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LMI Workshop: Climate and Land Use breakout notes

Breakout group members:

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1. Challenge #1: Computing needs for running high-resolution models for the region
 - a. Such models may be considered operational needs, but the funding for such cyberinfrastructure (defined as hardware, software, and personnel) is not sustainable on a project-to-project basis.
 - b. The availability of sustainable cyberinfrastructure will inspire new scientists to engage in similar types of research to advance the science.
 - c. Cyberinfrastructure that is established, owned, and operated by national entities (i.e. purely under the jurisdiction of the government) may not be the solution: it will likely come with restrictions due to security concerns.
 - d. Other countries in South East Asia, with the likely exception of Malaysia and Singapore, have a similar challenge of not having a community resource for computing. This contrasts with the European ECMWF for medium-range weather forecasting which is a shared resource. Or the many US facilities like the NCAR Wyoming facility, NCSA's Blue Waters, SDSC, and others.
 - e. Given that scientists in both Vietnam and Thailand have a

common interest on improving forecasts, is there a way to leverage each country's resources through a shared computing facility to ameliorate duplication?

- f. Given Singapore's affluence, can it play a neutral role of offering a computing facility for regional needs? E.g. Singapore already has a Centre for Climate Research Singapore (CCRS) that operates under the Meteorological Service Singapore (MSS). The CCRS already has a stated role of "*understanding of Southeast Asia's complex tropical climate and weather systems and the prediction of future climate changes, by conducting climate modeling and research*".
 - g. Can the MRC play a role in advocating for such a shared resource that would produce data products to meet the needs of the region?
2. Challenge #2: Utilization of tools and models
- a. Require capacity building to support tools and models.
 - b. Sometimes the needs of decision-makers may be met using a simple model over a complex one. However, exposure to the spectrum of tools and understanding how to select a relevant tool is needed. I.e. capacity building in this arena.
 - c. Land use planners need to know the level of uncertainty inherent in model output.
3. Challenge #3: Data sharing challenges
- a. For a certain country in the region (deliberately anonymized), departments within the Ministry of X (deliberately anonymized) do not share data. A new department charged specifically with climate change matters has overlapping jurisdictions over older, existing departments (e.g. land-use planning). Jurisdictional protection has probably contributed to the effect of "data-silos". This is a somewhat universal phenomena that is not limited to this region.
 - b. Are there datasets that are under the auspices of the WMO,

ICSU, or other global programs and coordinating entities that can provide the transboundary data the MRC countries need?

4. A path forward that addresses #1, #2, and #3 above.
 - a. Utilize a requirements-driven approach to bring together decision-makers AND authoritative scientists involved in IPCC AR5 (or previous assessments) from around the region in a workshop to:
 1. Determine the resource management / policy / decision-making needs. I.e. develop legitimate use-cases.
 2. Derive top-level requirements for those use-cases in the fashion that NASA uses to derive requirements for complex systems. E.g. “we need to be able to forecast river heights with an accuracy of +/- *X units Y days* in advance of an event”.
 3. Derive successively detailed requirements until we can determine what research project(s) will support those requirements.
 4. Use those research project(s) to:
 1. Derive requirements for computing needs (see #1 above) so that there is a means of justifying how much computing capacity is needed, so that the needs can be sourced appropriately (i.e. acquire funds for new facility? Use Singapore’s capacity?)
 2. Structure interactions with regional / provincial governance structure for capacity building (see #2 above). As per the IPCC AR5 WG2 recommendations for the lower Mekong River Basin, make sure that planning at different geographical / government (e.g. regional / provincial) scales are aligned.
 - b. The research projects identified above could also be used to justify for a more open data policy and sharing of data

between countries. Individuals in each country would have to do the heavy lifting within their respective countries to make that case to their national leadership (see #3 above).

- c. Recommendation that the follow-up workshop idea be included in the final workshop report (for ****this**** workshop). There is the related issue of who (MRC, US State Department, others) to champion for the funding of such a workshop.