

12-12-2013

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Recommended Citation

David, Madeline; Countey, Jedd; Jacobson, Sarah; and Chandhoke, Bridgette, "Sustainable Energy, The Androscoggin, Grow L+A" (2013). *Community Engaged Research Reports*. 8.
http://scarab.bates.edu/community_engaged_research/8

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Project 8: Sustainable Energy, The Androscoggin, Grow L+A

Madeline David, Jedd Countey, Sarah Jacobson., Bridgette Chandhoke

Executive Summary

The canals next to the major mill complexes in Lewiston, Maine, once served as a crucial source of power and energy for the encompassing mill industry as well as a scenic green space for the community. Over the years the mills have become mostly deserted, with new projects being introduced to utilize the huge vacant spaces. The landscaping and welcoming atmosphere around the canals also faded over time. Now the canals remain fenced off from the sidewalks using chain-link fences and the landscaping has become replaced by weeds, shrubs, and parking lots. Old photographs of the space show the drastic change of scenery that also has had an affect on the relationship between the community and the canals. In the past the canals were a cultural keystone to the Lewiston/Auburn area contributing to the local reliance and support of the Mill industry. There are photographs of the canals being used for winter recreation like ice skating when the water was frozen in the winter time.

In an attempt to revitalize that past atmosphere, our group has focused on ways to incorporate canal beautification and historical narrative into the revitalization of the Lewiston canals. By looking at projects similar to ours that have been successful in other states, we were able to draw inspiration for possible implementations to the canals in our area. Lowell's canals, for instance, have undergone tremendous renewal projects that have influenced our research. The Gowanus canal revitalization efforts in New York City, as well, have implemented current design methods. While both of these canal beautification projects have highlighted the aesthetics in revitalization, the effects of urban renewal on local communities is an aspect that we critically examined. We would like to see similar ideas to these incorporated into the Lewiston canals such as walkways inspired by a historical narrative of the canals and the mills. There are images of the older bridges used in the past as walkways around the canals, by adding a similar design aspect to the newer existing bridges we can bring back the historical narrative aspect of the place.

Another facet of this project involves working with the hydropower capability of the canals. Our group looked into the possibility of installing a new micro-hydropower system along the canals. After speaking to several parties about the idea, Brookfield Energy and FERC representatives thought the idea of repurposing one of the older stations might be easier and more cost-effective for our project. We are hoping that the community will consider supporting the idea of repurposing one of the older systems into a battery based system and using the small power output to light up the canals at night.

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Introduction

The disconnect between the canals and their surrounding urban landscape is the central issue we wish to address. Constructed in the mid-1800s, the canals fueled Lewiston's economic boom and signify the city's industrial past. Central to the mill construction along the river, these waterways were a symbol of the development and growth that Lewiston had achieved through the 19th century. They wind through the heart of the downtown, and represent what made Lewiston significant and unique. Both spatially and theoretically at the crux of the city's urban development, the canals have become a long forgotten commodity and space. In their heyday, the canals were a modest source of energy through small hydroelectric power systems placed at drop sites. As industry dwindled, the canals fell into a state of disrepair and are now currently fenced off from the community. They also face potential water redirection as the small-scale hydropower systems are dangerously close to collapse due to aging equipment and the high cost of repairs. Once bordered by green lawns, rows of overarching trees, functioning hydropower systems, and a place for ice skating during the winter months, the canals are now adjacent to parking lots and chain-link fences.

Our research objectives have ranged from exploring practices of canal beautification and community conscious urban renewal, to affordable and educational installations of micro hydropower systems that celebrate the city's history of industry. While we have examined canal beautification projects from around the world, a paramount concern for our project is to accentuate Lewiston's own inspiring past through historical narrative influenced design. Along with this mindset, our group has also strove to derive ways in which the canals may become focal points for community development. We hope to

propose a revitalization of the canals that is not merely aesthetically pleasing to the residents, but a place for Lewistonites to constantly interact with. Just as seamlessly as we wish to incorporate the canals to their physical surroundings, we have also executed our research so as to discover ways in which to foster social cohesion on the banks of these landmark waterways.

