S-1063 USDA Hatch Annual Meeting
University of Rhode Island, Kingston, RI
Participants:
Soni M. Pradhanang (University of Rhode Island), Arthur Gold (University of Rhode Island),
Kelly Addy (University of Rhode Island) , Zhuping Sheng (Texas A &M), Rabin Bhattarai
(UIUC), Prasanta Kalita(University of Illinios-UC), Sunday Tim (IowaState), David Sample
(Virginia Tech), Cibin Raj (Penn State), Kyle Young (URI), Marzia Tamanna (URI), Jeeban
Panthi (URI), Khurshid Jahan (URI), Shiva Shrestha (URI), Mamoon Ismail (URI), Sarah
McMillan (Purdue University), Adel Shirmohamadi (University of Maryland)

0900 – meeting kick-off

0900 – project renewal details (Adel)
-   S1063 ends September 2019.
-   To renew – there will be a period of time where we can write a proposal and submit;
    proposal to be submitted before regional meeting; committee to review proposal and
    provide comments prior to September national meeting (regional meetings before-hand).
    MAC – multi-state action committee will review and approve proposal. However, it will
    be business as usual until they assign and approve a number (until then the committee
    works under a temporary number).
-   Saied can tell us the schedule for the southern region proposal. Saied's recommendation:
    form a writing group and start writing; by end of July submit writing draft for review for
    final proposal (due ~ Sep 2019).

0905 – personal introductions (all members)

0915 – S1063 presentation (Dr. Pradhanang) – "S1063 Quantification of BMP for protection at
the watershed scale"
-   S1004 (2002-2007): Develop and evaluation of TMDL planning and assessment
    tools & processes:
-   S1063 (2014-2019): Quantification of BMP practice effectiveness for WQ protection
    at the watershed scale.

   Objective 1:
-   Questions remain about ability of BMPs to mitigate NPS pollution & processes at
    play that determine/define BMP pollution mitigation performance.
-   Increasing demands for pollution mitigation
-   Efficiently achieve increased level of implementation, pollutant fate & transport
    process in BMPs
-   Measure fluxes at soil-air, water-air, and soil-aquifer interfaces

   Objective 2:
-   Develop & evaluate models for predicting effectiveness of BMP

- Developing new or adapting existing sub-models
- Emphasize: incorporate & validate new BMPs into models

Objective 3:
- Uncertainty of BMP yielding effective results
- Quantify confidence

Ideas/challenges:
- Priority BMPs, emerging environmental issues, emerging contaminants
- Reduce occurrence of HABs (harmful algal blooms)

0925 – Research highlights:
Zhuping Sheng (Texas A&M) – urban stormwater management; community gardens; permeable surfaces; roof greenhouses.
- Challenge – salinity. Looking at potential reaction models. Looking to link GW models with SWAT (w/MODFLOW).
- Recommendations – uncertainty of data, incorporate RS via UAVs; use UAVs to assess salinity; multispectral imaging to assess salinity??

Rabin Bhattarai (UIUC) –
- challenges of assessing impact of NPS, specifically nutrients (nitrates, phosphates) on water quality; $4M project to collect data to assess farm BMPs and field response to different nutrient inputs vs. topography/soil/weather/drained & undrained fields, etc. Farm-to-farm monitoring.
- Looking at denitrification and phosphate removal media (ie. divert water for denitrification and phosphate removal media). Developing a web tool and enter their farming information, brings up wx, SSURGO info, to see implications and implement change in nutrient practices. Project to look at how drainage impacts yield and nutrient practices to optimize drainage system.
- Side comments – scaling is important. We need to be able to look at large & small-scale models (can we effectively up-scale small scale models)? Larger scale models give us regional assessments of environmental hydrologic issues. Smaller scale models are necessary for BMPs due to localities of water management.
Sunday (Iowa) –
- Using techniques to input field strips (roadside ditches) into models and evaluate their effectiveness – looking at where they are in landscape, adding to maps, and using them to model hydrology w/roadside ditches.
- Attempting for a comprehensive database of structural and non-structural BMPs. Question – 1) how do we extend the BMPs that are normally structured to small (field) scale, but when using watershed scale models to evaluate their effectiveness? Do we scale down models or scale up BMPs? 2) how do we integrate BMPs into models?

