CRC Meeting 18
July 27, 2022
Present: Dean Wesson, Director Baptiste-Sexton, Dean Couzis, Dean Gutman, Professor Higney, Dean Lamboy, Dean Rich, Vice President Mozeleski, Chair Silber, Senior Director Wooten, Professor Aguasaco, Dean Perkins, Associate Dean Lima, CRC Chair Tinajero

Item 1: Review of the timeline for the CRV Initiative Final Team Selection Process, such as the due date for the scoresheets and the announcement of the award.

Item 2: CRC Presentations (See Below)

CRC Presentations:

Introduction: Dean Wesson introduced the College-Wide Research Vision Initiative Final Team Presentations. There are four presentations in this session; the presentations are open to the CCNY community. The session was recorded, and the recording will be made available, along with slides, on the CCNY CRV website https://www.ccny.cuny.edu/research/college-wide-research-vision.

Team 5: The "Beloved Community" Project
Team Members:
Terri N. Watson – School of Education
• Billy Council – School of Education
• Edwin M. Lamboy – School of Education
• Susan Perkins - Division on Science
• Noel Manyindo – Community Health and Social Medicine

Guiding Question: What would be the social consequences if Harlem's residents were given access to culturally affirming and quality health care?

Problem Statement: Historically, Harlem's Black and Hispanic residents have experienced race-based discrimination and systemic inequities. These inequities were exacerbated during the global COVID-19 pandemic.

Methods:
- Contexts
- Partnership Processes
- Intervention and Research
- Outcomes

Future Funding Prospects and Self-Sustaining Plan: The team proposes an inter-disciplinary research project that will combine faculty from the School of Education, the Division of Science, CUNY's School of Medicine, along with several of Harlem's residents to improve the overall health of Harlem. The team's aim is to create a better and healthier Harlem for the sake of all who live and work in this "Beloved Community."

Questions:
Q: Why do you think there were few young people among your respondents?
A: I think it was us. Many of us asked our friends and neighbors and we are in the age of the respondents. But there are ways to get younger people involved, especially when schools are in session, and we will do that on site visits to community-based organizations that have younger members.

Q: Can you elaborate on specifically the research objectives that you have outlined in the white paper.
A: The overarching aim is to help to create a healthier Harlem. So, this is that we're address their needs that have been exacerbated by COVID-19 and, as you know, Black and brown communities are marginalized and under-resourced. We can publicize this. Community partnered research.

Q: Why is this the right time, why is the time to grow this opportunity?
A: The state of the world, in terms of the economy, political activism, the far right and the far left. I think that interdependency is far better than dependency. We're realizing that we need one another. Because of COVID, it's more than just the scientists, it's everyone. We can meet the need of the people.

Team 6: "Hygroscience" for Evaporation Energy Harvesting
Team Members:

Faculty Name	Expertise Critical in Project (up to 2)
Dr. Xi Chen (Team Lead)	A. Vision for the Technology; B. Water-Responsive Materials.
Dr. Ahu Aydogan	A. Design; B. Prototype Implementation.
Dr. Daniel DiSalvo	A. Public Communications; B. Energy/Public Policy.
Dr. Raymond Tu	A. Polymer Science; B. Natural Materials.
Dr. Charles Vörösmarty	A. Scalability of Energy Production Process; B. Water Cycle Analysis at Regional and National Scales

Guiding Question: What would it look like if we could create a NEW form of sustainable energy?

Summary: The team is interested in creating a new sustainable energy source that harnesses energy from open water reservoirs to create electricity.

Project Statement: Scientists are urgently seeking to develop cheaper, cleaner, and more sustainable energy sources. While great progress has been achieved in renewable energy

technologies, we are unlikely to simultaneously solve the climate crisis and address challenges to the nation's economic health without adopting a more diverse mix of renewables.

Methods:

- Reduce the parameter space of potential materials by focusing on critical benchmarks of WR power density (>50 kW/m3), efficiency (>10%) and scalability
- Material processing to define a set of silk-based films where a different degree of crosslinking or welding defines WR properties for different operating conditions
- Build a series of testbeds from laboratory- (0.2 to 1 meter) to meso-scale (1 to 10 meters) that are easy to reconfigure for different WR materials and adjust for optimizing power output
- Create a plant-based, evaporation-powered air filtering system
- Develop theory and simulations that describe the whole energy conversion and transfer processes
- Determine the theoretical potential of the system and its management for application in electricity generation scenarios in a variety of environments
- Develop marking materials, where the evaporation energy harvesting technique will be compared to existing renewable energy to show the potential of our technique
- Gather information and create a contact list of these relevant agencies

Future Funding Prospects and Self-Sustaining Plan: The team sees the DOE, DOD, NSF, and the Alfred P. Sloan Foundation as potential funding agencies. The team wants to find applications in other fields and in new technologies, consolidate the new research field of "hygroscience," and find different funding sources can propel the future progress of the field.