Methodological Approach

In our meetings with Grow L+A we discussed what their organization would anticipate from our project as well as potential avenues for achieving our shared goals. Our first meeting focused on the vision that Grow L+A had to integrate the canals into the fabric of the community more seamlessly. After this meeting we were able to understand the observed need of the Lewiston-Auburn community to foster a shared common space within the environment that celebrated the history of the canals. Additional meetings with both Grow L+A, Holly Ewing, and Sonja Pieck enabled us to further focus the objectives of our project.

The initial focus of our research was on historical narrative and canal beautification in other communities. Our group worked on researching other communities that had done similar projects around the world. To supplement our research, we conducted field research in the Lewiston-Auburn community and visited the canals. The purpose of our field work was to assess the current relationship the surrounding city-scape has with the water. The criteria for our analysis included accessibility, aesthetics, safety, and the potential to highlight historical artifacts along the canals.

Both our research of other communities and our field visit catalyzed our investigation into the feasibility of installing/repurposing micro hydro power turbines on Lewiston's canal. After our initial research we held a phone conference with Thomas Mapletoft, a Water Manager from Brookfield Power Company. Our conversation with Mr. Mapletoft enabled us to further focus our project and to come to understand the ownership rights along the canal as well as the community development projects that Brookfield is involved with. Additionally, we met with Steve Shepard from the U.S. Fish & Wildlife Service who was able to explain to us the intricacies of FERC licenses.

Our group continued to research the effects that urban renewal projects, specifically waterfront revitalizations, have on community development. Our focus of melding the history of place with a new vision for the future called for the understanding of the history of Lewiston. We studied historical photos of Lewiston's Canal in order to incorporate historical narrative into our project.

Results and Discussion

Our research focused on the reintegration of the canals back into the cultural fabric of the downtown Lewiston community. The culture of the Lewiston-Auburn community is deeply connected to its former industrial mill town persona, the canals being a major contributor to this. The canals have become a forgotten aspect of the downtown community, yet they are integral to the revitalization of the entire downtown scene. The canals as they stand are uninviting and closed off; littered with trash, graffiti and overgrown shrubbery. We see the canals currently as a deterrent rather than an attraction for the downtown community. Community engagement with the canals is pertinent to our

project. Creating an inviting space will not only provide a positive space for community interaction, but will also contribute significantly towards our end goal of using the canals as a multifunctional educational space.

Contributing to the community feel of the canals we hope to install benches and to refurbish what is left of the green space along the canals. Looking at old photographs of the canals we were able to discern a huge difference in the amount of this green space that is left. Where once the canals were maintained and displayed proudly, they are now surrounded by parking lots and deteriorating architecture.

Reintroducing green space along the canals would be a huge stepping stone in creating a more inviting place. Given that the potential space for greenery is limited, in any city, we suggest that the surrounding chain link fences be removed from around the canals to maximize the space around the canals. Removal of the fences would allow not only for an increase in the space for greenery, but also allow for an unobstructed view of the canals. Discussions with Brookfield Energy raised questions of safety with regards to removing the fencing. Although we feel that fencing removal would not necessarily pose a safety risk to the community, meanwhile we would suggest leaving the bumper guard for vehicles. But if these safety concerns were steadfast, we propose looking into alternative types of fencing, ones that better reflects the history of Lewiston and don't obstruct the views of the canals.

We also want to acknowledge and celebrate the historical accomplishments of the mills during their former glory. After considering several different options we came to the conclusion that the best way to do this would be through the installation of memorial plaques along the canal walk. These plaques would allow people to have a more complete experience with the canals by connecting in a way that is not simply visual. We want to

welcome a more thoughtful connection to the canals versus simply observing a restored green space.

Canal walks were once a central factor to downtown life, giving a space to gather and interact. Our project looks to restore this central characteristic in urban life that fell to the wayside after the mills closed. While funding is relatively low for projects such as these in the Lewiston City Budget, our discussions with Brookfield Energy revealed a “Sustainability Fund” that provides money for local projects that foster community and development, like our canal revitalization project. We hope to fund most of the project through this fund.





Figures 1, 2, and 3: All are comparisons of older pictures of the Lewiston canals compared to modern day photos. 1) the landscaping next to one of the Bates Mill Complexes. 2) View of the canal from Continental Mill. 3) View up the canal.

