A Network of Urban Field Stations in the City of New York

A research outlining the possibility of creating a network for urban field stations in the City of New York

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I would have never understood the ground reality, if the 13 professionals that I interviewed, had not given me some time out of their busy schedule.

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I dedicate this report to all the incredible people I came across during this research, whose work inspired me and kept me going.

PROJECT ABSTRACT

The study is an investigation regarding outcomes of creating a network of urban field stations in the City of New York. The paper explores the nexus between urban ecology and environmental stewardship. The paper compares the working of a conventional field station to an urban field station and elaborates on the aspect of community stewardship. A set of 13 urban field stations are studied in detail in terms of their audience, funding, structure of their parent organization and shortcomings. Further, the paper develops a strategy of creating a network of the existing field stations such that they benefit from each other, become indicators of the health of the ecology and represent a unified goal of improving and maintaining urban ecology by catalyzing environmental stewardship. The project also delves into creating symposium content for the managers of existing urban field stations as the first step towards establishing the network.
1. THE CLIENT

The organization supporting this study is Thread Collective. It is a design firm located in Brooklyn, NY. They undertake a wide range of projects from residential/commercial interiors to urban landscape projects. Thread collective is creating Green Infrastructure STEM curriculum for Gowanus Canal Conservancy (GCC). They worked with GCC to create design ideas for the Gowanus field station. The field station was designed as an outdoor classroom that facilitates volunteer training as well as works in conjunction with the school programs of GCC. The Gowanus Urban Field Station will be constructed through a New York State Council of Arts (NYSCA) grant. Having worked closely with the grassroots organization, the client is aware of the opportunities and constraints. The firm has 15 years of work experience in the New York City and is well versed with context of the project. Thread Collective plays the dual role of being the client as well as a guide in this project.

Thread Collective worked on creating a list of various field stations in New York City and has located them geographically on the map of New York City. The field station map has been a great resource and strong foundation for the study. Thread Collective wants to understand the nature and the feasibility of the network. This understanding will help them draw trajectories for expansion of the concept of urban field stations in the City of New York. They envision a tangible end product in the form of a symposium, which will be the first step towards catalyzing the network. The project will culminate in a feasibility report for the network, recommendations for creating a network, and material for the urban field station symposium.

2. DEFINITION OF AN URBAN FIELD STATION?

The concept of a field station in an urban area is contemporary. Currently, there is no official definition or dictionary meaning of urban field station that elaborates or specifies this particular concept. In order to understand the essence of this paper, it is necessary to understand the term, urban field station. In my opinion, an urban field station can be defined as an open or closed space located in an urban context, which is used by the citizens to conduct research and collect data regarding the symbiotic relationship between the environment and its inhabitants, including the human population.

Some important criteria for an urban field station are as follows:
1. It should be located in an urban context
2. It should conduct environmental research
3. It should collect data
4. It should create awareness regarding the study area through various mediums.

An urban field station can be defined as an open or closed space located in an urban context, which is used by the citizens to conduct research and collect data regarding the symbiotic relationship between the environment and its inhabitants, including the human population.
3. PROJECT SYNOPSIS

Field stations all over the world have been instrumental in recording, recording and collecting data that have helped exposed various trends and facts. Typically these field stations are physically located in the same geographical area, on which they conduct research. A field station is associated with a larger grassroots organization of biological field stations. The study not only envisions the network of field stations, stewards and researchers and creates and maintains a healthy ecology. Consequently, a field station but also works towards creating a sanctuary for opening the discussion to the pros and cons of the study. Existing urban field stations were conducted which helped in reconfirming the ideas of the informal network between field stations that will catalyze interaction. For instance, both the network aspect of field stations, served. It also identified the available research instruments, expertise available, the operational structure and expansion plans. 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This paper states that, the site-based efforts by the existing group have led the City to have the potential to create stewardship around the urban ecosystem. These stewardship efforts and initiatives have taken place in various forms (in terms of knowledge, manpower, etc.) between public agencies and civic organizations. This paper highlights that governance network is generative through various mediums. These organizations work as collaborators as well as the critiques of the existing system and thus have a very adaptive and iterative role in the society. The paper also acknowledges the limitation of the literature review around the urban ecosystem. These stewardship groups work towards the river clean. Thus, the steward groups have the local expertise they do have and are a continuation of the previous research paper. It talks about how the stewardship system, since its birth somewhere around the turn of the century, is evolving and changing system particularly in the city of New York. It identifies that multiple groups are organized and are engaged in New York’s environmental and geography. It explores the possibility of cross-disciplinary network between groups with similar goals or similar working boundaries. These groups work in various scales such as watershed, certain land use, etc. This team of urban field stations in New York City (SMAP project of 2007 and has gained some striking insights regarding the existing networks. The authors say that the engagement of the public in environmental decision-making itself is an indicator of close-knit connections between social and ecological advancement in the city. The groups are constantly adapting the relationship with the government organization. Sometimes they work in opposition and other times with the existing laws. These papers also suggest the possibility of these groups working individually and collectively as well as working on a citywide lens by connecting urban field station with local expertise.

6. LITERATURE REVIEW

a. Organizing urban ecosystem services through stewardship governance in New York City

The extensive role of humans in shaping in- teractions between living and non-living compo- nents of the urban environment makes the term environmental stewardship governance in New York City. The goal of this project is to create a network of field stations such that they serve the dual purpose of creating urban ecosystem awareness and create data sets that function as urban ecology indicators for the City of New York. How do we leverage the existing system of urban field stations by creating a network between them and through this network, figure out a path from ecologically unaware to eco logically aware citizens, while creating indica tors that inform our ecological progress?

b. THE GOAL OF THE PROJECT

The goal of this project is to create a network of field stations that they serve the dual purpose of creating urban ecosystem awareness and create data sets that function as urban ecology indicators for the City of New York. The nature of environmental stewardship of any city is the result of its ecological, political en vironment and nature of the citizens. Although the study recommends the expansion of the network to other cities, the study is limited to the urban field stations that operate in the City of New York. The Science Barge in Yonkers is an exception to the group. The Science Barge of Ground Works Hudson Valley in Yonkers is an exception to the group. The City of New York has more than 3000 experts that inform our ecological progress?

