

Workshop Title: How can advanced mathematical modeling tools be useful to address sustainability challenges?

Workshop Organizers: Ali Kharrazi & Katya Perez-Guzman, ASA-IIASA

Location: Wodak Room, IIASA

Date: March 14-15, 10:00-18:00

Narrative: Future sustainable development requires actions today at every level of society, from the individual citizens and local organizations all the way to international institutions and national governments. The problems that constitute the challenge to sustainability are not easy to solve because they require a multi-stakeholder decision making process that must balance the interests of today and the future. This process is more efficient when informed by scientific modeling tools and systems thinking approaches.

Another complexifying factor is the significant role of indirect feedbacks arising from the interaction among systems, which necessitates a systems analysis approach: for example, water systems strongly impact the limits of development of the food and energy production, which is referred to as food-energy-water nexus.

Such tradeoffs between several of the natural systems involved, the different levels of stakeholder involvement, and the need for a final public policy that aims at getting the most benefit for people and ecosystems, can be studied with several advanced mathematical modeling tools. Each presentation in the present workshop will give a brief overview of some of these mathematical modeling tools and sustainability challenges that scientists in the Advanced System Analysis program of IIASA currently use to inform public policy on sustainable development.

Key learning outcomes:

- To understand policy challenges relating to sustainable development through real case studies.
- To understand how mathematical tools can support public policy and decision making on various sustainability challenges.

Agenda

Wednesday, March 14, 2018

Moderator: Matthias Jonas

13:30 - 14:00 Iain Stewart - Introduction of IIASA and its history

14:00 - 14:30 Jan Marco Müller - IIASA's role in the world and global governance for sustainability

14:30 - 15:45 Interactive brainstorm session where participants present what they have learned so far regarding the challenges of sustainable development.

Triggering questions....

- What are your personal reflections about the concept of sustainability?
- Do you think sustainability challenges can be overcome?
- What needs to be done? What has been done?
- What is missing?
- How do you see yourself as part of the solution?
- What mathematical models have you seen implemented toward meeting sustainability challenges?
- Other suggestions?

15:45 – 16:00 Coffee Break

16:00 – 17:00 Katya Pérez-Guzman + Ali Kharrazi - Resilience of national economies and global trade to shocks - network analysis of environmentally extended Multiregional Input-Output Tables

17:00- 18:00 Sibel Eker - System dynamics modelling for sustainable production and consumption. Agricultural fertilizer use

Thursday, March 15, 2018

Moderator: *Katya Perez-Guzman*

10:00 - 11:00 Elena Rovenskaya - Optimal Resource Allocation: Food-Water-Energy nexus and the role of uncertainty

11:00 - 12:00 Artem Baklanov - Integrated assessment model DICE and Clean Power Plan

12:00 - 14:00 Lunch + Free time

14:00 - 15:00 Piotr Zebrowski - Tradeoffs in implementation of SDGs: how to integrate perspectives of different stakeholders?

15:00 - 15:30 Coffee break

15:30 – 17:00 Junko Mochizuki - Social simulation games for complexity