Cibin Raj (Penn State)

- manure management & "manure-sheds"; phosphorous index; built geospatial tool to look at landscape, proximity to streams, and various other indicators, and assess how suitable locations are for manure management.
- Adaptability of BMPs and influence on riparian areas – looking at flexible buffer systems, what is grown & how it is managed in the riparian buffers. Using SWAT and ANAGNPS for buffer-specific nutrient loading.
- Using SWAT for Chesapeake Bay modeling (vice Ches Bay model).
- Interested in uncertainty of BMPs. Exploring landscape optimization, nutrient management, and scalability. Looking at slow-release fertilizers.
- Also looking at urban BMPs – identification, monitoring, quantification & effectiveness.

Art Gold (URI)
- UV vis sensors to understand contaminant fluxes during baseflow and storm events. Focus/challenge – concentration vs. flow (C vs. Q) – doesn't scale well & see very different relationships in large vs. small catchments.
- Algae/cynoabacteria blooms – increasing # of lakes closed due to algal blooms: what's the role of the timing and extent of nutrients on these algal blooms? EPA wants the right to measure nutrient outputs & take action.

David Sample (Virginia Tech)
- Temperature is not well-accounted for in ag or urban models (one motivator is toxicity to trout);
- uses SWMM. R-SWMM optimizes. Monitoring: monitoring ponds as nutrient retention locations – is phosphorous getting bound in sediments, is it mobile, are they exporting nitrogen?
- Looking at bioretention in ponds & wetlands as a real-time control system for nutrient loading and flooding control.
- Process based model

Soni (URI)
- riparian buffer zones, modeling of N & P loading (Marzia);
- mitigation plan for reservoir flooding (SWAT integrated with OASIS for reservoir release operations) (Supria);
- urban hydrology modeling & effectiveness of roadside best-management practices & impact of soil amendment via SWMM (Luna);
- saltwater intrusion monitoring (GPR, electro resistivity, UAVs), MODFLOW coupled SEAWAT, & requires climate input for storm surges (Jeeban & Mamoon);
- downscaling of climate data for RI & machine-learning to assess high frequency signals (Shiva).

- Precursors of disinfection by products (Maxwell and Hichem)
- PRMS modeling for runoff prediction/climate change k-nn clustering, fourier transformation to understand baseflow and stream temperature (Kyle)

1315 – New Objectives:

Questions:
Q: Did we meet the objectives that were discussed in 2014?
A: Efforts are ongoing

Q: What do we think are important questions?

Q: Which of those important questions do we believe might garner *additional* funds that allow us to make progress in the projects? (Because the HATCH funds add value but are not primary financial drivers).
A: Incorporating farmers as stakeholders

1330 – Possible NEW OBJECTIVE ideas:

o   Incorporate farmers as members of the network/advisory board for the initiative; incorporate their input into models. Form network of scientists and stakeholders.

o   Data analysis & synthesis of BMP Data: stormwater management database has compilation of BMPs w/statistical analyses and (developing) teaching components. Being able to select the best-performing BMP to address specific functions, pollutants, etc. Data synthesis & data gap analysis

o   Targeted BMPs in time and space: Can we assess effectiveness of BMPs specific to location? Performance of BMPs under climate variability & in extreme weather events; can we assess BMPs specific to extreme weather events?

o   Using HABs as motivator to assess nutrient loading and nutrient fluxes

o   Assessing integrated uncertainty of monitoring & modeling in combination

o   Modeling mixed-use watersheds: recognize & model growth of urban agriculture and assess hydrology and nutrient transport in those regions

o   Emerging contaminants: emerging contaminants in agricultural areas – pathogens, antibiotics, precursors to chlorinated VOCs

o   New technologies: remote sensing - use of UAVs (UV, multi-spectral sensor, thermal IR) for water quality monitoring; high frequency in-situ nutrient monitoring

Potential synthesis papers:
Scaling – applying insights from experimental watersheds to larger watersheds (synthesis)

Effectiveness of BMPs specific to location; during extreme weather events

Day 2
May 30, 2019

0900: Review of minute and objectives from 20 May, 2019 meeting.
An hour time was allocated to discuss potential NSF-RCN proposal and highlighted on synthesizing research papers- necessary fodder for a successful outcome of any project.