c. LIMITATION OF THE PROJECT

Sample Sizing:
The appropriate way to conduct this project was to adopt a snowball process, create growing list of urban field stations and inter- view them to understand the exact dynamics of the network. The nature of urban field sta- tions vary, few even have temporary operating periods. For instance, the plus pool project – A Plus shaped pool which filters Hudson river wa- ter and enables safe swimming in the river, had a temporary field station where they conducted water testing and filtration systems. Due to the time span of the project, the study is limited to the list of 13 urban field stations. Although, all the field stations identified during the process are mentioned in the appendix. The nature of environmental stewardship of any city is the result of its ecological, political environment and nature of the citizens. Although the study recommends the expansion of the network to other cities, the study is limited to the urban field stations that operate in the City of New York. The Science Barge in Yonkers is an exception to the group. The Science Barge of Ground Works Hudson Valley in Yonkers is an exception to the group. The City of New York has more than 3000 experts that inform our ecological progress?

7. PROJECT DETAILS

a. GUIDING RESEARCH QUESTION

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b. THE GOAL OF THE PROJECT

The goal of this project is to create a network of field stations such that they serve the dual purpose of creating urban ecosystem awareness and create data sets that function as urban ecology indicators for the City of New York. This paper will explore the idea of creating a network of field stations such that they serve the dual purpose of creating urban ecosystem awareness and create data sets that function as urban ecology indicators for the City of New York. The nature of environmental stewardship of any city is the result of its ecological, political environment and nature of the citizens. Although the study recommends the expansion of the network to other cities, the study is limited to the urban field stations that operate in the City of New York. The Science Barge in Yonkers is an exception to the group. The Science Barge of Ground Works Hudson Valley in Yonkers is an exception to the group. The City of New York has more than 3000 experts that inform our ecological progress?
In order to understand an urban field station, it is important to understand the similarities and differences between the field station and a rural field station. Both field stations and an urban field station are located near the subject they are studying. For instance, if a researcher is studying a river, it will be located near the river. Typically, a field station is located in a remote area, which is not easily accessible. An urban field station is located in an urban area. Hence, is highly accessible to researchers. A field station has a big tangible footprint and houses every facility that is required for the research such as laboratory, educational space, living space, etc. The price of land is expensive in urban areas. Therefore, due to space constraints, and an atmosphere of a remote location may not have all facilities required for the research. The research conducted by field stations is directed towards researchers and scientists. The research conducted by urban field stations is done for the benefit of the public. Since the knowledge is disseminated through various mediums such as STEM courses for school students, educational programs for adults, etc. The next section gives a detailed explanation about the workings of both field station and an urban field station by stating an example.

a. What is a Field Station?

The National Science Foundation (NSF) defines a field station as follows; “Biological Field Stations (BFS) and Marine Field Stations (MFS) are off-campus facilities for research and education conducted in the natural habitats of terrestrial, freshwater, and marine ecosystems. FSMILs support environmental and basic biological research and education by providing facilities and equipment in close proximity to those study areas, and by developing and valuing relationships with the communities around them by playing a key role in maintaining the knowledge base, they do not have direct interaction with the community. The end product is technical and thus difficult for everyone to process. The very technical nature of the expertise that is generated make the knowledge exclusive to the professionals who have a particular expertise. Currently researcher and teachers are taking surveys to understand the level of outreach and have plans to work on their outreach component.”

The remote location and inaccessibility through public transportation can add level of complexity to the outreach and community. The field stations have various kinds of funding sources and it varies from facility to facility. The funding sources range from the parent university funding, private donations to NSF grant funding.

b. Case study of a Field Station – Central Michigan University (CMU)

Central Michigan University (CMU) is a public university located in Mount Pleasant, Michigan. It is associated within CMU’s Mount Pleasant campus, which is located on the outskirts of the city of Mount Pleasant. CMU is in the middle of rural Michigan. Central Michigan University (CMU) is a relatively small school with a focus on undergraduate education. CMU has approximately 6,000 students enrolled in its undergraduate programs.

The CMSU field station is 180 miles apart. The location gets difficult for everyone to process. The very technical nature of the expertise that is generated make the knowledge exclusive to the professionals who have a particular expertise. Currently researcher and teachers are taking surveys to understand the level of outreach and have plans to work on their outreach component.
rooms and a greenhouse. The CMU Biological station boathouse has Mesocosm facility and provides access to Beaver Archipelago. The Matt and Ellie Hohn Center has the main lodge, cafeteria, men’s and women’s dorms, vending machine and bookstore.

Transportation to the location is tricky. Patrons can arrive on the island by ferry from Charlevoix. The ferry from Charlevoix and the beaver island is operated by Beaver Island Boat Company and takes 2.5 hours. There is a local airport on the island called as the Beaver Island Township Airport. Only two airlines provide this facility and the travel time is 20mins. CMU provides transportation from ferry drop-off and the airport. The field station is run by the grants provided by various organizations such as National Science Foundation (NSF), United States, Environmental Protection Agency (EPA), U.S. Geological Survey, etc.

The research papers are published under the university’s copyright and published online and to the peer reviewed journals.

Improvement to Facilities at CMU Biological Station on Beaver Island. [Accessed April 8, 2018].

THE CMU BIOLOGICAL FIELD STATION IS 180 MILES AWAY FROM THE PARENT ORGANIZATION.

BIOLOGICAL FIELD STATION

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c. What is an Urban Field Station?

The definition and case study of field station or lab as part of research and education. The proximity of human interaction and daily activities contribute to the health of the ecosystem. The human population is an integral part of urban areas. The Northern Research Station is one of the 10 units of the USDA forest service. The community comes into the picture in various forms through research and education. The concept of field stations responded to the changing environment as well as connecting people. Their studies resulted into following database such as, comprehensive list of fish species, colonization of shoreline invertebrates, fish behavior and behavior. They are associated with harbor school and conduct few classes for harbor school students.