Our group was also looking into potentially including a micro-hydroelectric power system within the canals to supply a small amount of energy to power a creative idea along the canals. Micro-hydro systems are smaller scale versions of the Monty hydropower dam in Lewiston/Auburn, currently the smaller stations are collectively called the Upper Androscoggin Facilities. The individual systems themselves are expensive to install and each moving part comes with a large price tag, as seen in Tables 1 and 2. When talking with community partners such as Jonathan LaBontè and Thomas Mapletoft from Brookfield Energy, we learned that it might cost less to repurpose one of the old, pre-existing hydro stations along the canals that is out of working order and has been properly “mothballed.”

Also while consulting with Steve Shepard, a retired representative from FERC, we learned about the legal technicalities that arise when trying to install a new hydropower system. If an entirely new system is being installed the city will have to apply for a brand new FERC license, which can take some time to process. The older stations are already under a current license, it would just need to be updated once put back into working order as well as if newer parts are added. However, there are some exceptions to the FERC licensing process. For instance, if we were to use a battery based system as an alternative to connecting to the main power grid, we would not have to follow the same FERC licensing process since these systems are disconnected from the central energy flow.

After talking to Brookfield it was decided that repurposing an older system might be cost effective. However, there are factors that need to be considered when using a micro-hydro system. We are unclear whether the systems are AC-direct or battery. Currently, we are looking into using a battery-based system. These power stations produce less net power outage, but they have more storage capacity and would be more ideal for our group

project. The battery power system would also be considerably less expensive and therefore more feasible for a small budget project.

Approximate Micro-Hydro System Costs: Battery Based Systems		
Component	100 W (flow rate of 4 lps / 63 gpm; head at 5 m / 16 ft)	400 W (flow rate of 4 lps / 63 gpm; head at 25 m / 80 ft)
Penstock	\$650	\$1,000
Turbine-generator	\$2,500	\$2,500
Controller	\$400	\$400
Batteries	\$520	\$1,000
Inverter	\$1,200	\$3,000
Transmission Line	\$500	\$500
Powerhouse	\$200	\$200
Miscellaneous	\$500	\$1,200
Total cost of equipment	\$6,470	\$9,800
Installations	Optional (\$2,000)	Optional (\$2,000)

Table 1: Costs of individual parts for a battery based system.

Approximate Micro-Hydropower System Costs: AC-Direct Systems	3.5 kW	10 kW	50 kW
Component	flow rate at 14 lps / 222 gpm; head at 50 m /165 ft	flow rate at 62 lps / 982 gpm; head at 32 m /100 ft	flow rate at 100 lps / 1585 gpm; head at 85 m / 280 ft
Penstock	\$1,600	\$3,500	\$24,000
Turbine-generator	\$3,300	\$6,000	\$9,500
Controller	\$1,900	\$3,600	\$5,400
Transmission line	\$1,500	\$3,500	\$7,500
Powerhouse	\$1,000	\$3,000	\$4,500
Miscellaneous	\$1,650	\$1,800	\$4,500
Total cost of equipment	\$10,950	\$21,400	\$55,400
Installations	\$2,000	\$4,500	\$10,500
Total Amount	\$12,950	\$25,900	\$65,900
Cost \$/kW	\$3,700	\$2,590	\$1,318

Table 2: Costs of the main individual parts of an AC-direct system.

There is a steady flow rate along the Lewiston canals at about 4.2 m³/s and a Head height of 3 m, which are important to take into consideration for a small system. As seen in Figure 4 there is a provided equation available that can be used to calculate the total power output being supplied by a particular system. These numbers are critical when determining the type and scale of the system. The Lewiston canals have a generally low canal head and a smaller flow rate. In Table 3 we can see the types of turbines and generators that are recommended and their corresponding voltage. Also, by determining the power output of

the system we can move forward with design efforts and determine the necessary wattage needed for lighting or other creative endeavors.

$$P_{th} = Q \times H \times g$$

P_{th} = Theoretical power output in kW

Q = Usable flow rate in m^3/s

H = Gross head in m

g = Gravitational constant ($9.8 m/s^2$)

Figure 4: This is the equation used to calculate the average power output for a given canal system

Battery Based Micro-Hydropower Systems					
System	Power Output (W)	Head (m) Minimum/Maximum	Flow (lps) Minimum/Maximum	Voltage (Vdc*)	Type of Turbine and Generator
Ultra-low head	100-1000	1/3	30/65	12/24/48 /120	Propeller; permanent magnet DC generator
Low and medium head	50-1600	3/60	0.6/10	12/24/48 /120	Turgo ; permanent magnet DC generator
High head	100-1500	6/180	0.25/16	12/48	Pelton ; permanent magnet DC generator
Water Current	100	Water Flow	0.25 m/s	12/24	Propeller ; submersible generator

Table 3: once the needed variables are calculated the types of turbines and generators for a battery based system can be determined.

