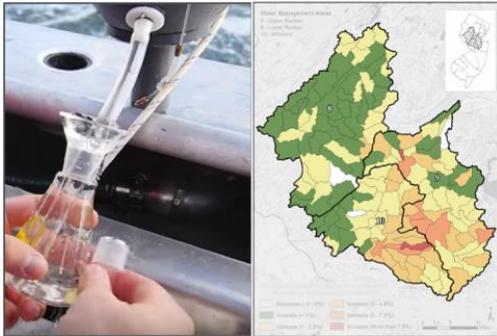


10th Annual Sustainable Raritan River Conference and Awards Ceremony



Micro to Macro

The Future of the Raritan

Kathleen W. Ludwig Global Village Learning Center

Rutgers, The State University of New Jersey

Douglass Honors College, 26 Nichol Avenue, New Brunswick

Friday, June 8, 2018

Conference Summary

Summary prepared by Fairfax Hutter and Erica Rossetti, AmeriCorps NJ Watershed Ambassadors

I. Welcome

- A. Speech highlights from Dr. Robert M. Goodman, Executive Dean, School of Environmental and Biological Science, Rutgers
 - 1. As it is the 10th annual conference, it is important to rethink strategies and policies that will benefit the Raritan
 - 2. Measures of success and areas of focus:
 - a) Student engagement, with the Raritan River as the centerpiece of academic work and research
 - b) Community engagement across the watershed
 - c) Mobilization of resources (donors/supporters)
 - d) Outreach
- B. Speech highlights from Dr. Michael R. Greenberg, Interim Dean, Edward J. Bloustein School of Planning and Public Policy, Rutgers
 - 1. In the past there has been a need for scientific collaboration, so we must keep up the good work.
 - 2. Science is important for the future of our water.
- C. Q/A Summary
 - a) *Q1 from Jen Senick:* What is the global impact of our work on the Raritan, and how do we form collaboration abroad?
 - (1) *A1 from Dean Goodman:* “This is a watershed, it’s a river, it’s an estuary, and it is highly populated. There are many highly populated

watersheds with rivers and really, really important estuaries all around the world. And they too, for all their own cultural and historical, topographic and geophysical reasons are highly populated. Every one of these features is unique in its way, but there are commonalities. Exploring what those commonalities are, putting a focus on the international dimension, the way in which what we do with the community here can serve as an example, as a laboratory, as inspiration to other peoples around the world. Many of these estuaries elsewhere we already work in, in various ways, whether it's the environmental impacts in the Mekong Delta, Red River, Yangtze, Nile, around the world... to quote our new Chancellor: "Rutgers moves from a university for the world to a university of the world."

(2) *A2 from Dean Greenberg:* "I hope that a lot of people see what you do and what you are putting up here will be published all over the world. The probability of people seeing what you do is really, really important these days. Internationally, the opportunity is almost boundless. I used to teach industrial location economics and have just written a book: "Siting noxious facilities." I know that the Chinese, Vietnamese, and Malaysian groups are going to be some of the major readers of this book. They are facing the same issues with siting noxious facilities in densely developed urban areas. If you look at Google you will see that the places bombed during the Vietnam War, look at them now, lots of river basins now have a lot of factories right in the middle of them. Those issues of water quality & water supply, related to industrialization, in other parts of the world are perhaps a lot more critical than they are here. We were one of those laboratories of the world. New Jersey was one of those places that in 1960 every other job was a manufacturing job. Now I think it's about 4%. We have become more of a white collar state, while these nations are highly industrialized. China is the largest in world, the U.S. is number 2, countries elsewhere we are e dealing with many of this industrialization. What you do, if you publish it, people from all over will be sending emails asking for consultations."

II. Lightning Talks Focused on Water Quality (see slides)

- A. Dr. Meg Christie, Marine & Coastal, SEBS, "Anthropogenic alterations of the Raritan River, NJ from pre-European settlement through the present"
- B. Dr. Nicole Fahrenfeld, Civil & Environmental Engineering, SOE, "Putting the micro in microplastics: an investigation of biofilm communities"
- C. Kaixuan Bu, Marine & Coastal, SEBS, "Temporal Heavy Metal Distribution and Bioaccumulation in the Lower Raritan River"

- D. Dr. Abigail Porter, Environmental Science, SEBS, “Microplastic can Mobilize Pharmaceutical Transforming Microorganisms”
- E. Phil Sontag, Environmental Sciences, SEBS, “Examining Influence of Raritan River Bay Dissolved Organic Matter and Extracellular Enzyme Hydrolysis on Methylmercury Uptake in Phytoplankton”
- F. Dr. Donna Fennell, Environmental Science, SEBS, “Tracking Organohalide Reduction in the Raritan River Basin”

