

Social-ecological systems modeling working group  
September 1, 2015  
LTER All Scientists Meeting

### **Participants**

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### **Next steps/action items**

We decided to focus on writing a primer article on SES modeling for a journal (tentative Global Environmental Change).

We need to find funding sources for collaborative writing

- SESYNC proposal for workshop for synthesis of modeling knowledge
- We also discussed possible funding from Nimbios, Future Earth, and Science for Nature and People.
- The next deadline for Nimbios workshop proposals is March 1st 2016. I'm not sure our group completely fits within Nimbios topical areas.
- Future Earth and SNAP don't have current workshop calls.
- I'm also looking into general "women in computational science" funding since there are a large number of women participating in our group, but I haven't had much success.

### **Meeting notes**

Developing a social-ecological systems (SES) modeling typology would be useful (Patrick Bourgeron)

- A typology for landscapes was created approximately 20 years ago, could be useful as an example to look at
  - LANDIS (?)- a forest landscape model, which is a simulation at different scales
- The typology could include different modeling spaces (Abby York). For example:
  - Policy relevant models

- Collaborative models
- Models that contribute to theory
- Etc.
- Types of data and the ideal scale for different types of data can be included in the typology

Create a primer on modeling and a typology—include the typology in the primer

- Journals that were discussed as outlets for the primer:
  - Landscape and urban planning
  - Frontiers
  - Environment and planning
  - Global environmental change
- We need to think about the audience for the primer and who we want it to reach
- It seemed like most people settled on the idea of Global Environmental Change for now
- The paper should include a road map of where we've been as SES modelers and where we want to go
- We should look at the CHANS-Net modeler database because many of them have been involved in long term CHANS modeling
- Our paper could emphasize the long term data LTER sites have and focus on our ability to potentially start filling data gaps
- The idea of a special issue was proposed with different articles from people with various modeling expertise. The group ultimately decided (for now) that as a special issue will take longer, we should pursue a single article instead.

Discussed ensemble modeling (aka meta-modeling), where multiple models are compiled into a single model

- Meta-models stem from systems thinking
- It is very difficult to get models to work together
- One common way of meta-modeling is obtaining a value from one model and using that value as an input in another model
- Is it ideal to engage in meta-modeling or is it better to start from scratch like the LTER usually does?

SES modeling barriers:

- Type of modeling, or scale of model, etc. hasn't been implemented in your field before; it can be difficult to break through and introduce something new to your field
- Some scientists unfamiliar with coding, GIS, mathematics, etc. might be intimidated by engaging in modeling even if they are interested
- Not enough opportunities to learn SES modeling. Where do graduate students and other scientists go to take classes or workshops on modeling? Limited information on both how to think about developing an SES model (how to frame the question, collect the data, etc.) and how to actually gain the technical skills necessary to build a model.
- Data collection

- Seeking out partnerships for modeling, whether other scientists, resource owners/users, or other stakeholders
- In collaborative modeling, how many people on the team actually need to have the technical skills to implement the model versus understanding the modeling process?
- Lack of data science and coding/technical training

#### Collaborative modeling and data scale

- Scales of ecological versus social data—scale mismatch, both spatial and temporal
- Possible to plan data collection specifically for an intended SES model to resolve issues of scale mismatch between social and ecological data?

#### Communicate different disciplinary standard/common spatial and temporal scales

- For example, social scientists might have parcels, households, neighborhoods, etc.; while natural scientists might have transects, plots, etc.
- Communicating common vocabulary is important
- How can we integrate interdisciplinary language into graduate programs?
- Vocabulary depends on the different audiences for your model including scientists within your discipline, outside your discipline, public, and practitioners
- We discussed there has been somewhat of a shift in generational thinking; it's often more difficult to label scientists now

#### Stakeholders:

Are models designed specifically to make predictions for stakeholders different?

- The amount of variability in a model matters greatly when trying to use a model to inform stakeholder management decisions and this often depends on the quality of data
- After you've created your model, visualizing the data for stakeholders to help them make decisions is important
- While general or stylized models may not be useful for prediction or stakeholders, they can be useful for understanding general trends or the starting point for future models.

If you are involved in creating a model for stakeholders, you must consider them in choosing the factors included in your model

- Sometimes stakeholders want too many factors included
- Sometimes stakeholders want clear justification for all parameters and factors included
- Values and norms are ultimately important in deciding what factors to include because as a scientist, you may be able to find literature/theory/data to support any factor you want to include

#### Envelope idea to describe uncertainty to stakeholders

- Gradient/levels/range of uncertainty inherent with a model
  - Different scenarios given specific degrees of uncertainty
- This is also where visualization of data can help you communicate this information to stakeholders

General modeling difficulties:

One of the core components of modeling is: how simple can you make your model while ensuring it still represents the intended system?

- Modeling is a way of critical thinking that can be taught—it involves using logic to try to figure out the pieces that matter
- We discussed the process of science—frame the problem and question and then begin the model

How valid is your model and can it be verified?

- Empirical validation is becoming increasingly important
- Verification and validation can also include complimentary models
- Also complimenting models with local knowledge and qualitative data (comparing narratives and interview data, for example) can help verify and validate them

“Maps and locals” group was active a couple years ago and discussed some these same issues addressed in our working group