Since, may 2005, the facility is temporarily located in the Pier 40 building of Hudson River Park. The administration work and part of the research is located in the Pier 40 facility or conducts tests on samples collected by other organizations. Their incubator facility that is used to check enterococcus levels in the water. The area of the station is 1500sqft and is designed for fish tanks and lab area. The fish tanks are specifically designed such that are connected to the pipes that pump in the brackish water from the Hudson River to ensure perfect pH and salinity levels for the species. They also have benches that can accommodate a class of 15 to 20 students. This space is open for public and has exhibits and fish tanks that inform citizens about the ecology and species of Hudson River. The same space accommodates a lab space that has restricted entry. Besides conducting their own in-house experiments the river project rents out the lab space to other organizations that do not have this facility or conducts tests on samples collected by other organizations. The facility is currently located on pier 40 and in future will be located on pier 26, both are accessible by road, subway and water. There are 5 subway stations and 50 bus stops within 0.75 miles (walking distance) of both the locations. This clarifies the ease of access to urban field stations.
9. LIST OF URBAN FIELD STATIONS:
1. Gowanus Canal Conservancy field station
2. Brooklyn Bridge Park – Education Center
3. Brooklyn Botanic Garden – Discovery Garden
4. Portsride New York
5. The River Project – Wet Lab
6. Bronx River Alliance – Outdoor Classes
7. Northern Research Station
8. Jamaica Bay Science and Resilience Institute
9. Freshkills Alliance – Mobile Science Lab
10. Harbor School
11. Groundwork Hudson – Science Barge
12. Swale
13. Biobus

List of Urban Field Stations

1. Urban Farms
2. Landfill
3. Water
4. Trees
5. Marsh
6. Community

10. TYPES OF URBAN FIELD STATIONS:
In order to create network of the field stations it is important to understand the nature of their work as well as their position in the city and impact on the city. In New York, field stations can be broadly categorized into public facing and non-public facing field stations. But, every field station mentioned in the list is different from one other in terms of its location, audience, the environment they study, the purpose they serve etc. Public facing field stations are instrumental in both community outreach as well as data collect. But the study gives equal weight on stewardship as well as data. It recognizes non-public field stations too as they have strong repository of scientific data and publications.

In order to understand field stations in terms of their organizational structure, goal and audience, they have been categorized into four broad categories such as:
1. Urban field station that is part of a NPO.
2. Urban field stations that resulted into a NPO.
3. Urban field station associated with the government.
4. Urban field station associated with school/college.

Type 01: Urban field station that is part of a NPO:
Around 60 percent of the field stations mentioned in the list above belong to this category. These field stations are born out of the parent organization’s need for outreach. They represent part or entire goal of its parent organization. They may or may not have a robust component of data collection, but do have a very strong component of community stewardship. School kids and volunteerform large part of their audience.

Type 02: Urban field stations that resulted into a NPO
In this type, NPO organizations developed from an Urban Field Station. They too have a very strong component of community stewardship.

Type 03: Urban field station associated with the government.

Type 04: Urban field station associated with school/college.

These field stations are born out school or university programs.

3. Type 03: Urban field station associated with the government. These field stations are part of government’s efforts towards maintaining the quality of life in urban areas.
4. Type 04: Urban field station associated with school/college.

These field stations are born out school or university programs.
The Science Barge is an urban field station that exhibits the values of sustainable living in Groundwork Hudson valley, which is part of larger network of Groundwork USA. The par

ty organization was established in the year 2001 and focuses on transforming the natural environment through community based partnership. The organization's work is con

cerned but not limited to the watershed of Saw Mill River, which is 23 mile long tributary to the Hudson River. Groundwork Hudson valley undertakes various programs such as Healthy Communities, Sustainable Educa-

tion, Youth Development, River Trails and Restoration, education, green way, outreach and recreation. The outdoor class is part of the education initiative. The alliance does not have a formal space for conducting k-12 class; all the classes are conducted on the field and therefore vary through the season. Eel mop-

ing activity and fish passage tour are conducted in spring semester (March – July). Rain garden reporting is conducted in summer and A tree grows in the Bronx is conducted in fall semester. Water quality monitoring, dive into Micro invertebrate, Project waste are the programs that are conducted throughout the year. The alliance has volunteering programs that also involves citizen science data collec-

tion. The citizens are provided with kits, which include bottles, in which they collect 500ml of water. They have devices that are used to collect data. These samples are taken to nearby labs for testing. The Bronx River Alliance runs an open access website, where water quality data is recorded and displayed. The data is tested for parameters such as temperature, pH, dissolved oxygen, Salinity/conductivity, turbidity, fecal pathogens and nutrients.

c. Examples of Type 01 urban field station: Fresh-kills Alliance – Mobile Education Lab

The Fresh-kills Alliance is a non-profit organi-

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city of New York. The vision and purpose of this alliance is to transform fresh kills from a landfill to a 2200 acre urban park. They have partnered with NYC Department of Sanitation Island (CSI) and Hunter College. The Fresh-

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and have gathered robust list of fish species conducting this program since the year 1988. They have been fishes monitoring section, where data on marine biology Internship program, estuarine research programs that support their goal. The River Project marine station was established in the year 1986. The goal of this organization is help protect and restore the ecosystem of the Hudson River Estuary. The Gowanus field station is part of the Brooklyn Botanical Garden’s field stations are meant to integrate various initiatives. The Gowanus canal conservancy has initiatives such as the Gowanus Lowlands, the Gowanus Nursey, Urban forestry, Bioswale stewardship, Green Team and Composting. The organization works closely with many schools and has range or programs that cater to students from 3rd to 12th grade. The field trip has a Fishes monitoring section, where data on fish population is collected. They have been investigating the year 1888 and have gathered robust list of fish species found in Hudson River. The internships are either lab bases or field based. The wet lab is used to conduct classes and for outreach. The research section outlines the various research paper and project undertaken by the organization. Their water quality data is published through water trail association and is open to public.