III. **Micro: Emerging Contaminants (EC) Panel and Discussion**

- A. Dr. Keith Cooper, Biochemistry & Microbiology, SEBS, Rutgers
 - 1. Legacy contaminants: PCBs, PAHs, metals, manufacturing (dyes and chemicals)
 - 2. Emerging Contaminants: microplastics, PFAs (polyfluorinated alkalines)
- B. Dr. Brian Buckley, Environmental and Occupational Health Sciences Institute, Rutgers
 - 1. Human health effects are related to environmental pollution, therefore it is extremely important to us to determine what is in our water
 - 2. Solids retain less volatile compounds, water retains more volatile compounds
 - 3. Mass spectrometry helps accurately identify what compounds are found
 - 4. Take home message: we can measure anything with enough time and resources
- C. Dr. Donnell Fennel, Environmental Sciences, SEBS, Rutgers
 - 1. There are a variety of pollution input sources:
 - a) Discharges
 - b) Contaminated sites that pollute the groundwater
 - c) Stormwater, wastewater, and CSOs
 - 2. Bacteria can biodegrade pollutants
 - a) Occurs naturally
 - b) Can be enhanced as part of bioremediation
 - c) A viable technical solution to some pollutants
 - 3. Must study whether or not bioremediation process is complete (the original pollutant is degraded and the by-product is non-toxic) or incomplete (the pollutant is not fully degraded or there is a toxic by-product).
 - 4. Emerging contaminant: Organohalides
 - a) Widely used in industry
 - b) Common environmental pollutant
 - c) Biodegradation is mediated by the same bacterial microbes for different Organohalides and are facilitated by different enzymes.
 - 5. Take home message:
 - a) Pollutants sorb to microplastics in water.

- b) Plastics may help drive biodegradation of pollutants (as seen with the Naproxin study)
- D. Dr. Sandra Goodrow, Science/Research/Environmental Health, NJDEP
 - 1. The NJDEP is creating toxicity concentration references for several emerging contaminants
 - 2. The Division of Science/Research/Environmental Health is a unique department compared to other states. New Jersey is number 1 in setting contamination levels!
 - 3. Emerging contaminants the NJDEP is studying:
 - a) PFAs (Polyfluorinated substances)
 - (1) A class of manmade chemicals for commercial/industrial uses.
 - (2) Often used in production of non-stick, waterproof, heat/grease/stain-resistant coatings
 - (3) First reported in 2006
 - (4) Long chain of compounds being phased out due to toxicity and persistence in the environment
 - b) Dioxane
 - c) Pharmaceuticals (endocrine disruptors)
- E. Dr. John Reinfelder, Environmental Sciences, SEBS, Rutgers: Inorganic Emerging Contaminants in the Raritan River
 - 1. Old contaminants, new “packaging”
 - a) Silver nanoparticles
 - b) Titanium
 - c) Metal oxanes
 - d) Antimony sources:
 - (1) Copper/lead smelting
 - (2) Petroleum refining
 - (3) Manufacturing of plastics and flame retardants
 - (4) Brake linings
 - (5) PET water bottles
 - 2. Other issues to consider
 - a) How inorganics interact with organic contaminants
 - b) Synergistic biological effects
 - c) Microbial ecology effects
 - (1) Resistances
 - (2) Shifts in community structure
- F. Q/A Summary
 - a) Q1: Bioremediation: does it imply adding things to water bodies?

- (1) Dr. Fennell: We don't know enough about microorganisms to insert them into water bodies. We must do pilot studies to gain knowledge about what microorganisms there are, what the byproducts are, etc. There is potential to inject compounds like carbon or organisms, but it is very difficult to do. We might be able to insert them on weighted particles so as not to disturb the sediment, but we are still in lab phases. Note that these organisms exist naturally and we are still researching that.
- b) Q2: What is known about inorganic compounds interacting with microplastics?
- (1) Dr. Cooper: A study in Europe used microplastics as a wastewater treatment approach. If you look at different parts of the river, you get different compounds, enabling you to identify specific patterns about the plastics, biofilms, etc. Don't know of any research about inorganics specifically, but there are though experiments there.
- c) Q3: How do we communicate with the public about emerging contaminants?
- (1) Dr. Goodrow: The NJDEP is transparent by publishing research, especially those that are important for public health.
- (2) Dr. Buckley: One issue is a lot of emerging contaminants don't have toxicological research. Once we assess risk and establish safe limits we will be able to better educate the public.
- (3) Dr. Cooper: The state is always open to releasing their data to the public. Good science leads to good regulations. However, sometimes there are policy issues because we also need to consider fish and invertebrate species when making water quality decisions.
- d) Q4: What can we safely eat and drink?
- (1) Dr. Buckley: Don't expose yourself to anything you don't have to
- (2) Dr. Cooper: Fish and drinking water is always being monitored. "I still eat sushi any chance I can get!"
- (3) Dr. Reinfelder: While there could be some issues, don't panic: it's not the end of the world!
- (4) Dr. Buckley: PFAs are on top of the priority list.
- e) Q5: Do these studies only focus on drinking water?
- (1) Answer: They focus on both surface water AND drinking water. There are different methods for each.
- f) Q6: Source reduction: what are the implications for the pharmaceutical sector, medical sector, and then our own personal management?

