Governor's Council on Climate Change (GC3)
Resilient Infrastructure and Nature-based Solutions

MEETING MINUTES

Meeting Date: October 18, 2022

Meeting Time: 11:00 – 12:30 PM

Zoom Recording: Resilient Infrastructure and Nature-based Solutions Working Group Recording

ATTENDANCE: GC3 Working Group Members in bold

Name:
Samuel Alexander
Tyler Anderson
Michelle Andrzejewski
Dominic Antonio
Tyler Archer
Paul Aresta
Thomas Baptist
Ashley Benitez, DEEP Liaison
Rick Bennett
Todd Berman
Beth Bernard
Amy Blaymore Paterson
George Bradner, *Co-chair*
Mary Buchanan
Kathy Castagnetta
Louanne Cooley
Sarah Crosby
David Dickson
Rebecca French
Matt Fulda, *Co-chair*
Amber Garrard
Nicole Govert
Kevin Grigg, *Co-chair*
Eric Hammerling

Paul Hearn
Michael Hogan
Christopher Kelly
Jonathan Kinney
Robert LaFrance
Anthony Lanzaro
Alysse Lembo-Buzzelli
William Lucey
Joseph Marrone, Science and Technology Liaison
Erik Mas
Jennifer Mattei
Mark Moriarty
Katharine Morris
Sara Morrison
Heba Naqvi
James O'Donnell, Science and Technology Liaison
Mary Pelletier
Malaquias Pena
Joshua Petro
Emily Pysh, *Co-chair*
Cynthia Rabinowitz
Megan Raymond
Denise Savageau, Equity and Environmental Justice Liaison
Emily Slotnick

Ashley Stewart
Kelsey Sudol
Tyler Theder
John Truscinski
Sarah Watson, DEEP Liaison
Joanna Wozniak-Brown
Michael Yeosock

AGENDA & NOTES

Welcome: Sarah Watson, DEEP Liaison

Ground Rules:

- Meeting is recorded and a link will be posted
- Announcement that the chat is public record, but may be used for questions and comments by working group members
- Working group members are asked to post their names and affiliation in the chat
- Reminder that the discussion portion is reserved for working group members
- Announcement that non-working group members should mute and turn video off until public comment

Welcome and Introduction of Co-chairs: George Bradner, Matt Fulda, Kevin Grigg, Emily Pysh

- Recap from previous meeting:
    - Co-chairs will put together a presentation based on what the working group has discussed
    - In November, this draft will be presented to the Equity and Environmental Justice working group
    - Final presentation will be presented in December for the entire GC3

Presentations:

Stratford Reef Ball Living Shoreline Project: Jennifer Mattei, Sacred Heart University

- Jennifer notes that each coastal point is different than the next
- Her presentation focuses specifically at Stratford Reef
- Specific goals for a living shoreline or nature-based solutions at the shore:
    - Erosion control + Sediment Deposition
        - What are the causes of the loss of sediment?
        - How does sea level rise and wine affect erosion?

    - To address wave attenuation, they used an artificial shellfish reef that was transitioned to a natural shellfish reef
    - Habitat Restoration + Ecosystem Services:
        - Address through shellfish reef, low march, high marsh, grasslands and dunes
- Each site has a history and it's important to understand that history when beginning
    - Planning:
        - Understand neighboring habitats and consider expansion of what is existing
        - Consider the larger landscape (larger the habitat = greater the biodiversity)
- Pilot Study, Stratford Reef:
    - Put in 150 feet of reef balls and added rocks to tether the balls
    - The reef performed as they hoped
        - Decreased wave heights
        - Grasses filtered out sediment and created more of a shoreline
    - Need to plant early so roots are stronger during storm season
    - In 2016, they undertook a reef expansion and deployed 327 reef balls
    - Education is important
        - Created Earth Day planting event for community
        - Had around 200 volunteers
    - Enhanced grew drew denser compared to comparable sites, but did not grow as tall
    - Both oysters and blue mussels are established on the reef, though the mussels took longer to establish
        - Deeper reef balls have better shellfish, but they do not contribute to wave attenuation
    - Microhabitats emerged
        - Mudflat – as it increases in depth, the marsh may grow seaward
        - Need to account for possible changes
    - Site is heterogeneous
    - Tidal range is 6-7 ft (this is a work in progress)
    - Successes:
        - 30-40% wave abatement
        - Marsh has doubled in size in one year
        - Significant sediment deposits
        - Lead is no longer exposed on the beach (sediment burying the lead)
        - Shellfish surviving on the reef
    - Warnings:
        - Do NOT use geotextiles (these do not belong on a living shoreline)
            - Used to preserve sediment on high-tide line
            - Not a good idea to use plastic here
    - After restoration:
        - Turned barren, flat, and vulnerable area to one with habitat structure, biodiversity, and resiliency