One of the unique feature of The Wet Lab is that, they have fish tanks with open systems (the brackish water of the river flows through the tanks). They are temporarily located at pier 40 in the Hudson River Park, and soon will be shifting to pier 26 in Manhattan.

e. Examples of Type 01 urban field station: Gowanus field station

The Gowaus Canal conservancy was started in the year 2006. This organization focuses on ecology of the Gowanus canal, which is a superfund site. Their area of influence is the Gowanus canal watershed. They undertake various initiatives. The Gowanus canal conservancy’s field stations are meant to integrate design and maintenance. It will be developed in such a way that it can be used as training space for volunteer citizens. The Gowanus canal conservancy has initiatives such as the Gowanus Lowlands, the Gowanus Nursey, Urban forestry, Bioswale stewardship, Green Team and Composting. The organization works closely with many schools and has range or programs that cater to students from 3rd to 12th grade. The field trip can be used for training citizens for water quality monitoring. Seining the river is open to all, in this program participants catch fish, examine them, note down the details and release them back to the river. The Education center has high volume of students with the rate of 10,000 school children every year.

g. Examples of Type 01 urban field station: Brooklyn Botanic Garden

The Discovery Garden is an urban field station that is part of the Brooklyn Botanical garden and was started on June 5, 2015. This space is built so that kids can grow their own plants and harvest them. The Discovery Garden has one-acre space available for school gatherings. The field station has 250-gallon aquarium filled with critters from the coastal regions of the world. The aquarium is set up to conduct classes and for outreach. The park's ecology, history and sustainable features are the features. The discovery garden has one-acre space available for school gatherings. The field station has 250-gallon aquarium filled with critters from the coastal regions of the world. The aquarium is set up to conduct classes and for outreach.

The BioBus has visited over 500 schools in New York City.
Swale is a forest developed by an artist Marry Mattingly. It was established in the year 2016. Swale is functional from the month of May to October. The popularity of this program is increasing every year; they have also started developing their school programs. Their programs are not prescribed to any particular age group and can be modified according to the age of the audience. Some of their school programs are: The color wheel dye lab, permaculture, regenerative urban agriculture and herbal ethnography. The group conducts wide range of public events such as the water filtration, pickle making, rope making, facial toner making etc. Through their workshops and presentations for second time visitor such as the teachers, parents, students. They have two special program recommendations for visiting scientists have developed data sets regarding the types of soil used, types of plants used and water quality data.

i. Examples of Type 02 urban field station: Swale

Swale is a forest developed by an artist Marry Mattingly. It was established in the year 2016. Swale is functional from the month of May to October. The popularity of this program is increasing every year; they have also started developing their school programs. Programs are not prescribed to any particular age group and can be modified according to the age of the audience. Some of their school programs are: The color wheel dye lab, permaculture, regenerative urban agriculture and herbal ethnography. The group conducts wide range of public events such as the water filtration, pickle making, rope making, facial toner making etc. Through their workshops and presentations for second time visitor such as the teachers, parents, students. They have two special program recommendations for visiting scientists have developed data sets regarding the types of soil used, types of plants used and water quality data.

j. Examples of Type 03 urban field station: Biobus

Ben Dunbluthner who has a PhD in biology started Biobus in the year 2007. The aim of this organization is to make science interesting. They work with marginalized groups such as: minority groups, girls and low-income K-12 students. They have visited over 500 schools in and around New York City. The Biobus – mobile science lab gets parked in the school campus and the students access it as part of their class during school hours or as an extra activity after school hours. They study species from the Hudson River. They have many programs around Daphnia- plankton that help them understand environment. They have programs such as seeing shapes, Daphnia-microscope and me, itty Bitty Bug bodies, mi- crobiome, particles & properties of food, cells and living environment regents. They have two special program recommen- dations; one named visit Biobase to invertebrate diversity and collecting data with Daphnia. Their programs gained popularity and they expanded their functions to Biobase. The Biobase is a lab located in Harlem at Colum- bia University's Zuckerman Institute. The Zuckerman institute deals with neurology and bio- tech. Biobase expanded their functions to Biobase. The Biobase conducts summer camps as well as after- school programs. They also have a program called Saturday science where they combine science and art. The organization was established in the year 2007 and is hosted by the Brooklyn Col- lege. The goal of this organization is to serve people. They conduct research project throughout the city.
as a knowledge bank for coastal communities and waters that surround Jamaica Bay and New York City. It focuses on resiliency in wetland areas especially in the Jamaica Bay area. They are a part of a consortium of nine research institutes.11


m. Examples of Type 04 urban field station: Harbor School
Harbor school is located on the Governors Island and was established in the year 2003. They have three academics, career & technical education and work based learning. The CTE programs involve aquaculture, marine biology, marine policy, marine systems, ocean engineering, professional diving and vessel operations. The school has developed Billion Oyster project, whose object is to have a long-term, large-scale plan to restore one billion live oysters to New York Harbor over the next twenty years and in the process train thousands of young people in New York City to restore the ecology and economy of their local marine environment.12 Harbor school involves and trains their student through Billion Oyster project. The BOP runs programs such as oyster monitoring, growth, water quality and biodiversity in their satellite campus schools such as The Peter Rrouget school, Hunters point community middle school and Mayer Levin school, etc. They also involve scientists and volunteers that are interested in understanding oysters. The Harbor wide oyster monitoring data is accessible for students and volunteers that are registered for the oyster-monitoring program.12 The New York harbor lab. The New York Harbor School. https://www.newyorkharborschool.org/ (accessed 01 28, 2018).

GLEON is an international non-profit organization that consists of 400 members and 65 lakes spanning through 45 countries. GLEON stands for the Global Lake Ecological Observatory Network; it is an international non-profit organization. Limnologists in Wisconsin founded it. The goal of GLEON is to conduct innovative science by sharing and interpreting high-resolution sensor data to understand, predict and communicate the role and response of lakes in a changing global environment.1 GLEON consists of 400 members and 65 lakes spanning through 45 countries. GLEON can collaborate with any level or organization provided they have a specific goal that aligns with GLEON’s goal. There are professionals belonging to various back- grounds computer science, biology, science, etc. GLEON is funded through National Science Foundation (NSF). Through which it provides every member organization with a high frequency sensor that is attached to the buoy. Those high frequency sensors collect data- sets for different components such as chemical composition, biological composition, etc. Data collected through this instrument, is entered in a data repository called Data One. In other words, GLEON manages the network of organizations by standardizing the data collection method. These data sets are cleaned and maintained by students from GLEON’s university partners. Scientists, researchers, students etc. can access this data by contacting the student in charge. GLEON conducts annual meeting, where all the members are invited to share their expertise. GLEON members write the grant proposal for getting funding from the NSF (National Science Foundation). With that funding they create small workshops mainly involving students interested in lake science. GLEON provides funds to conduct local chapter meetings.


