techniques?
    - A study on the feasibility of carbon capture: Although the group acknowledges that the technology is still unavailable in the market, they would like to explore possible locations. How much capacity can be stored into geological formations, taken from where and in what quantities and how? What are the technical requirements and parameters for compliance?

## End of report.

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<sup>i</sup> The Solar Radiation Management Governance Initiative (SRMGI) is an international, NGO-driven project that seeks to build the capacity of developing countries to evaluate SRM. SRMGI works by partnering on engagement workshops in Global South and by funding research teams in developing countries who want to study how SRM could affect their regions. SRMGI was launched in 2010 by the Royal Society, The World Academy of Sciences (TWAS), and Environmental Defense Fund (EDF).