Connecting Beaches, People, to the Landscape

John Peckenham and Avinash Rude: Connecting Beaches to the Landscape

Coupled Natural Human System
People ←→Environment
People and the environment are connected in many intimate ways. This study is designed to tease out how physical aspects of that relationship affect water quality.

Metrics Used: Maine Healthy Beaches data, Weather History, Oceanographic Observations, Land Use, Pollutant Sources

Methods: Land Use Analysis, GIS Analysis of potential sources
Observations Classification
Random Forest method to partition, measure the importance

Set the limit at >60 cfu/100mL (BAV)
Focus areas are Mount Desert Island (MDI) and Wells Beaches – geographically separate and different, use is different

Influencing Factors from GIS Analysis – looking for factors influencing water quality:

- Topography
- Watershed
- Land Use
- Wastewater Outfalls

Need to combine human and natural factors to find the ones with most influence

Dominant Influencing Factors – 269 sampling events at the 9 beaches. These factors varied between the two focus areas (MDI and Wells) and between the beaches sampled within each focus area. Different factors are more important for different locations. Some locations are more sensitive to rainfall, which can lead to follow up questions about what is going on. This could be developed into a tool to help beach managers proactively predict exceedance.

Examples of dominant factors: wind speed, salinity, rainfall, current weather, weather trends, dew point, water temperature, air temperature. Rainfall seems to be the dominant factor most often, but there is some variation, particularly with the second-most dominant factor for each beach.

Next steps: Collate with land use and demographic data, evaluate why rainfall and routing matters, test with monitoring data.

Encourage communities to work on their stormwater infrastructure, can track over years and make incremental improvements.

Kate Beard: Spatio-temporal Patterns in Coastal Beach Water Quality

They are looking at Maine Healthy Beaches data and analyzing it on a coastwide scale.

Current exceedance threshold for enterococci is 104mpn/100mL. What happens in changes in exceedances when moving to a different exceedance threshold, like 70 or 60? With heavy rain events, there is a big increase.

Temporal – looking at yearly exceedances.

Seasonal change: Exceedances strong in fall. More heavy rain events in fall.

How does beach water quality vary spatially in response to precipitation events? Exceedance proportion for non-rain associated events had few exceedances.

Proportion Test/Site Sensitivity test: At various sites, is the proportion of exceedances from non-rain samples the same as proportion of exceedances from rain associated samples? Finding that it depends on the site. Some sites are more sensitive to rainfall events.

This work helps to narrow down sensitive sites – now can find sites with disproportionate exceedances and look closer at what might be going on.

What are drivers behind spatial variation? Freshwater inputs, outfall sights, impervious surface, land use, land cover, overboard discharge, enclosed embayments, number of residences, etc.

Next step: Examine patterns in exceedances in more detail with regard to the above spatial context.

Malin Clyde: Beach Blitz 2015: Experimenting with a citizen science approach for simultaneous water quality sampling at NH coastal beaches.

NH Beach Water Quality:

- 18 miles of coast
- NH some of the cleanest beaches in US
- Very few exceedances on ocean
- No volunteers sampling (as in Maine Healthy Beaches Program) – few enough beaches that staff at NH Dept. of Environmental Services can conduct sampling in-house throughout summer. (~2-6 samples per beach per year)
- Little public discussion about water quality
- Interest in keeping beaches clean and safe

Research Questions:

1. Will simultaneous water quality sampling tell us something new about fecal/bacterial contamination at beaches?
2. How hard is it to engage local volunteers to help? How might it work?

Citizens Science is engaging members of the public in research to generate new science-based knowledge.

Researcher + Volunteer Programs + Energy & Organization

How did we select beach sampling sites?

- North Hampton State Beach: History of beach advisories.

- Jenness/Sawyer Beach: PSU Surfer Survey results – perceived poor water quality

How to best work with Citizen Science volunteers?
- Logistics: ¼ - ½ mile beach, 20-25 volunteers, snacks, etc.
- Tides: Important to plan for!
- Protocol: All must simultaneously follow same protocol

Logistics: middle to late summer, low tide, afternoon (already that narrows down the date possibilities)
Rent school buses to transport.