Questions:
Q: So, you're harvesting solar energy and also using evaporation, so the point of it would be for at night, when there wouldn't be solar energy to use?
A: Basically, evaporation, it doesn't matter if there's sunshine or not.

Q: The efficiency of harnessing the kinetic energy, is it practical?
A: Yes. We published a paper in which we estimated the efficiency to depend on where you are, but in the United States, the annual average efficiency can reach 50%. It is feasible. It's all about the process.

Q: Sometimes it's more or less humid, how do you handle those fluctuations in the weather?
A: When the energy isn't needed, they'll cover the water and then the energy is in the water as heat, and when it's needed, they'll let it go.

Q: Would this be more feasible to operate in more humid climates?
A: The hotter, the drier, the better. New York isn't that bad, though.

Q: How expensive is this, comparable to other renewable energy sources?

A: Our estimate is that if they control the [metro? natural?] price to $5 per kilogram, the electricity price could be around two cents per kilowatt per hour.

Team 7: Energizing Equity: Co-creating Scalable Urban Resilience via Climate Solidarity

Team Members:

Faculty Name	Expertise Critical in Project (up to 2)
Yana Kucheva (Team Lead)	A. Housing Policy; B. Demographic Projections
Ahmed Mohamed (Co-Lead)	A. Power systems; B. Renewable energy
Zihao Zhang (Co-Lead)	A. Urban ecology; B. Smart city/urban technology
Michael Bobker	A. Energy engineering; B. Building electrical systems
Katherine Chen	A. Transformative organizations; B. Participatory research/pedagogy
Prathap Ramamurthy	A. Urban climate; B. Environmental sensing technology
Shawn Rickenbacker	A. Urban climate resilience; B. Urban justice and community engagement
Catherine Seavitt Nordenson	A. Coastal resilience and adaptation; B. Landscape restoration
Huy T. Vo	A. Urban computing; B. Data visualization
Zhigang Zhu	A. AI/machine learning; B. Multimodal sensing and modeling

Guiding Question: Imagine if solidarity surrounding climate actions were leveraged to reimagine and co-create a future for New York City?

Problem Statement: The climate crisis is an opportunity to reimagine urban futures. Growing climate injustices coupled with pre-existing urban inequities can foster mass displacement of vulnerable populations and catastrophic failure of critical urban infrastructures. While existing technologies could mitigate these, gaps between data and design, analysis and action, top-down visions and bottom-up efforts hamper contemporary communities' efforts to establish actionable plans to adapt to the changing climate.

Methods:

- Work Package 1: Online platform "Climate Solidarity" for convergence research around climate actions
- Work Package 2: Data Science for modeling and visualization of impacts and risk assessment
- Work Package 3: AI-Enabled Community Energy Cells: a transformative approach to decarbonize the grid and achieve energy justice
- Work Package 4: Community Climate Response Index (CCRI) by evaluating current NYC climate resilience efforts
- Work Package 5: Participatory Research and Community Engagement for Public Policy Development

Future Funding Prospects and Self-Sustaining Plan: The team's funding comes from government sources like NSF (Smart and Connected Communities; Coastlines and People Hubs for Research and Broadening Participation), the Department of Energy, and Building Technologies Office; private foundations such as New America Public Interest Technology; public and private partners including NYSERDA Clean Energy programming, the NYC Mayor's Office, the NYC Housing Authority, Con Edison, and NGO partnerships; and curriculum development from

CCNY Cengage. Its self-sustaining plan includes creating a book series tied to annual interdisciplinary conferences.

Questions:
Q: How can this project be applied to our own CCNY campus?
A: The team wants to harness all of CCNY's opportunities. One of the members teaches a class where students go into communities, take notes on what's happening there, and then partner with community members on solutions. Different departments are working together on this project, and students are a part of this. Another way is putting roof pots on all of the CCNY buildings.

Q: Given the importance of trees and open space in reducing urban heat, absorbing flood waters, and addressing root causes of climate change, do you see a need for biodiversity in your project?
A: They work on how to engage architecture with urban biology and landscapes. Diversity is considered as part of a social concern to address problems.

Q: In your objective, you mentioned microscale climate projections. How and who on your team will achieve this?
A: One of the members runs physics-based climate models at various scales.

Q: Package three talked about energy justice. Can you explain what you mean by that and how you will accomplish that?
A: The team sees energy justice, at least in the short term, is thinking through models of how to make the energy grid more stable, especially for low-income communities. We know that, in the United States, when private utilities, such as Con Edison, make decisions about the electric grid, they usually do not prioritize low-income neighborhoods. So, what happens is that low-income New Yorkers are much more likely to experience blackouts and are also much more likely to not have their power restored after a potential blackout. Because low-income communities usually live in inefficient housing, they pay multiple times more on their energy costs compared to people who can afford newer housing. For our concrete project, we're not only working on our supply of clean energy to the community but also the potential energy sells to make the cost of energy much more affordable.

