## Workshop Modeling Challenges for Sustainability

**Research Institute for Humanity and Nature,**

**Kyoto (Japan), September 28-30, 2016**

**Programme**

**This programme is flexible, and can be adapted to include ideas of participants**

**Introduction**

This workshop is part of a focused effort to achieve two goals: (1) search for the best way to develop approaches to integrated modeling of natural and social dynamics, and (2) to make these models multi-scale and able to include transitions between system states. In doing do, we will focus on two kinds of environmental dynamics that are heavily impacted by human action: land use and biodiversity.

This workshop is part of a Future Earth clustering action entitled *"Linking earth-system and socio-economic models to predict and manage changes in land use and biodiversity"* The aim of this FE Cluster is to bring together the modeling communities in the Earth system-, Biodiversity- and Socio-economic sciences in order to significantly advance the capabilities and approaches used to model human-environment systems, and to develop an integrated socio-environmental modeling framework. A focus is placed on the interactions between societal and environmental dynamics on one hand, and land use, biodiversity and ecosystem functions and services on the other, with the aim of identifying chances to create new opportunities for societies to develop. As part of this action, two preparatory workshops were held in Paris and Aix-en-Provence in June 2015 and January 2016.

But the workshop also links to the recently held “Human Dimension” workshop organized by the *Community Surface Dynamics Modeling System* in Boulder, CO, USA (May 24-27, 2016, co-funded by our Clustering initiative and NSF).

Another workshop will be held in Berlin, Germany in March 2017, at the Institute for Advanced Studies in Sustainability Science. Its topic will depend on the outcome of the current (Kyoto) workshop.

Finally, this series of events will feed into the revival of the AIMES project, a long-standing modeling project that has substantively contributed to IPCC and other events in the history of sustainability modeling (Schimel et al, 2016). AIMES 2.0 (see van der Leeuw 2013) has finally found a home for itself in an IPO to be jointly funded by the Stockholm Resilience Center and the International Institute of Applied Systems Analysis in Laxenburg, Austria. In that context it will also contribute to the “World in 2050” modeling effort supported by these two institutions and Columbia University in New York, USA.

**Theme of the Kyoto workshop**

After an introduction of all participants, his workshop will not have the format of a series of presentations. It is aimed at triggering and fostering an open discussion between all participants on ways to achieve the two goals mentioned above and elaborated in the draft white paper that has been sent to all participants:

(1) Search for the best way to develop approaches to integrated modeling of natural and social dynamics;

(2) Search for ways to make these models multi-scale and able to include transitions between system states.

**Organization of the workshop**

**Day 0 (September 27, 2016)**

**18.00: Informal reception in the Kyoto Royal Hotel and Spa**

**Day 1 (September 28, 2016)**

**Venue: Research Institute of Humanity and Nature**

**Departure from hotel: 8.30**

**Morning session:**

9.30 – 10.00:

Roundtable of participant introductions

Welcome (Tetsuzo Yasunari, DG of RIHN)

Organization of the workshop (Dr. Hein Mallee)

Introduction (Sander van der Leeuw)

10.00 – 10.30:

Summary of earlier workshops (Paris June 2015, Aix-en-Provence January 2016, Boulder CO May 2016) (Sander van der Leeuw; James Syvitski)

10.30 – 10.45: *Coffee*

10.45 – 12.30: 10-minute presentations of participants summarizing their ideas on the workshop themes, followed by discussion. ***This session, and the following sessions of the same character, serve to level the playing field, to signal the main issues and to list potential avenues forward.***

* James Syvitski (University of Colorado, Boulder, USA)
* Garry Peterson (Stockholm Resilience Center, Sweden)
* Benis Egoh (University of KwaZulu Natal, South Africa)
* Kasper Kok (Wageningen University, the Netherlands)
* Jed Kaplan (University of Lausanne, Switzerland)
* Ishii Reiichiro (RIHN)
* Tanaka Katsumasa (NIES)
* Yasuhisa Kondo (RIHN)
* Discussion

12.30 – 13.30: *Lunch and group photo*

**Afternoon session:**

13.30 – 15.30: 10-minute presentations of participants summarizing their work and their potential contribution to the workshop, followed by discussion:

* Zhanggang Han (Beijing Normal University)
* Brett Bryan (CSIRO, Australia)
* Onishi Yuko (RIHN, Kyoto)
* Daniel Contreras (OT-Med, Université Aix-Marseille)
* Marco Madella (Universitat Pompeu Fabra, Spain)
* Kristian Lindgren (Chalmers University of Technology, Sweden)
* Gilberto Gallopin (independent scholar, Chile)
* Michael Barton (Arizona State University, USA)
* Jasper van Vliet (Free University of Amsterdam, the Netherlands)
* Cornelia Krug (BIODISCOVERY, Paris, France)
* Discussion

15.30 – 15.45: *Tea*

15.45 – 17.00: 10-minute presentations of participants summarizing their work and their potential contribution to the workshop, followed by discussion:

* Tatiana Filatova, University of Twente, the Netherlands)
* Paul Leadley (CNRS, France)
* Dan Faith (Australian Museum, Australia)
* Qian Ye (Beijing Normal University)
* Jeannine Cavender-Bares (University of Minnesota, USA)
* Bert de Vries (University of Utrecht, The Netherlands)
* Discussion

17.00 – 17.30: Summary discussion (Sander van der Leeuw)

17.45: Bus to hotel

18.30: Dinner at Moku-Moku Farm Restaurant (Casual Japanese food)

**Day 2 (September 29, 2016)**

**Venue: Research Institute of Humanity and Nature**

**Departure from hotel: 8.15**

**Morning session:**

9.10 – 10.30:10-minute presentations of participants summarizing their work and their potential contribution to the workshop, followed by discussion:

* Katsumasa Tanaka
* Daniel Mueller
* Other participants
* Discussion

10.30 – 10.50: *Coffee*

10.50 – 12.30: First breakout sessions: *General problems in integrated modeling of human and environmental dynamics.* How, for example, to combine differential equation models of natural Earth system dynamics and agent-based models of societal dynamics

12.30 – 13.30: *Lunch*

**Afternoon session**

13.30 – 14.15: General session – reporting on breakouts

14.15 – 15.30: Second breakout sessions: *How best to model system transitions?* What is needed to enable us to move from dynamic equilibrium models to dynamic models of transitions between system states?

14.30 – 15.45: *Tea*

15.45 – 17.00: General session – reporting on breakouts

17.00 – 17.30: General summary: where we are so far?

17.45: Bus to hotel

18.45: Meet in hotel lobby for dinner

19.00:Dinner at Ganko Ni-jo Restaurant (Traditional Japanese food)

**Day 3 (September 30, 2016)**

**Venue: Research Institute of Humanity and Nature**

**Departure from hotel: 8.15**

**Morning session:**

9.15 – 10.30: Tour of RIHN

10.30 – 10.50: *Coffee*

10.50 – 12.30: Third breakout sessions: *How to best include multi-scalar dynamics in integrated models?* The limitations of three-scale models for our understanding of biodiversity and land-use change. How to integrate up-scaling of societal dynamics with downscaling of earth system models?

12.30 – 13.30: *Lunch*

**Afternoon session**

13.30 – 15.30: General discussion: the way forward

15.30 – 16.00: *Tea*

16.00 – 16.30: Closing the workshop

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