The need to understand human impacts on the functioning of terrestrial ecosystems and to design sustainable management policies necessitates integrating land-use decision making into an Earth systems perspective.

To address this, the Third AIMES Young Scholar’s Network Workshop on Modeling Land-Use Decision Making brought together an interdisciplinary group of young researchers from diverse backgrounds, ranging from biophysical to socioeconomic research. Participants came from both developing and developed countries. The workshop sought to (1) improve understanding of land-use decision-making processes and (2) identify knowledge gaps that hamper progress in integrating these processes into Earth system models.

The following four major issues were identified during the course of the workshop:

1. **The challenge of representing land-use drivers in Earth system models.** These drivers include socioeconomic, environmental, and political factors interacting across multiple spatial and temporal scales. Techniques for quantitatively measuring socioeconomic and political parameters exist, but their inclusion in models is problematic. One recommendation was to use an agent-based model (ABM) approach to integrate spatial and nonspatial factors. Construction of an ABM requires an understanding of driving forces of land-use decision making and specific responses of different agents to particular drivers, reducing the full spectrum of individual agents to a manageable number of agent “functional” types.

2. **Spatial scale.** Global land-use models require simplification of processes for model transparency, error reduction, and proper parameterization of complex relationships. Under this philosophy, generalization is introduced in which local geographic variation and local communities’ dynamics are difficult to represent, despite their significant impact on climate and land-use change. One approach for resolving these spatial-scale “conflicts” would be the development of a nested model, very general at global level and showing more complexity at more local levels.

3. **Incorporating socioeconomic vulnerability.** Vulnerability of a land system is defined as a function of exposure and sensitivity to natural or anthropogenic stress and variability, and the capacity to cope with the consequences. We recommend the development of indicators that include the future states of land systems and link the land system attributes to vulnerability.

4. **Model evaluation.** Currently, evaluation is limited by a lack of suitable global data sets. As modelers begin to consider key processes influencing socioeconomic drivers in different regions worldwide, and as global spatial databases and standards allowing cross-site comparisons continue to be developed, we anticipate progress in evaluating the applicability and limitations of global land-use models.

The AIMES Young Scholar’s Network hopes to contribute to the ongoing discussions and to apply the gained insights into their current work. The workshop was made possible with support from Quantifying and Understanding the Earth System (QUEST), the National Center for Atmospheric Research (NCAR), the Natural and Environmental Research Council (NERC), and the U.S. National Science Foundation (NSF).

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