

**9am-12pm, Dana Building (Computer Lab)**

### **A3. Open-Source Analysis of SDGs at the Food-Water-Energy Nexus Using Global, Gridded Modeling**

**Facilitators:** David Johnson (Purdue University), Uris Lantz Baldos, Jungha Woo, Iman Haqiqi

This workshop will introduce participants to an open-source, easy-to-use, web-enabled modeling framework for analyzing those SDGs that relate directly or indirectly to management of the world's land, water, and energy-producing resources (9 of the 17 SDGs). These natural resources are already under intense pressure from rising global population and income. The complex relationships between food, energy, and water demand that these SDGs be viewed in a global context and pursued using a systems perspective, with local resolution. This poses a barrier to entry for high-quality analysis, suggesting a need for open-source, transparent, modular tools for modeling feedbacks between global and local scales and the impact of policies targeting the SDGs.

*Attendees will receive a flash disk which contains workshop presentations and relevant papers covered during the workshop.*

#### **1. Specific aims of the workshop**

- Provide an overview of the historical evolution of global agriculture and the future challenges of sustainably feeding the world's growing population
- Promote deeper understanding of the synergies and trade-offs among sustainable development goals surrounding the world's farm and food system both at the local and global-level
- Provide hands-on experience using the SIMPLE-G web application - an open-source, easy-to-use, web-enabled modeling framework for analyzing those SDGs

#### **2. Agenda (total length 3 hours)**

##### ***Part I. Introduction***

(Lecture and hands-on, ~20 minutes)

- Discuss the motivation, background, and activities of the workshop.
- Introduction of participants.
- Account set-up and overview of GEOHUB and the SIMPLE-G web application.

##### ***Part II. Understanding the grand challenge of sustainability feeding a growing planet***

(Lecture ~ 60 minutes + 10 minute break)

- Provide an historical perspective on the key drivers of global farm and food system

- Population and income growths as drivers of food demand
  - Agricultural productivity as key component of food and environmental security
- Highlight future trends of main drivers of agriculture as well as new challenges to achieving key sustainable development goals
    - Different trajectories of historical drivers of world's agriculture
    - Constraints to agricultural land and water resources
    - Climate change and its impact on the agricultural sector

**Part III. Using SIMPLE-G web application in Global-Local-Global Sustainability Analysis**  
(Lecture and Hands-on ~ 60 minutes + 10 minute break)

- Setting-up experiments using SIMPLE-G US gridded model
- Explore results of pre-run experiments
  - Increased Productivity
  - Reduction of Cropland for Biodiversity Preservation
  - Reduction in Water Use to achieve sustainable withdrawals
  - Reduce Nitrogen Fertilizer Use to limit Nitrogen Leaching
  
- Setting-up experiments using SIMPLE-G Global gridded model
- Explore results of pre-run experiments
  - Future Baseline 2050 Projection
  - Future Baseline 2050 + Water Scarcity Projection
- Brainstorm with participants on SDGs of interest and how that can be implemented in the SIMPLE-G web application (15-20 mins)

*Facilitators will walk through each experiment and summarize key findings / interesting insights of the group*

**Part III. Workshop Wrap-up**  
(Lecture, 20 minutes)

- Discuss GEOHUB and available tools as well as teaching materials on line and on how they can contribute

**3. Key knowledge, tool, or skill presented**

- Knowledge about key drivers of global farm and food system and where to find these information
- Greater appreciation about the synergies and trade-offs among SDGs at both global and local level
- Awareness of GEOHUB and SIMPLE-G Online Tool as well as related materials

#### **4. Outcomes for the participant**

- Better understanding on what is the key drivers of global agriculture
- Better knowledge about the synergies and trade-offs among SDGs at both global and local level
- Identify available resources in GEOHUB which could be useful to the participant

