Job Posting

The University of Massachusetts, Amherst is seeking a multi-disciplinary post-doctoral scientist to develop an agent-based modeling (ABM) framework for integrated energy-water-land nexus at multiple scales.

Projects Overview:

Two projects are related to this position.

The primary goal of the CGIAR sponsored project is to develop a generic agent-based modeling framework and to test this approach in 2 major basins: the Niger and Mekong River. The envisioned framework couples a distributed hydrologic model: SWAT with an agent-based river basin model, where water users, including people and ecosystems are defined as agents. This "next generation of river basin modeling" approach allows model builders to interact with key stakeholders: policy makers, the private sector, NGOs and large-scale investors using evidence-based research from water, land, and ecosystems studies. It also provides a framework that allows key stakeholders to engage with each other.

The primary goal of the DOE sponsored project (pending) is to incorporate the agent-based modeling approach into the flexible and integrated modeling framework developed by national labs that captures the dynamic multi-scale interactions among climate, energy, water, land, socioeconomics, critical infrastructure, and other sectors. The agent-based model will be coupled with a river-reservoir-routing model: RiverWare to simulated climate change adaption actions and human behaviors at watershed scale. A regional ABM will be developed based the ABM-RiverWare framework and this regional ABM will be applied to upscale the watershed scale decisions to regional scale. The overall integrated modeling framework will be used to study the vulnerability and resilience of coupled human and natural systems from local to continental scales under scenarios that include short-term shocks, long-term stresses, and feedbacks associated with human decision making.

Duration:

This is a one-year position with the possibility of extension for another two years depends on work performance and available funding. The starting date is flexible but should be ideally no later than 2016/10/15.

Minimum Qualifications:

- PhD in Civil and Environmental Engineering or Natural Resources Management or similar fields;
- Experience in developing and applying optimization models/hydrologic model in water resources, including knowledge of optimization and system analysis;
- Coding experience in R, Matlab, Python or C++;
- Extensive understanding of hydrology and water resources management;
- Experience conducting original research and publishing in peer reviewed scientific journals;

- Experience synthesizing and integrating research findings and lessons learned, and communicating next steps and strategy to a management team; and
- Experience designing, organizing and directing multiple complex projects of strategic importance and working on a multi-disciplinary team;

Major Duties:

- 1. Modifying the existing agent-based model (under development and coupled with SWAT) for the Mekong and Niger Basin;
- 2. Running the ABM-SWAT model for scenario analyses (e.g. dam development, climate change, etc.);
- 3. Developing an agent-based model that coupled with RiverWare (Watershed-ABM) to simulate influences of human decisions on watershed level energy-water nexus;
- 4. Developing the upscale routine based on ABM-RiverWare watershed model and coupled the resulted Regional-ABM with land surface model and/or energy production cost model via agent aggregation;
- 5. Using Watershed and Regional scale ABM to evaluate system-wide vulnerability and resilience as well as climate change adaption;
- 6. Participate in other works in Dr. Y. C. Ethan Yang' research group, located at the University of Massachusetts Amherst

Location:

University of Massachusetts-Amherst, Amherst, MA.

The PI on this project for the University of Massachusetts is Prof. Y. C. Ethan Yang <u>https://cee.umass.edu/faculty/yi-chen-yang</u>

Please send letter of interest, CV and/or questions to <u>yceyang@umass.edu</u>