Key thrust identified for the RCN proposals are:

Art Gold:
- RCN Grant could provide money to bring international experts, support early career faculty members; special issue journal

Art Gold will share RCN proposal that was funded in 2009. Leveraging fund (other funding agencies) is also something that we should think of.
Identify which group has large RCNs? Low overhead on RCN projects

Healthy Waters and Watershed? Potential theme: suggested by Sunday

Team Development is difficult but essential for putting together a proposal.

10:00AM-11:30AM
Themes for next round of proposal was discussed and highlighted below

- Advanced understanding and prediction of watershed and climatic factors drivers of cyano bacteria blooms
- Warning systems for climatic signs for cyanobacteria- (based on Lack of wind, N , P) E.g specifying TMDL targets
- Effectiveness of BMP at isolation or combination (like treatment train) in improving water quality
- Guided Decision from DSS tools (Rabin)— validation phase
- Pretty much success with biomass (being function moisture and temperature)- 2-3 sample point every year
- Economic cost and benefits of BMP
- Extension and outreach
- Change in knowledge, behavior and condition

- Condition- Precision Targeting, LOGIC model context, need of social scientist

Oklahoma, Virginia Tech -representatives present

Art asked an interesting question to the group about ongoing projects and projects in next 3 yrs that could give the next round of proposal a direction. F

Following section shows research projects that are currently ongoing with each PIs and could be tied to the future proposal

Ongoing Research Projects /3 yrs projection:

Art and Kelly-

- urban ponds, Stormwater renovation, Cyanobacteria,
- database development,
- N-sink (tracking n sources, delivery, fate and transport, removal between the edge of field and receiving water)

David:

- Selection and design of BMPs; Effectiveness of individual and combination of BMPs
- Stakeholder participation
- Scaling issue field-watershed-region - inform each other
- Cost Benefit analysis - have existing tool, plans to extend that tool
- Bioretention and pond- process based models focusing on BMPs only
- Uncertainty component for Fredericksburg project

Cibin

- Selection design of BMPs
- Spatial and temporal components; Scaling up of models
- BMP performance/management

Sunday

- Decision Support Tool (DST)
- Database development and Web interface
- Scaling of models
- Effectiveness of individual/combination of BMPs
- New BMPs as part of nutrient reduction strategy

Rabin:

- New BMPs technology
- BMPs performance, erosion/sediment control from the construction site
- Decision Support Tool (DST)

Ping and TAMU team:

- Stakeholders engagement; Extension works
- UAVs; emerging BMPs; spatial and temporal studies; BMPs performance; DST

- Mixed use watersheds; Hydro fracking
- Alternative water use; Water reuse

Soni
- UAVs with Thermal infra-red
- Surface/groundwater modeling
- Urban Stormwater LID modeling
- Floating wetlands
- Disinfection by products
- DST
- Outreach

REQUEST FOR ONE YEAR OF EXTENSION OF S-1063 PROJECT WAS RECOMMENDED.
The next meeting is tentatively scheduled in Texas A&M, El Paso
Since the project is in the last year and will be requested for extension, new officers were not elected. The officers from year 2018-2019 will resume their duties.

13:00-16:30 IMPACT WORKSHOP
Sara Delheimer, Multistate Hatch Impact Writing

- Multi state Research Fund Impacts
- NIFA communication
- Workshop
- 20-30 mins presentation
- Impact Statement
- 2 group exercises - good and bad ways of impact writing
- Important for future funding, effective science communication is essential