Observations of Wave Damping by an Array of Reef Balls in the Inter-Tidal Zone: James O'Donnell, UCONN CIRCA

- Many places in Connecticut demonstrate where the spit has receded, creating high levels of erosion
    - Marsh edge retreats
    - Wave height increases
- Reef balls have been tested since 2000s
    - Shows wave height reduction
    - Determined an equation to demonstrate estimated wave height reduction based on variables of reef ball depths, among others
- In application at Stratford Reef, Jim notes findings:
    - Water level at the site changes significantly naturally
    - When the water level is at the height of the reef ball, the transmission coefficient is at 50%
- Summary:
    - At Stratford point at mid and low tide, the transmission coefficient is between .5 and .3; at high tide, it is .7 or roughly twice the depth of the reef ball
    - Wave height decreased while marsh edge increased
    - Reef balls seems to work better than the small-scale lab tests suggest
        - Comparable to traditional submerged breakwaters
    - Developed a high-resolution simulation of the wave field to assist in design at other sites

<u>Questions and Discussion:</u>

Question: In terms of scalability and co-benefits, do living shoreline projects ever allow for economic benefits, like food production or health?

- Jennifer Mattei: Have seen reef balls been used for shellfish production in Texas and South Carolina
    - However, they are trying to show how these can be utilized for restoration rather than commerce

Question: What is the cost difference between reef balls and breakwater?

- Jennifer Mattei: The most expensive part of reef balls was the shipping, as they are shipped from out of state
    - Reef balls are about 300/each, but shipping can be several thousand
    - Breakwater tends to be more expensive and must be repaired after storms

Question: Was lead remediation done before the experiment?

- Jennifer Mattei: Major remediation was prior. When the clean sediments were put back, they were washed away, creating "hot spots" of lead. The idea was to bury what was left.

Green Infrastructure for Stormwater Management and Stormwater Utilities in Connecticut: David Dickson, UCONN CLEAR

- Context:
    - Stormwater management is important and expensive

        - Climate change puts a strain on aging infrastructure (storms and floods)
        - Infrastructure is typically undersized as development increases
            - Impervious cover exacerbates stormwater runoff
        - Stormwater runoff also contributes to pollution as it runs over impervious surfaces
            - Can create sewer overflows
        - More regulatory pressures to reduce stormwater runoff and pollution at the municipal level
            - Seeing more nature-based solutions, like rain swales
    - To upgrade infrastructure, become more resilient, and disconnect impervious covers to address water quality and quantity is costly
- What is a storm water utility?
    - Collects fees that generate direct, equitable, and stable funding for stormwater management
    - Less common in the Northeast for various reasons
    - Based on impervious cover, so the more you have, the more you pay to help reduce impact on community and waterways
    - Benefits:
        - Capture negative externalities
        - Help communities plan for more resilient patterns of growth
        - More equitable funding source than property taxes since it is based on the amount of impervious surfaces you have
        - Also includes tax exempt organizations, which typically do not contribute to things like this
        - Creates dedicated fund for stormwater management, so you're not competing with schools or other urgent community needs
        - Creates a stable source of funds because the amount of impervious coverage is known
        - There is flexibility with funding and fees can be adjusted
        - Incentivizes folks to put in nature-based solutions because credits are given on the stormwater utility bill
    - Increasing in popularity (over 2,000 in 41 states)
    - Average fee for a single-family home is around $6/month
    - Utilities can serve very small or very large communities
    - In Connecticut:
        - Effective July, 2021: now allowed everywhere in Connecticut and any municipality can create a stormwater authority
        - Can also create stormwater utilities across towns (regional)
    - Stormwater utilities can:
        - Control construction and post-construction runoff
        - Control and abate stormwater pollution
        - Control illicit discharge detection and elimination
        - Contribute to public education and outreach
        - Establish boundaries of district

