CNH planning meeting

Those present: Kelly Cobourn, Mike Vanni, Kevin Boyle, Pat Soranno, Chris Duffy, Kathie Weathers, Mike Sorice, Paul Hanson, Cayelan Carey (notes)

Baltimore, 12 August 2015, Cayelan notes with Kevin’s edits

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Some definitions up front:

LAGOS=LAke multi-scaled GeOSpatial & temporal database

GLM=General Lake Model

PIHM=Penn State Integrated Hydrologic Model

ODS=Organic Data Science

GLEON=Global Lakes Ecological Observatory Network

* Introductions
  + Kevin: The role of property price effects in collective action; two way interactions between people and water quality.
  + Pat: Upscaling from the lakes to the LAGOS scale (17 states)
  + Chris: Integrated, physics-based models of hydrology; dealing with data is a major challenge - essential terrestrial variables for watersheds and linked hydrological coupling with the landscape: 40 TB of data!
  + Kathie/Kak: Citizen science role and interactions with lake associations.
  + Mike S.: Thinking about human decision-making and behavior; inspired by manatees! Identifying motivations for collective action to have an effect at a landscape scale.
  + Paul: Computer science linkages; GLM development; physical responses of lakes to loadings.
  + CCC: Personal connections to lakes and watersheds and people.
  + Kelly: Costs to farmers of improving environmental quality? How does decision-making alter water quality? Biophysical services that are an outcome of land-use decisions.
  + Mike V.: How working in a reservoir system has altered his perspective about human-lake interactions; how do we connect people in when the stakeholders are diffuse; what is the role of toxins, i.e., water quality that cannot be seen.
  + Armen: Agronomist, modeling water flow, policy connections, engineer.
* Kelly: Need for model integration and clarifying linkages and identifying first steps.
* Kak: Linking the entire system through the upscaling.
* Chris: Use complex models for numerical experiments and sensitivity analyses to determine essential variables (EVs); then use simple mathematical relationships.
* Chris: Let’s start with the data - and see what emerges.
* Paul: Hilary (Paul’s postdoc) can pull together the data to set up PIHM for Lake Mendota.
  + By January, we should have water quality GLM models set up for Sunapee and Mendota.
* CCC: Start with Mendota and Sunapee and bring Oneida in when Amy’s dissertation is finished.
* Chris: Need lake level information for water balance.
* Kak: Need a table of all input and output data.
* Kevin: Include scaling up as we talk about model coupling.
* Chris: let’s get all of the data on the table somewhere (via a new website) so that we can all access it.
  + We need Sunapee, Oneida, and Mendota watershed delineations.
    - Pat: LAGOS watersheds are automatically delineated and may have errors for Oneida; LAGOS best for checking catchment delineations.
    - Chris: Use National Hydrography data set coupled to local expert opinion.
* Chris: Need to take water table into account because water comes from groundwater for many systems.
* Kevin: Should we think about Monona? Monona and Mendota are one market.
  + Paul: Monona has different WQ now from Mendota due to Bythotrephes invasion; they are fundamentally linked systems.
  + Kelly: use Monona watershed delineation from NTL LTER.
  + Kak: This may be an issue for other watersheds, e.g., Sunapee.
* Kelly: How to define what a ‘farm’ is? Can get property values from county records; define by classes of producers (e.g., livestock vs corn, etc.).
* Chris: CropScape could be useful resource.
* Kevin: Modeling will be done on a parcel scale, based on scale we define in analysis, not necessarily on a farm basis. Ownership is not the best designator for a collective land-use decision because much of the farm land is leased by operators.
* Kak: How to take care of McMansion production?
* Kelly: Use lake association data to create scenarios of human development and effects on nutrient loading; also model risk-adverse farmers. Would also want to talk to local land-use planners.
* Pat: How do we move from farm scale to catchment scale to pixel scale? We need to get to pixels for scaling up.
* Kelly: Cathy Kling visit to VT in November: can ask her about catchment/pixel scale scaling from CNH work she has done in Iowa.
* Kevin: Ian Bateman has done this for all of England
* Chris: Virtual water - think about water being transported between catchments; can we use this concept to think about lake contamination, soil degradation, etc. from one catchment harming environment in another catchment.
* Paul: There is a 2011 paper on this and papers from Stockholm Resilience Center.
* Paul: Chris Kucharik (University of Wisconsin Water Sustainability & Climate PI) interested in sharing scenarios from WSC for our group.
* Kak: LSPA has hired consultants to do scenarios for Sunapee that we can use. What about Oneida?
* Pat: Can we have a primer on each of the models at the first workshop and some documentation? How has sensitivity analysis worked for each of these models?
* Kevin: Did not include recreation into this project because of cost; important to remember that this stakeholder group may not necessarily reside in the catchment.
* Paul: What is time scale for modeling?
* Kevin: Property data goes from 2002-2012.
* CCC: All of the lakes have water quality data that goes back to early 1980s, the hydrology/terrestrial data go back to 1979 - let’s start with 1979 for lake/hydro modeling.
* Kak: Boat wash stations at the lakes have surveys, could we use this to our advantage?
* Kevin: What do people respond to? Water clarity, macrophytes, invasive species (zebra mussels/quaggas/spiny water flea)?
* CCC: What about water quality indicators that people can’t see, e.g., toxins?
* Kak: What about historical reference for people? More transient people may not be as sensitive to changes in water quality versus people who have spent decades on the lake.
* Kevin: for purchase we do not know when they first viewed the lake and what dimensions of quality they use in purchase decisions.
* Paul: There may catchment characteristics such as data availability that are associated with organizational effectiveness of lake associations.
* Chris: What about urban effects, not just crops?
* Kak: Start with Lake Sunapee Protective Association (LSPA) because they have already examined organizational effectiveness, inflection points, how human responses to water quality have changed, catalyst points, e.g., algal blooms, macrophytes.
* CCC: Can we compare human perception of water quality over time from historical LSPA data with actual water quality over time from GLM?
* Pat: How do we classify lake associations? Use Mike’s data to determine different classes of groups.
* Pat: We need to look at how state level, county level and local policies for the watersheds have changed over time – and code into LAGOS?
* Kevin: We can look at influence of policies (e.g., a fertilizer tax) in simulations using Kelly’s economic model.
* Kevin: Mike and I should talk to other nearby lake associations beyond our three study lakes. (Perhaps informed by Pat’s summer intern, who will examine lake association classification.)
* Chris: Adirondack League as a potential lake association to explore that has a lot of control over human behavior.
* Kevin: Property frontage guidelines, septic systems requirements, etc. are important policies from the residential perspective that can influence water quality.
* Mike: Lake associations evolve over time and is this linked to changes in water quality. What is the difference between lake and watershed associations?
* Chris: Have a senior at PSU that will help get started now and then finish with a M.S.
* CCC + Paul: Have student who will start summer 2016.
* Kevin + Kelly: Have a student already at VT that can get started.
* Kak: We need a data manager to help with this (Corinna will do it for free).
* Pat: We need to document how we are going to share, what will be shared, what will be built on beyond 3 years. How we plan to publish?
* Pat: Can distribute LAGOS documentation, sharing metadata, code, github, model repositories, model output, etc.
* Paul: ODS is designed for task-oriented people and for the end of a project, sets up for reports, requires some technical know-how, Wikipedia-style, needs a task manager; let’s try it for a general overview of how we are going to move forward.
* Pat: No one web service does everything, so let’s try a few different options and go from there.
* Pat: We need one person to be a part of every single team to unify documentation, and a postdoc can’t do that; need management team to do it (Kelly, Kevin, CCC).
* Kak: Need to be careful with communication with students and postdocs so that we can maintain strong coordination and delicacy that is needed.
* Pat: Monthly project meetings of all personnel are critical.
* Kak: Need a Project Tracker GLEON-esque.
* Paul/Pat: Will there be a server for a project?
* Kak: Create a general authorship statement/mission statement about our policy for sharing data and publications.
* Kak: What can the project do to ensure that the pre-tenure PIs get to tenure?
* Chris: CNH website and project requirements?
* Kak: IRB training for project PIs?