(1) Dr. Buckley: In my personal experience, a reasonable way to get rid of personal drugs is adding detergent and coffee grounds to destabilize it. It is probably better in landfills as opposed to the water system.

g) Q7: What about well water?

(1) Dr. Goodrow: Through the Private Well Treatment Act, you can get data whenever houses are sold. There is data about where compounds are showing up in certain areas, and citizens can work with municipalities to address sources, well testing, and citizen health. If you have a well you should test it every few years.

h) Q8: Why are sources of well contamination increasing? What are we doing about identification and remediation of these sites? (E.g. Arsenic).

(1) Dr. Reinfelder: Lead is usually a private household issue. Arsenic is a natural one that needs to be treated. Not sure whether or not sources are increasing, but that is something to investigate depending on your area.

(2) Dr. Buckley: New Jersey is the only state actively looking for unregulated compounds. There are naturally occurring arsenic maps available. Some areas are naturally higher in arsenic than others. Overall, most issues with emerging contaminants are in surface water and have slow percolation rates into the groundwater, so there is less to worry about there.

IV. Keynote speaker, Debbie Mans, Deputy Commissioner, NJ DEP

A. Speech highlights:

1. Climate change is one of NJ's biggest challenges.

a) Plan to work on coastal resilience and shore protection plans.

b) Want to reduce greenhouse gases in sync with the Paris Agreement

c) Goal: 100% renewable energy by 2050

(1) Especially wind energy off the coast

(2) Must gain robust stakeholder support to avoid problems down the line.

d) Want to reduce carbon dioxide emissions from public transportation, since 40% of emissions come from transportation in NJ versus the 32% national average.

2. Water-related goals:

a) Upgrading past issues while also addressing emerging contaminants

b) Investigating contaminants relevant to human health further than the federal government requires (taking a protective stance)

- c) TMDL lookup program (online) helps identify problem areas
 - d) Protection for Raritan will soon be posted
3. After the last eight years, there are a lot of things to go back and fix as well as identify new moves to make to improve the environment and quality of life in New Jersey.

B. Q/A Summary

- a) Q1: When will we hear about the money from the Volkswagen settlement to help fund car charging stations?
 - (1) Right now it is going out for public comment, then it will be reviewed again, and then the monies will be released.
- b) Q2: How to keep federal and state governments from going in different directions?
 - (1) Commissioner McCabe has deep ties to the EPA, and will try to address issues person to person.
- c) Q3: Logging in state forests?
 - (1) Some projects are still under review. Need to investigate forest health and ecology.
- d) Q4: How to advocate against building pipelines?
 - (1) Cannot comment: reclude.
- e) Q5: What are the chances of a bottle bill in NJ? Afraid that mandatory recycling is ineffective.
 - (1) While we are not on the legislative side of things, the department is very focused on where recycling ends up e.g. if we send it out, does it end up being actually recycled?
- f) Q6: Will the DEP move any money from the Barnegat Bay initiatives to focus on other water bodies, such as the Raritan Bay?
 - (1) The department has talked about prioritizing different estuaries.

V. **Macro: Addressing Concerns through Basin-wide Watershed Management Planning**

A. Dr. Richard G. Lathrop, Jr., Johnson Family Chair for Water Resources and Watershed Ecology and Sustainable Raritan River Initiative, Rutgers: the 10 Key [Problem] Indicators of Watershed Health

1. Increased impervious surfaces due to urban development and increased populations
2. Emerging contaminants
3. Decreased wetlands
4. A large portion of open space is inaccessible
5. Complex flooding and reactionary mitigation

6. Decreased prime agricultural land
 7. Consistent protections for at-risk species are deficient
 8. Groundwater recharge is declining
 9. Decreased upland forest and canopy cover
 10. Non-proactive cleanups and remediation
- B. Working table session

VI. Data Blitz: Lightning Talks on key Raritan issues including watershed planning, stormwater management, public access, restorations, etc. (see slides)

- A. Michael Pisauro, The Watershed Institute, "The Watershed Institute's Model Stormwater Ordinance"
- B. Johnny Quispe, Ecology and Evolution, SEBS, "Marsh Response to Sea Level Rise: Survival of Tidal Marshes in the Raritan River"
- C. Angela Gorczyca, New Jersey Water Supply Authority, "Raritan River Basin's Most Wanted List"
- D. Mehdi Rahmati, Electrical and Computer Engineering, SOE, "Enabling Real-time Dynamic Control and Adaptation of Networked Robots in Resource-constrained and Uncertain Environments"
- E. Nick Zemlachenko, New Jersey Water Supply Authority, "Peters Brook Residential Rain Barrel Rebate Program"
- F. Dr. Richard G. Lathrop, Jr., Ecology, Evolution, and Natural Resources, SEBS, "Monitoring water quality and marsh surface elevation on the lower Raritan"
- G. Anthony Vastano, Marine and Coastal, SEBS, "Evaluating Fish Passage on the Raritan River: The Results of a Six Year Study"

VII. Poster Session (see attachments)