        - Administer the program
        - Recommend fees
    - Considerations when setting fees:
        - Area of property containing impervious surfaces
        - Land use types (how much runoff it generates)
        - Property values (equity consideration; not burdening lower property value owners)
    - Limits on fees:
        - Can exempt hospitals, but cannot make up more than 15% of the total fees
        - Can only levy certain fees on open spaces, farms, and forests in specific instances
        - Must offer credits for onsite BMPs that reduce, retain, and/or treat stormwater
- New London created stormwater utility in 2018
- New Britain created one more recently
    - Charge per house size
    - Help exists for communities that interested
        - NEMO, UCONN provides resources and information, including a webinar series
        - CIRCA has also offered grant assistance in the past
- Public outreach and education can alleviate community concerns over a "rain tax"

<u>Questions and Discussion:</u>

Question: Can stormwater utilities fund large-scale stormwater infrastructure projects?

- David Dickson: Yes. These funds can be used for any resilient or nature-based solution projects.
- Mary Pelletier: What about in the context of riparian corridor restoration project?
- David Dickson: He would think so. It's up the community on how they would want to allocate funds, but anything related to stormwater is relevant.

Question: How can core logs be used in living shorelines?

- Jennifer Mattei: Not generally the answer to sites that have waves greater than 3-4 feet. Softer products are for low wave energy areas, so you typically need a hard structure to break waves and provide protection.
- Denise Savageau: Core logs would not be used in a marine environment, but rather a freshwater environment. Core logs are good because they are biodegradable, but coconut fibers hold up well.

Question: Mary Pelletier - There is a need for development of bio-sensitive products and to test them in order to make retrofits happen. Is Connecticut supporting the production and manufacturing of these products, or are we buying them out of state? Notes that this is a growing need.

- Rebecca French: Asks that Mary sends an email.
- Jennifer Mattei: Notes that reef balls would be much cheaper if they were produced locally. Also notes that the molds are available, you just need someone to take the project on.

- Jim O'Donnell: Not a private sector right now that is competitive enough to make sense in Connecticut right now, but the more projects there are, the more companies can execute this cost effectively.
- Kevin Grigg: There are also biodegradable geotextiles, but the challenge is their durability.
- Jennifer Matteri: Bese elements are made from potato starch and can be used to produce grids on the shoreline.

Breakout Group 1: *For full comments please see the Zoom recording and/or audio transcript*

- Jim O'Donnell: Challenge with shoreline projects is that they are outside the coastal jurisdiction, so property owners are at a disadvantage
- Amy Blaymore Paterson: Are there examples for freshwater environments and funding programs? Also curious about stormwater authorities and if there was any opposition to establishing it?
    - Denise Savageau: There has been some work done with logs that biodegrade and prevent erosion. There are other products available like that, too. Flood control looks a bit different, but with erosion there has been a lot of work done there.
    - Jennifer Mattei: Can use logs with root balls attached to prevent erosion, but there is a lot of literature on riparian repair.
    - Mark Moriarty: In New Britain, there was a lot of surprise in response to it despite education, so most of the pushback stemmed from customers who were unaware of the stormwater utility. For one customer, the fee increased by $10k/year, which means the person either must divest from the property or greatly reduce their impervious surfaces. Important to note that the previous cost is borne by taxpayers, so this is more equitable. A lot of properties are between $25-$50/year. The mayor was in favor of promoting the stormwater utility, but there has been some opposition.
- Denise Savageau: Reef balls have been around for a while, but there are other products coming out. Are there any activities emerging to look at other products? Wave attenuation device? It has better wave attenuation. New things that are coming out have a more angular look. Are we exploring any of those devices?
    - Jim O'Donnell: Unsure if we are exploring anything else but agrees that there are many other products available. The shape, however, does not matter for the waves – it is the size and spacing that makes an impact. It may affect the habitat or colonization potential and some shapes may be more stable in waves, but from a wave dynamic perspective, the detail of the shape doesn't matter.
    - Jennifer Mattei: Also notes that they tried to implement a reef ball site close to their original site and there was a lot of push-back, which indicates education is needed to further work here.