12. ANALYSIS

The first section of the paper outlines the detailed working of each urban field station and its parent organization. The analysis section delves into getting that information together and creating a citywide scale, without losing details of each urban field station. In the case study of GLEON, standardizing the data collection and data storing method creates a network. Since the urban field stations work on different environmental areas, they have devised data collection parameters and methods, which are pertinent to their study area. What works for one urban field station, may not work for other urban field stations. For instance, every year The World Science Festival conducts The Great Fish Count. This event is conducted on the same day at 17 sites through 5 boroughs of the New York City.1 They collect data on the species and the number of fishes found at each site, which determines the ecological health of the particular site. The day is decided according to the Hudson River’s current, which does not necessarily work for other locations. As a result, no species were found at the Bronx River’s concrete plant park. In such conditions standardizing the data collection techniques will take away from each urban field station’s distinct approach. In my opinion, this is one of the reasons why they unable to work on a citywide scale. Now, the challenge is to create a network between urban field stations, which have different physical forms, environmental focus, organizational structure and impact boundary. The analysis is directed towards strengthening each urban field station by strengthening the network between them. The project uses three analysis tools - the matrix, interviews and maps to draw inferences, recommendations and frame next steps.

a. Matrix

As we saw in the previous chapter, all field stations have different programs, initiatives and data sets etc. In order to understand the nature of the network between urban field stations, it is important to put them into a matrix, which analyses them through similar parameters and understands the prevalent trends. The matrix investigates various factors such as the age of the parent organization, age of the urban field station. Every urban field station has a distinct audience group, which is evaluated through the matrix. The information regarding the functional seasons, environments studied, data sets maintained, etc. is compared. Considering the adaptive nature of the urban field stations, the matrix is designed in a way that additional parameters can be plugged into it.

b. Interviews

The inferences derived from the research were used to prepare questionnaires for the managers of the urban field stations. These interviews were instrumental in understanding the nature of existing informal and formal network between urban field stations. Few speculations derived from studying the matrix were confirmed through the interviews. The interview questions were framed around following categories:

- Physical forms
- Environmental focus
- Organizational structure
- Impact boundary

How to create a network when every field station has different parameters
1. **Location, goal, associations, and scale of operation of the urban field station**
2. **Programs, apparatus or materials used to run the urban field station**
3. **Number of core staff and volunteers that are required for the urban field station**
4. **Funding – Initial funding and funding for salaries, maintenance, and resources required for the urban field station**
5. **Collaboration with schools and other organizations**

(List of questions is available in the appendix.)

### c. Mapping

The software Arc-map was used to create a base map that determines geographical extent of the impact area/work area of the 13 urban field stations. The shape files of the base map were layered with different parameters, such as median housing income, land-use zoning maps etc. in order to understand which areas require field stations. This information reveals the scope of expansion for the system of urban field stations. The maps also attempt to draw co-relations between the city policies and the working of urban field stations.

### 13. INFERENCES

#### a. Inferences from matrix:

1. **Adaptive Nature** - The first urban field station was built by the river project. Although, the first marine urban field station was built in the year 1987, most of the field stations were built in the last decade (2001-2010). Indicating that the concept is comparatively new to the city and to some extent explains the lack of awareness regarding urban field station. Since, the concept of urban field station is comparatively new to the city, every urban field station is constantly adapting. Thus, informing that the nature of a network will also be dynamic.

2. **Audience Group (schools)** – Most of the urban field stations cater to the students from kindergarden, intermediate school and high school and have designed STEM curriculum for them. The fact that, The BBP – Education Center caters to 10000 students per year and the Bronx River Alliance – outdoor class cater to 3000 students every year, explains the popularity and demand for these programs. It is evident that urban field stations are yet to explore the potential of conducting programs for graduate students, as only two field stations, The Portside New York and The harbor School have Career and Technical Education (CTE) programs.

3. **Audience Group (minority)** – The Bio-bus was started with an intention to provide access to high-end research instruments to students in low-income neighborhoods. They have special program for schoolgirls, another special audience group they cater to.

4. **Staff and Volunteers** – Although there are only two urban field stations that develop curriculums for graduate students, they are involved in the working of an urban field stations through internship programs, scholarships or through volunteer programs. But, the opportunities are limited and at the most 10 students are recruited every year. Thus, limiting the interaction of graduate schools with the urban field stations.

5. **Programs and groups** - All urban field stations have volunteering programs, most of which are field-based activities. For instance, the Gowanus Canal Conservancy has tree stewardship program, where volunteers work on the field...
understanding various planting techniques. The Portside New York has a program for water stories, which is the only program that taps the wealth of older population.

6. Open Hours - The field stations associated with NPO have open hours, where they provide free access to the citizens and create an extension to the open space and recreation infrastructure. The open access itself plays a key-role in creating awareness among the citizens. In an ironical situation, the only publicly owned urban field station; The Northern research Center (which is developed through collaboration of NYCDPR and USDA) does not have open access.

7. Operational Seasons: Even though the parent organizations of the urban field stations are functional throughout the year, the urban field stations are functional only during certain period of the year. For instance, The Bronx River Alliance is functional throughout the year. But, its rain garden reporting program is only functional from July to August. As, the urban field stations work closely with nature, that they are dependent on the weather conditions and seasons. Therefore, all urban field stations are active during the months of May to November.

8. Program themes: The city of New York has 520 miles of coastline, most of which was contaminated during industrialization. Therefore many urban field stations work around the issues of water. As a result 11 out of 13 urban field stations conduct programs related to water testing and fish species. It can also be observed that, The Fresh kills alliance – mobile science lab, Gowanus Canal Conservancy and Brooklyn Botanical Garden's – Discovery Garden have started developing composting programs after the year 2011. This was the same time when the process of turning Fresh kills landfills to fresh kills alliance park was in its final Environmental Impact Assessment stage. The compost program also aligns with the Mayor's office of sustainability and DSNY's – zero waste initiative.