Recruiting volunteers through The Stewardship Network New England. This org. is 2 years old – makes it easier for people to volunteer for the environment.
NE Citizen Science Catalog and Resources

Whole thing will be 4 hours – including bus ride, training (on bus!), etc. Volunteers will collect grab sample, # of people, diapers, percentage of seaweed, other factors.

Exploring the Local Ecological Knowledge of Surfers in Maine and New Hampshire – Sophia Scott (presenting) & Dr. Shannon Rogers

How can surfers' knowledge keep our beaches healthy?
- Local ecological knowledge – people in the environment
- Good source of info

Surfers are more vulnerable to water pollution:
They go to beaches more often, spend longer periods of time in the water, get totally immersed, ingest more water, get cuts or scrapes, surf during storms with big waves (tend to have poor water quality)

Survey Sites: 7 Maine beaches from Scarborough to York. 5 NH Beaches. Southern Maine chosen because it is more populated, more tourists, surf spots more accessible.

What do we know about surfers?
- Ingest 10X more water than avg beach goer (Half a can's worth)
- Risky surfing = higher percentage of self-reported illnesses
- Surfers as stewards
- Socio-economic role in communities

Getting to know surfers: Stakeholder engagement, scoping interviews, learning from surfers (Informs survey questions)

Intercept Survey to 138 Surfers: 10 questions, demographics, beach and conditions. Average: Male, age 33, 12 years spent surfing (but many with much more or much less experience)

Surfers preferred to get water quality info on surf forecast websites. For some, it would affect their decisions.

When asked what are the top 3 risks of surfing, water quality did not come in top 10 risks. However, when asked if water quality is a risk, about 75% said yes.

Many said they have gotten sick after surfing. They want to know water quality.

Next steps: Continue intercept survey. Conduct in-depth interviews.

Future outcome: More informed decisions. For example, post water quality info at times when surfers are there (early morning, etc.)

Follow Up:
- Some surf organizations used to be heavily involved. For example, Surfrider got Higgins Beach into the Maine Beaches Program, but interest is waning now.

- Types of illness? GI & respiratory mostly. Some skin infections

- Usage off-season: DEP & State need to consider. It's not just a 3 month season.

Coastal Connections – Place, Beach Use, and Water Quality – Abigail Kaminski presenting

What factors influence connections to Maine's ocean beaches?
Do these connections influence how beaches are used and perceived?

Questions emerged from conversations with stakeholders

There was a lack of info on visitation to beaches.

This study is digging deeper from previous 2014 NEST USM Beach Survey (Charlie Colgan/plenary), looking at beach visitation, use, perceptions, and preferences

Quantitative and qualitative analysis with open-ended responses

Open-ended responses actually revealed many thoughtful passages. Lots of generational place-based connections to the beach.

Findings:
- Most users are long time visitors (may have a different perspective than newer visitors) – almost 75% have been visiting that beach for 15+ years
- Overall high perception of water quality
- Water quality perceptions vary between beaches and user groups
- People rated water quality at the beach they were at as higher than average coastwide
- Clean water is a high priority...
- BUT very few users seek out water quality info

Answering guiding questions –
What factors influence visitation?
- nostalgia, tradition, feeling of connectedness
Do these connections influence how beaches are used and perceived/
- Beachgoer activities vary by beach
- Overall, visitors perceived water quality as 'very good' or 'excellent' regardless of the number of years visiting Maine.

    - Perceptions of water quality at select beaches varied

Management implications:
- Sensitivity to beachgoer variation
    - Tailoring outreach and beach safety communication
    - Incorporating results into risk assessments for public health
- Economic development strategies

Next steps:
- Additional data collection
- Analyses and publications
- Collaborations with other NEST colleagues and coastal stakeholders