- Jim O'Donnell: One thing to advance would be a comparison site. Jennifer's site has gotten a lot of attention because there is a lot to learn and it's really practical. Comparison sites would help this, as well.

Public Comments: *For full comments please see the Zoom recording and/or audio transcript*

Denise Savageau: Need to be looking at all these issues through an environmental justice lens. The EJ working group met yesterday and we're trying to put a checklist together for the working groups. Need to keep a focus on how these issues relate to and impact equity and environmental justice.

Adjourn and Next Steps:

- Matt Fulda: Reiterates next steps
  - Presentation to Equity and Environmental Justice working group in November
    - Calendar invite will be sent when the date is set
  - Final presentation for GC3 scheduled for December

Resources:
DEEP Climate Resilience Fund
DEEP Climate Resilience Fund FAQs

Chat Record:
00:21:14 Mary Pelletier: Mary Rickel Pelletier, Park Watershed
00:21:17 Amy Blaymore Paterson: Amy Blaymore Paterson, Executive Director, CT Land Conservation Council
00:21:20 David Dickson: David Dickson, UConn CLEAR
00:21:22 Beth Bernard: Beth Bernard, Education Director with Connecticut Forest & Park Association
00:21:25 james o'donnell: I'm Jim O'Donnell, Exec Dir. CIRCA, and Prof. at UConn
00:21:31 Megan Raymond: Megan B. Raymond, SLR Consulting
00:21:33 Sarah Crosby: Sarah Crosby, The Maritime Aquarium at Norwalk
00:21:36 Amber Garrard: Amber Garrard, Yale Office of Sustainability
00:21:38 Joanna Wozniak-Brown: Joanna Wozniak-Brown, CT OPM
00:21:50 Louanne Cooley: Louanne Cooley, UConn CIRCA
00:21:50 Nicole Govert: Nicole Govert, Sustainable CT
00:21:52 Robert LaFrance: Robert LaFrance, National Audubon Society
00:21:56 Mark Moriarty: Working Group member. Director of Public Works, City of New Britain
00:21:57 Dominic Antonio: Dominic Antonio - CTDOT Hydraulics & Drainage
00:22:04 Kelsey Sudol: Kelsey Sudol, Northwest Conservation District and Lake Waramaug Task Force
00:22:14 Jennifer Mattei: Jennifer Mattei, Sacred Heart University, Biology Dept.
00:22:17 Michelle Andrzejewski: Michelle Andrzejewski, City of Norwalk, Planning & Zoning
00:22:18 Katharine Morris: Kat Morris, OTG/DEEP
00:22:36 Joseph Marrone: Joseph Marrone, PE, Area Leader for Urban and Coastal Resilience, Arcadis