9. Open data sharing: Only 3 out of 13 urban field stations have website which enables open data sharing. The data collected by other urban field stations is either shared within the network or not shared at all. Thus, this valuable information gets locked. For instance,
Currently Urban Field Stations network for funding opportunities, similar programs, shared resources and events. The limited networking does not help in developing an overall citywide lens.

**Analysis: Interviews**

### Funding

<table>
<thead>
<tr>
<th>NFWF</th>
<th>Five Star Grant</th>
</tr>
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<tbody>
<tr>
<td>NYSF</td>
<td>New York State Fund</td>
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### Themes

- Oyster
- Resources
- Events

### Resources

- **Billion-Oyster Project**: A collaborative effort to monitor and protect oyster populations in estuaries across the United States. [Visit Billion-Oyster Project](https://www.billionoysterproject.org)
- **Five Star & Urban Waters Restoration Grant Program**: A program of the National Fish and Wildlife Foundation aimed at restoring urban waters. [Visit Five Star & Urban Waters](https://www.fivestar.org)
- **Swale**: An urban farm in Brooklyn that focuses on food education and community engagement. [Visit Swale](https://swalesurbanfarm.org)
- **Gowanus Canal Conservancy (GCC)**: Works to clean and protect the Gowanus Canal, one of the most polluted waterways in the United States. [Visit GCC](https://gowanuscanal.org)
- **Hudson River Project**: A nonprofit organization dedicated to the restoration and protection of the Hudson River. [Visit Hudson River Project](https://www.hudsonriverproject.org)
- **Eco-Bus**: A mobile laboratory and science education program that travels to schools and community events. [Visit Eco-Bus](https://www.ecobusnet.org)

### Events

- **Billion Oyster Project**: A mobile lab and science education program that travels to schools and community events. [Visit Billion Oyster Project](https://www.billionoysterproject.org)
- **Challenge**: A competition that encourages innovation in urban water management. [Visit Challenge](https://www.challengeatlas.org)
- **Green Infrastructure Week**: A national conference that focuses on green infrastructure solutions for urban water. [Visit Green Infrastructure Week](https://www.greeninfrastructureweek.org)
- **Billion Oyster Project**: A mobile lab and science education program that travels to schools and community events. [Visit Billion Oyster Project](https://www.billionoysterproject.org)

### Analyses

1. Networking for funding opportunities:
   - Currently, the urban field stations formally connect for funding opportunities. For instance, 4 out of 13 urban field stations are pitching together to acquire the National Fish and Wildlife Foundation’s five star grant program. This program requires five or more partners that work towards achieving sustainability to collaborate for creating overall impact. The grant amount of $50,000 is divided amongst all the partner organizations.

2. Networking because of similar research topics:
   - Urban Field stations with similar research regarding social relevance of Freshkills Park. In this study, they explored and analyzed Staten Island resident’s opinions regarding turning Freshkills landfill to Freshkills Park.

3. Networking because of shared resources:
   - The Gowanus Canal Conservancy has recently started citizens science water monitoring data collection program, in which they collect water samples from the Gowanus Canal and check the level of contaminants. The Entero cocci test requires incubator, which the GCC does not have. Therefore, they send these samples to the lab at The River project for processing and pay the wet lab for their service.

4. Networking because of events:
   - The Freshkills – Mobile Science Lab was part of the annual event conducted by the Gowanus Canal Conservancy, called the Gowanus Expo Event. The Biobus was part of Port Side New York’s event, the Redhook summer 2017.
facing and public facing organizations. Which results into duplication of data, time and efforts. For instance:

b. There is limited networking between field stations. A field station can contact another field station only when they have to start and new program. So they stay limited to the field stations that work around similar areas and miss the citywide scale.

c. Field stations: The urban field stations play dual role, they either work in the favor of the government policies or work to fill in the gaps of the government policies. For instance, the Gowanus Canvass Archeology is partnering with NYCDEP, NYPCEA and NYCDPR to conduct bioswale stewardship program. The River Project – Wet Lab argues that the NYCEPA collects water quality samples from the center of the river. But, most of the human interaction with the river is through fish swimming etc. There are limited urban field stations conducted along the edge of the river and therefore they collect water samples from the edge of the river.

d. Closely collect the issues of limited resources and space: The network will enable urban field stations to support each other. One Urban Field Station that does not have a meeting space can approach other urban field stations and their programs. Further, they can choose which urban field station aligns best to their curriculum.

e. Closely collect the issues of limited expertise: The network can hire experts and professionals. Through the network the expertise can be shared by sharing the professionals.

g. The citywide network will create an identity for urban field stations, such that they attract funding. The network will provide an identity to the localized urban field stations. In other words, the network will help branding of the urban field stations. Thus the network can attract private and public funders.

h. Extension to Infrastructure: Increased awareness will lead to increased public access to the

14. RECOMMENDATIONS

The inferences have led to some recommen-dations, which are:

1. Develop a citywide ecology lens

The network will make it easier for the urban field stations, parent organizations and citizens to develop a citywide ecology lens.

2. Create a pool of data and offer public access to the data.

The network will enable public access to the data. This will help the river alliance to acknowledge the presence of the urban field stations and their role in the ecology of New York City.

3. Schools and Colleges can look through the inventory of urban field stations

Schools and Colleges can approach the network work and can go through the list of urban field stations and their programs. Further, they can choose which urban field station aligns best to their curriculum.

4. The citywide network will create an identity for urban field stations

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7. Opinions regarding creating a network: The managers of urban field stations were asked about the opinions of creating a network, they responded in different ways. Their opinions can be themed as follows:

a. Currently, urban field stations share lab space but are not comfortable sharing instruments. Michelle Lubke from the Bronx River Alliance stated that the expensive instruments are purchased through revenue generated by grants. They are not confident if other urban field stations, which have not paid for the instrument, will use it appropriately.

b. The network of a particular field station, depends on the age of the organization and the programs they conduct. The network of field station is directly proportional to the age of its parent organization. The Bronx River Alliance was formulated in the year 1974 and the fact that they are an alliance, makes it easy for them to connect to different organizations.

c. The general conversation indicated that most of the urban field stations and their parent organizations are understaffed and experience lack of funding. They have a mammoth task for approaching private and public funders.

d. There is limited networking generation among urban field stations. Which results into duplication of data, time and efforts. For instance:

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The Online portal will be designed in such a way that it serves urban field stations as well as the citizens.

