Tailoring Climate Change Information to Facilitate Agriculture Decision Making

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Rationale: Resource management agencies seek to incorporate climate change information into long term infra-structure investments and adaptation planning to reduce climate change risks and vulnerabilities. In order to make such infra-structure investments or formulate adaptation policies in response to climate change, resource managers/decision makers require both "useful" and "actionable" information regarding future climate change and variability. Global Climate Models (GCMs) and Regional Climate Models (RCMs) are the best tools available to generate future climate projections. Arguably, these tools are necessary, but insufficient for impact assessments which require linking bottom up vulnerability assessment with multiple sources of climate information. Given the multitude of plausible projections of future climate, the computational and analytic requirements for assessing climate change impacts often deters analysts from identifying the climate hazards, further confounding the decision making process. Herein, we develop and demonstrate approaches to mitigate computational burden of climate change analyses, and ways to integrate the state-of-art climate information from future climate projections in the context of Agriculture decision making (ADM).

Objective: The objectives of this study are: (i) to develop approaches to reduce the computational burden of climate change analyses and integrate climate change information in ADM; (ii) use downscaled CMIP 5 GCM projections to select climate realizations to efficiently explore wide range of climate projects relevant for ADM; (iii) identify the subjectivity underlying climate model scenario selection and associated agricultural impact sensitivities.

What we are doing: Climate projections representing GCMs and future greenhouse gas emission scenarios are being analyzed. Future transient and period based changes relative to a baseline historic period are being evaluated. Analysis using inter and intra-model variability, weather generator, ensemble approach, period change methods are being carried out with a decision centric perspective. A decision centric climate risk assessment approach is being developed using multiple sources of climate information.

Expected Outcomes: To efficiently explore the range of climate change risk in the context of ADM, we argue that the primary approach to assessing climate change impacts, only through GCMs to estimate impact variables, is far from complete. It is critical to incorporate both "science centric" and "decision centric" approaches for GCM application is agricultural impact assessments.

Climate information, at its face value, may not directly benefit agricultural decision horizons that span 1 – 5 years. However, long term engineering decisions, e.g. Infra-structure design/investments, flood control, land use planning, and reservoir operations are influenced by climate change and inherently shape short-term agricultural decision horizons.

The gulf between the "climate scientists" and farmers in terms of relevant knowledge is large. There is a great need for participatory approaches among climate scientists, farmers, farm business analysts, and agricultural scientists within farming systems research to serve as a conduit to farmers regarding impacts of, and adaptation to, climate change.

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