00:22:39 Paul Hearn: Paul Hearn, Baralmar Advisors LLC
00:22:49 John Truscinski: John truscinski Director of Resilience Planning, CIRCA
00:23:00 Denise Savageau: Denise Savageau, Chair
CT Council on Soil and Water Conservation
liaison to the GC3 EJ working group
00:23:13 Tyler Archer: Hi all - Tyler Archer, Shipman & Goodwin LLP
00:23:31 Michael Hogan - CTDOT: Mike Hogan - CTDOT Hydraulics & Drainage/Soils & Foundations
00:24:47 Thomas Baptist: Tom Baptist - Town of East Hartford
00:27:59 Katharine Morris: will these slides be made available?
00:28:46 Sarah Watson, CT DEEP: The recording and slides will be available on the website.
00:32:23 Todd Berman: 6" in one year . . . . . incredible.
00:37:47 Rebecca French, Climate Planning CT DEEP: a recording of this meeting will be posted. slides may be posted at speakers' discretion.
00:40:37 Samuel Alexander: Sam Alexander, SCCOG
00:41:28 Todd Berman: Todd Berman - Avangrid
00:41:44 Rebecca French, Climate Planning CT DEEP: No geotextiles - Important finding!
00:43:31 Katharine Morris: was lead restoration only before or also during the experiment
00:44:00 Katharine Morris: remediation rather
00:46:41 Rebecca French, Climate Planning CT DEEP: Why should everyone care about this Stratford project … it has some of the best monitoring of a engineered living shoreline over multiple years. It is also a good example of work funded by the Long Island Sound Futures Fund, which has received a significant increase in funding with the Bipartisan Infrastructure Law.
00:47:26 Amber Garrard: In terms of scalability and co-benefits of these solutions, do living shoreline projects ever allow for economic opportunities/food production (shellfish, kelp) over time?
00:49:58 Rebecca French, Climate Planning CT DEEP: For folks concerned with freshwater environments, similar approaches have been applied in lakes and rivers where boat wake causes erosion.
00:55:56 Tyler Archer: whats the cost difference between reef balls and a breakwater?
00:56:37 Katharine Morris: can you speak more on remediation before and during the project
00:58:18 Rebecca French, Climate Planning CT DEEP: NOAA = National Oceanic and Atmospheric Administratin
01:02:30 Sarah Watson, CT DEEP: Please type questions for speakers in the chat
01:03:38 james o'donnell: The answer to the cost question is difficult. We need to know how big the submerged breakwater would need to get the same protection. That's why we are analyzing the relative effectiveness. But the cost drivers are personnel, deployment equipment, materials and permits. I think they are likely to be comparable until there are a lot of reef deployments.
01:07:57 Jennifer Mattei: Reef balls are better habitat than breakwaters to fish and shellfish. Boulders used in breakwaters can move during a hurricane, reef balls do not move.
01:08:21 Mary Pelletier: With respect to the problematic use of plastics in any living environments, what biodegradable materials are recommended. Also, could the GC3 recommend Connecticut begin to support/encourage design and production (“manufacture”) of non-toxic and biodegradable products needed to revitalize and restore damaged landscapes?
01:08:33 Mark Moriarty: We started a Storm Water Utility in New Britain July 1st of this year. We called it our Clean Water Fund.