2. Definition:
Create a definition for Urban Field Station and set criteria. It is important to clearly outline the dual function of urban field station and its context. The definition will help in differentiating organizations and urban field stations. Urban field is not a defined term. In Merriam-Webster dictionary field station is defined as an experiment station. The Oxford dictionary defines field station as a research station located in the field. But, there is no definition for an urban field station. That develops an ambiguity towards this concept.

3. Interactive online portal:
Develop an online portal that replicates the information in the matrix, for all the urban field stations in the City of New York. This portal will not only strengthen each urban field station individually, but also strengthen the network. For instance, if an urban field station requires an advice, help for funding or meeting space, they can go through the online portal and contact the urban field station that can provide them with that facility or expertise.

4. Maintenance of the portal:
Identify an entity that can maintain and regularly update the portal. As the study identifies, that the concept of an urban field station is comparatively new to the city and therefore the working of urban field stations is constantly adapting. In such conditions, static information will not be useful. Also, it was identified through interviews that the urban field stations have limited staff and maintain the network can add to their workload. In such conditions, it is important to identify an entity that keeps the online portal updated.

5. Proposal for NYC-Northern Research Station to lead the urban field station network:

Considering the capacity and the work/impact area, the northern research station can lead and maintain the network of urban field stations in the City of New York. Develop a proposal for NYC-Northern Research Station to develop a section that works for development of the network of urban field stations. The Criteria that make northern research station appropriate for this task are:

a. The northern research station is the only station that works in all the five boroughs of the New York City. In past they have conducted citywide projects. Currently, they are working on the STEW map of NYC. The STEW map

Urban field stations, such that they become part of the recreation infrastructure.
program collects data of over 3000 stewardship organizations in New York City and convert them into GIS shape files, which are made accessible to public by open data portal. This clarifies that they have the capacity as well as the skills to conduct such a citywide program.

b. The urban field stations will not work under the Northern Research Station. The urban field stations will voluntarily provide data to the northern research station, which will then be updated on the portal. Even now, for the STEW map project, the Northern Research Station distributes survey forms to all stewardship groups. These groups voluntarily fill the survey sheets and submit the information.

c. The Urban Field Stations have branches in other cities, such as Michigan, Chicago and Baltimore. They were responsible for replicating the NYC billion trees projects to other cities like Chicago. Thus, through The Northern Research Station, the concept of networked urban field stations can be replicated to other cities and the network can span through the cities in United States.

d. USDA & NYCDPR have collaborated for the establishment of the northern research station in New York City. Once the urban field stations become part of the network led by the Northern Research Station, it will be easier for member urban field stations to acquire funding from these two entities. Also, it will be easier to get access to the NYC parks. For instance the SWALE uses the park space by docking itself to the parks with waterfront.

6. Meetings: The GLEON case study was conducted to understand the networking of grassroots. One of the major takeaways from that case study was that annual meeting, where all members share their knowledge is instrumental in maintaining the network. Similarly it is recommended that urban field stations should conduct annual meetings, where all the member field stations get together for knowledge sharing. Best time to conduct meeting can be during summer or fall when all field stations are fully operational. The annual meetings can be complemented by symposiums, which may or may not involve all members. The symposiums can undertake local agendas.

7. An Urban Field Station Day: The urban Field stations are not very well known in the city. It is recommended to conduct an urban field station day. The concept is adopted from the Open House New York (OHNY), where organizations open their doors for public access. Similarly, on urban field station day, all field stations in New York can have open public access to the field stations.

8. Funding: This recommendation too is formulated from take-aways of GLEON (case study of a network). GLEON does not directly provide funds to any member organization. But, provides funds for purchasing instruments, maintain data portal and conducting local meetings. Similarly, the network of urban field station should have funding that takes care of the network. The funds will be used for conducting meetings, maintaining the portal and providing partial funding to the member field stations incase required.

9. Expansion: Use the gaps in the existing system for expansion of the network. The expansion examples can be as follows: a. Create programs to partner with graduate students and institutes. Through this partnership, urban field stations can leverage on the infrastructure of the institutes. For example, The Freshkills Alliance uses laboratories of Staten Island Institute to conduct water monitoring. Similarly, urban field stations can plug on to the existing infrastructure of schools and universities.

   b. The graduate students can research as well as guide organizations about the data collection methods and protocols. Graduate students can also be helpful by updating and informing urban field stations regarding latest technologies and strategies.

The partnership with colleges and educational institutes will enable urban field stations to leverage on the infrastructure and expertise of the institutes.
c. The inferences state that the urban field stations work to fill the gaps of the existing system. Thus, identifying the gaps in the system can expand the network for the urban field stations. For example, the overlap of GIS maps stating the locations of combined sewer outfalls (CSOs) clearly shows the unchecked CSOs at the north shore of Staten Island. Again, when the CSO outfall map was overlaid with DEP's Green Infrastructure plan, the gaps got clearer. Similarly, there are various other ways in which gaps can be identified and the working of Urban Field Stations can be expanded.
15. CONCLUSION AND NEXT STEPS

The first step towards forming a network will be to conduct a symposium for urban field stations, understanding their interest. Materials such as pamphlets highlighting the agenda of the meeting will be sent to all the urban field stations. The matrix created to understand the trends can be put up for comments and revision to the members during the symposium. A list of questions with anticipated answers is created to kick start the conversation.

The next step will be to develop a proposal for NYC Northern Research Station and plan a meeting discussing the proposal for network of urban field station in the City of New York. The network for urban field stations can be created and expanded in such that an urban field station represents every neighborhood. Every neighborhood can have their unique set of data and in the process create environmental stewards. The system of urban field stations can become that piece of architecture that enables interaction between the urban ecology and the human population.