Inputs/Outputs (what I could surmise):

1. Cycles/BiomeBGC: past weather, soils, US Dept. of Agriculture database of geology, National Land Cover Database, USDA: CropSyst - crop record for catchments over time, CropSCAPE, NLDAS II for climate-corrected weather (better than PRISM!; 1/8 degree resolution, 1979-2010), depth of water table and geological systems.
2. SDP: soil, crop yields for modeling farming operation, moisture and climate affecting product, price of fertilizer; output: nutrient application and economic yield on weekly scale; can examine the role of the size of agricultural operation, mix of crops that farmers chose to produce, fertilizer application
3. PIHM: use watershed delineation, combine with USGS data, NLCD, NLDAS climate data and create them all as GIS files. Should we make this available as qGIS open-source data or ESRI?
4. GLM: needs PIHM output for water balance + meteorological data + nutrient loads + information for starting conditions (LTER database, Sunapee data), use buoy data to calibrate model - DO/temp, GLM output includes multiple characteristics of water quality (e.g., water clarity, cyanobacteria, etc.) with one value per lake
5. Hedonic model: simulation of property values; but at a much slower time scale than for the other inputs; hard to determine time scale from property values; water clarity is a major variable that humans observe, but are there others? The human response to water quality is not linear!
6. Collective action modeling: what is the role of the lake association and effectiveness over time? Document analysis and retrospective analysis of how lake associations are integrated into the community; track the evolution of the lake association history over time and how that compares with lake water quality; use focus groups (to assess organizational effectiveness, public recognition, membership, shared norms). Can we link effectiveness of integration into the community to water quality (and economics)?

Need to do (from today):

1. Delineate watersheds: Start with local contact, then talks to Chris’s group, then compares with Pat.
   1. Kak for Sunapee
   2. Lars for Oneida
   3. Paul for Mendota
2. Add Monona to list for GLM modeling?
3. Figure out how to share data files/metadata/tasks- ODS?
4. Meet with Chris Kucharik to discuss scenarios.
5. Get data to Paul & Hilary for setting up GLM.
6. Set up ODS for general timelines and project management.
7. Project Tracker: for this project
8. Kelly: server space with FREC?
9. Kelly, Paul, CCC talk with Corinna about data management.
10. Schedule telecons for the fall.
11. Fall calls should include publications, especially because there are projects that are already ongoing that are getting close to publication.
12. Kelly: contact Program Officer before contacting lake associations.