01:10:39 Katharine Morris: what is "IC amount"
01:10:59 Katharine Morris: impervious cover?
01:11:03 Mark Moriarty: yes
01:11:05 Sarah Watson, CT DEEP: @Kat - IC = impervious cover. Land cover that doesn't allow for infiltration into the ground.
01:13:29 Tyler Archer: do you recommend stormwater utilities include processes by which individual properties can be inspected to confirm actual stormwater runoff? Thinking of a typical residential house with roof and driveway but rainwater discharges to a yard or garden without actually making it to the street and stormwater system
01:14:13 Todd Berman: These have been very informative briefings. Unfortunately I need to drop off of a 12:00 meeting.
01:15:38 Rebecca French, Climate Planning CT DEEP: Note on the hospitals, that 15% cap will not apply after 2026
01:15:40 Katharine Morris: can you elaborate on the state property limit
01:16:42 Rebecca French, Climate Planning CT DEEP: New Britain is the first municipality to set up an authority under the new law. Congrats New Britain!
01:16:43 Mary Pelletier: Could funding from stormwater utilities be designated to large scale green infrastructure projects that increase ecosystem connectivity and functionality? For example could funds collected from stormwater utility fees be directed to conservation and revitalization of designated riparian degraded/impaired corridors? Perhaps larger scale projects would have greater collective benefits.
01:18:44 Jennifer Mattei: Ben Zito (ben.zito@noaa.gov) is the person working on costs of living shorelines. Contact him for info.
01:19:44 james o'donnell: Climate resilience fund is larger and can be used to support the development of stormwater utilities.
01:20:05 Amy Blaymore Paterson: David, would you provide a direct link to the municipal ordinance template?
01:21:02 William Lucey: Some places give SW credits for maintaining riparian buffers
01:21:16 Katharine Morris: can you speak on the state property limit
01:21:36 Rebecca French, Climate Planning CT DEEP: trying to find the ordinance
01:40:57 Ashley Benitez-Climate Planning, CTDEEP: https://portal.ct.gov/connecticutclimateaction/executive-order/deep-climate-resilience-fund
01:41:06 Amy Blaymore Paterson: Thanks, Mark, for that response.
01:41:37 Cynthia Rabinowitz, NWCD: This has been invaluable. thank you to the great speakers.
01:43:21 Ashley Benitez-Climate Planning, CTDEEP: Thank you, Denise! EEJ working group + this group will have a meeting during November. Stay tuned.
01:44:55 Rebecca French, Climate Planning CT DEEP: For those interested in funding to develop a stormwater authority under the DEEP Climate Resilience Fund see FAQ#42: 42. My community is interested in exploring studying the feasibility for a stormwater utility or developing a climate change, flooding, and erosion control board as authorized under PA 21-115. Which track should we apply to?
Stormwater utilities and climate change, flooding, and erosion control boards are important so communities can fund and manage resilience projects. You can include this as an expense under your local match funding strategy component of your budget for either Track 1 or Track 2. If you are interested in applying for stormwater utility feasibility studies as a standalone activity, please email DEEP.climateresilience@ct.gov.
01:45:04 Rebecca French, Climate Planning CT DEEP: https://portal.ct.gov/-/media/ConnecticutClimateAction/DCRF/Docs/DCRF-FAQs.pdf

01:45:59 Mark Moriarty: Great meeting & presentations. I need to jump off & get on another meeting. Have a great day.
01:46:15 David Dickson: For those who asked, the current statewide IC layer resolution is 1ft. The upcoming flight is 3 inch.
01:46:22 Katharine Morris: Public Comment: Nature Based Solutions for climate resilience and mitigation are extremely valuable, especially when prioritizing the life rather than profit. I'll second the note on proactively considering environmental justice and equity as well as creativity and indigenous knowledge into these projects. Lastly, id note that we must remain vigilant about the broader sustainability in this process to ensure we are not putting our personal environment above the larger ecosystem. We are all connected, regardless of whether we see the folks our actions impact. That goes for Stratford to Bridgeport. CT to Florida, and USA to the rest of the world. Thank You.
01:46:41 Tyler Archer: excellent q, Mary!
01:47:58 Katharine Morris: also, the cost to be considered in more than fiscal.
01:48:02 Katharine Morris: best!
01:48:17 Kevin Grigg: There are biodegradable geotextile fabrics available, though durability remains an issue.
01:48:34 Denise Savageau: Mary - I was thinking the same thing for the reef balls and good comment Jennifer.
Job creation - is it a EJ solution
01:49:31 Amy Blaymore Paterson: Co-chairs, please remind us of next steps
01:49:54 Emily Pysh (CT DOT): Thank you everyone for the discussion today!
01:50:01 Amy Blaymore Paterson: Thanks for the slide! Great meeting.
01:50:05 Michelle Andrzejewski: Thank you!
01:50:12 Sarah Watson, CT DEEP: Note the date on this slide isn't correct
01:50:40 Louanne Cooley: Thanks all!
01:51:01 Megan Raymond: Thanks!
01:51:03 Amber Garrard: Thanks!