Ecological data + Environmental Stewards

For every Neighborhood in New York City
16. APPENDIX

a. Extended list of the urban field stations in New York City

1. Plus pool
2. The Hudson River field station
3. Bard college field station
4. El Puente’s green light district
5. New Town Creek Alliance
6. River keeper

b. Interviews

A. Lindsay Campbell

Background: Lindsay is a ‘Research Social Scientist’ at the USDA. She is working with this organization since 15 years and operates from New York’s Urban Field station (also called as Northern Research Station) in Queens. She started her career in the year 2002 by gaining a B.A. in public policy from Princeton University. Following which, she studied two Masters classes, first was in Urban, Community Regional Planning and second masters were in geography. She acquired Ph.D. in geography from Rutgers University in the year 2013.

Purpose of interviewing:
Currently, Lindsay is working on revising the 2007 Stewardship Map in NYC called as STEW-MAP. This map identifies environmental stewardship groups and geographically locates them on the map. The main aim of this project is to facilitate cross-sector and cross-organizational dialogue. The STEW map research aligns with my work and will be instrumental in identifying the overlaps between organizations.

Insights from the interview

Questions asked:
I am having hard time understanding the definition of field station? In your opinion what is the primary function of Northern research station? How do we identify new or existing urban field station? What about units that are not called as a field station but perform the same role?

The Northern Research Station is physically located in Queens, NY. City is an open system. We are not a localized institution and take up research in other parts of the city. We conduct social and ecological studies in the city we work with NGOs, National Area Conservancy – NAC, Universities. There are various local attempts of citizen science data collection. These smaller data collection systems can be termed as urban field labs.

The Northern research center is the network of collaboration between researchers and practitioners. It is a place where researchers can come and conduct researches. It also has housing for people to stay. We also have branches in other cities. In Chicago, we work on physiological and social dimension. In Baltimore we conduct ecosystem study. In Philadelphia we have started new social and biophysical work.

(I showed her the list of field stations I am looking at) I may call the listed institutions as field labs. But, maybe we can think of new lexicon or term for field station. These can be the places in the city where monitoring and education will happen. Your research is closely related to my STEW – Map project where we are studying the operational boundaries of stewardship groups in the city. It is interesting to study how all these different sites connect together.

While working on the STEW Map project did you observe any existing overlap between the works of urban field labs?

Currently, there is no umbrella group that keeps record or facilitates the availability of data. There are many informal connections. These organizations help each other. But, because of lack to knowledge about other’s work there is duplication of work.

What are some of the major roadblocks in functioning of UFS?
We have a very unique size, scale and mission to the organization. Like any non-profit the main roadblocks to smooth functioning of the organization are time resources and staff. We are not a public facing organizations. We keep on making new programs and apply for grants.

Does the USDA field station get its data from local field labs or does its own data finding?
We create our own data. It will be ideal to take existing data from the organizations working locally. But as of now we do not have knowledge about it.

In NYC, citizens are environmentally concerned/aware. Why do you think that UFS are unknown?
The organization and the concept of urban ecology is relatively new, people’s interest has risen in last decade. Thus, it is relatively new. The Institution structure is not apparent and citizens can only see the change. How do we transform cities in to ecological hubs when we work in silos?

With smartphones and democratization of data and affordability of existing science, the data is not locked up anymore.
How can public can be drawn into these field stations? It is necessary to create a matrix of the same. In order to create an understanding of the outcomes that the clients are speculating.

Insights from the interview:

- Non-profit organization has their own goal and research questions around which the organization is formed. Some of them have field stations. How, should and could these field stations be connected. The Thread collective wants to understand how they work. Some of them have field stations. They work amongst lakes around the globe. I am conducting a case study on organization and functioning of GLEON as a case study. I want to understand the capacity at which members of the GLEON get NSF grants for conducting workshops. But can GLEON fund the research of the other organizations? Grant is divided into different components like paying inters, giving scholarships and providing funds for attending travel or workshops. It is for an individual. GLEON is eligible to provide certain percentage of capital to the organization.

What kind of institutions does the GLEON collaborate with? GLEON can collaborate with any level or organization provided they have a specific goal that aligns with GLEON's goal. There are professionals belonging to various backgrounds computer science, biology, science, etc. During annual meeting they share their experience and knowledge.

Is GLEON sharing staff or resources or instruments? The apparatus is provided by GLEON. Everyone involved in this become connected. The Thread collective wants to understand how the GLEON helps in their work? Pro and cons of the apparatus extending/merging to become public spaces?

The lists of questions are as follows:

1. Why is your organization using lab or any special area for data collection or analysis?
2. What is your organization doing to public face organization, how does the flow of students or patrons vary throughout the year?
3. What kind of patrons is the organization most comfortable with? What do you think about the idea of field stations being merged to become public spaces?
4. Primarily, the LFS is associated with [example], do you have any other associations with similar organizations?
5. Which programs are currently, supported by the LFS? List of apparatus required for the same. What does the organization use labs or any special area for data collection or analysis?
6. What is the funding source for the construction of this lab? Were there any obstacles in form of zoning codes?
7. How was the funding source for the field station funded? Did individual programs have their respective sources of funding or is it by an overall fund that then gets distributed to programs?
8. If yes, what are the criteria for distribution?
9. How does your organization fund new projects or for an overall fund that then gets distributed to programs?
10. Does your organization have plans for expansion or expansion in terms of programs?
C. Abbreviations

- BOP - Billion Oyster Project
- BxRA - Bronx River Alliance
- CMU - Central Michigan University
- CSI - New York's College of Staten Island
- CTE - Career and Technical Education
- DEP - Department of Environmental Protection
- DSNY - Department of Sanitation New York
- GCC - Gowanus Canal Conservancy
- GLEON - The Global Lake Ecological Observatory Network
- GI - Green Infrastructure
- NFWF - National Fish and Wildlife Foundation
- NPO - Non Profit Organization
- NSF - National Science Foundation
- NYCDP - New York City Department of Environmental Protection
- NYCDPR - New York City Department of Parks and Recreation
- NYCEPA - New York City Department of Environmental Protection
- OHNY - Open House New York
- SBUR - Science and Resilience Institute In Jamaica Bay
- STEM - Science, Technology, Engineering and Math
- STEW Map - Stewardship map
- TRP - The River Project
- USDA - United States Department of Agriculture


2. Bronx River Alliance - About March 2018. https://bronxriver.org/?pg=content&p=aboutus&m1=1&m2=2&m3=21