Team 8: Biodiversity and climatic controls of New York State's economy – lessons from Sugar Maples
Team Members:

	Faculty Name	Expertise Critical in Project (up to 2)
BIO 	Ana Carnaval (Team Lead)	A. Integrative biology. B. Climatic controls of species distributions and genetic diversity.
BIO 	Michael Hickerson	A. Population genetics. B. Barcode data in ecology and evolution
EAS 	Kyle McDonald	A. Remote sensing technology and applications. B. Drone photogrammetry.
GEO 	Andrew Reinmann	A. Plant (maple) physiology. B. Plant responses to changes in snowpack.
POLICY 	Jean Krasno	A. Environmental Policy. B. Negotiation processes.
ART 	Rebecca Albee	A. Photography.
ENGL 	Emily Raboteau	A. Creative Writing. B. Climate Change Communication.
ENGL 	Michelle Valadares	A. Creative Writing. B. Film- and documentary- making.

Guiding Question: How do soil microbes and climate impact New York State's maple-related industries through sap production and Fall foliage colors?

Problem Statement: Climate and habitat change threaten biodiversity and the ecological services it provides. As such, they directly impact economies and human well-being worldwide. Shifting the global economic paradigm and the market forces that keep altering our planet's climate and natural resources requires changes in human perception, values, and behavior. To set this paradigm shift in motion, we must act locally and engage scientists, political scientists, artists, writers, students, and a diverse community of stakeholders.

Methods:

For Approach #1:

- Characterize temperature, precipitation and snowpack in 10 maple stands across different soil types and climates in the state of NY
- Document leaf colors through chemical analysis, drones and artistic photography (Fall)
- Characterize sap flow and composition (sugar content; Late Winter/Early Spring)
- Describe soil microbiota through eDNA barcoding: composition and diversity of bacteria and fungi (across seasons)
- Interview local sugaring communities: practices, relevant policies, narratives, challenges
- Involve CCNY students in field collection or lab-based analysis: Biodiversity, Climate Change and the Political Process (BIO/SUS/IR), Creative Writing (ENG), Intro do Biotechnology Lab (BIO), Environmental DNA (BIO), new FIQWS course in year 2

For Approach #2:

- Identify statistical relationships between climate and soil microbe biodiversity with maple sap flow, sugar concentration, and leaf color vibrancy
- Explore and develop correlative and mechanistic models to predict impacts of future climate change given ongoing tendencies and alternative scenarios
- Integrate scientific and social science research to identify policies that can facilitate climate change adaptation or mitigation
- Involve CCNY students in integrative lab-based analysis: Biodiversity, Climate Change and the Political Process (BIO/SUS/IR), Capstone Project (SUS), Environmental Project (EAS), new FIQWS course

For Approach #3:

- Hold all-hands-on-deck workshop in partnership with the Appalachian Mountain Club to:
    a. Report back to maple producers, share findings and strategies, delineate local policy proposals
    b. Lead a nature exploration retreat to CCNY students
- Organize public exhibit to showcase our creative writing pieces, art, scientific findings, policy, and management recommendations

Future Funding and Self-Sustaining Plan: The team's funding prospects are convergence-focused grants through NSF for biodiversity on a changing planet, critical aspects of sustainability, organismal responses to climate change, dynamics of integrated social-environmental systems. Monthly project meetings include dedicated time to discuss new proposals, and expansion ideas include maple adaptive genomics.

Questions:

Q: Have you thought about collaborations with SUNYs?
A: Yes. SUNY and maple syrup producers and journalists in this area are part of the list to whom the team wants to reach out to. There are many people around the team who can help them, and they can look beyond CCNY.

Q: Have you identified any companies or producers?
A: Yes. In the original pre-proposal, there was a list of producers who have ties already with collaborators because we want to use some of their maple stands. We want to make this science for the producers as they're the ones really living this.

Q: What about incorporating younger students, maybe a citizen science component?
A: We have not thought of that, but we can. There are many students who can connect with nature through phone apps, so it would be easy to have them help document the color of their local foliage and forests. That's a great way to reach out to the community.

Q: Why now?
A: Because the world is going to hell, Rose. We think that, to change this, we need to do more than just show data. We need to change people's emotions, and that's why we think it's so crucial to use this opportunity to combine the science with artistic expression, with writing, with politics. Writers see this as a pressing issue of the time. That's why CCNY has the climate writing course. Rural and urban students can both be included with e-DNA sampling for soil.

Q: The economics depends on the climate projections in the state-level. Do you have someone on your team who can predict that?
A: We don't have a climatologist, but our students have worked with the NYECC, so we do have ties with other people in the state who can do that. They don't really have anyone on economics right now, it would be a follow-up project.

Q: What specific innovations or technologies do you expect to come from this project?
A: We think the innovation comes from integrating the data and creating models that put together the environmental samples with the microbiological samples, and the colors of the leaves, the vibrancy of the leaves, or the amount of sugar in the maple syrup. It's also innovating to put artists and scientists and creative writers together. If we can change people's emotions by being multidisciplinary and reaching people, that would be worth a lot.

Conclusion: Thank you to the first four teams that presented. The CRC will try to make decisions by mid or end of August or beginning of September.