We considered using the micro-hydro station as a potential educational opportunity for grade school kids to learn about hydroelectric power and the benefits to renewable

energy. This would also be a historical narrative of the canals because of their intricate contribution to the development of the two cities. By using the power generated by the hydro system, we have looked into the possibility of powering a small set of lights along the canals at night, to also contribute to the canal beautification aspect of this project.

Outcomes and Implications

Our project focused on canal beautification, historical narrative and the possibility for one the micro-hydro turbines that are currently out of order to be updated and restored. Canal beautification would greatly improve the city-scape of Lewiston-Auburn as well as render the canals a more inviting space for both local residents and potential tourists. By introducing a repurposed micro-hydropower system the canals could also serve as an educational opportunity for students and community members who are interested in learning more about alternative energy sources. The use of informative plaques, providing historical information about Lewiston's industrial past and the way in which the canals shaped the Lewiston-Auburn community, could contextualize the hydropower aspect of the mills and provide both a quantitative and qualitative perspective of the canals.

Next Steps

To initiate this project of revitalizing the canals in both a historically and community conscious manner, stakeholders must meet to coordinate what aspects of the canal's history they wish to articulate. These next steps will simultaneously foster community development and canal beautification. Updating the micro-hydropower system will require an assessment of the current state of each moveable part of the system to determine any

necessary alterations. From there a comprehensive budget can be proposed to potential investors. As for the installation of plaques along the canals that describe the waterways' history, that can also be in a community discussion. It may also be a beneficial project for local elementary schools to partake in.

Literature Review

Historically the downtown areas of cities were the hubs of society, an area seen as the true identity of a city (Robertson, 429). Today the downtown scenes of cities nationwide have been forgotten as the activities of the city moved outward into the suburbs. By looking into previous programs and projects to revitalize downtown areas, we hope to better understand the beautification of the canals and the reincorporation of the mill system into the Lewiston-Auburn community. We want to create a space that will not only be easily accessible to the community but also accurately express the historical significance in this post-industrial time.

The history of waterfront's appeal in cities and the design of those spaces is paramount to this project. Both Andrew Hurley, in *Narrating the Urban Waterfront: The Role of Public History in Community Revitalization*, and Patrick Malone and Charles Parrott, in *Greenways in the Industrial City: Parks and Promenades along the Lowell Canals*, delve into this discussion. This is most explicit in Malone and Parrott's recounting of the landscaping along the Merrimack and Northern Canals of Lowell. From the birth of the city's industrialization, Lowell's citizenry and corporations "took pride in Lowell's image as the 'Venice of America'" (Malone 20). When the city was first being developed and the canals were being constructed, there was a wide sentiment that the city was lacking trees.

As a draw for potential workers, the local corporations began to landscape their land around the canals and factories. By the mid 19th century, the canals had become the city's unofficial mall, where double rows of trees lined walkways (Malone). Similarly, Hurley recounts the history of Laclede's Landing in St. Louis and how it was once the epicenter for trade, socializing, and the city itself. Once the steamships became obsolete in trade, however, Laclede's Landing lost its luster and the neighborhood was never the same. The city's initial response to the area's dilapidation was to clear much of the buildings and recreate Laclede's Landing in its heyday. As Hurley notes, this built celebration of St. Louis' waterfront lacked any connection with the present local residents.

Our report strives to both suggest approaches to revitalizing Lewiston's canal, but also reawaken the dormant relationship between local residents and their canals. Hurley discusses this specific issue at length. In addition to Laclede's Landing, he also asserts that the Gateway Arch offered no connection with those living around it. While the local residents would visit these two projects, they viewed the Arch and Laclede's Landing to be "weakly integrated into the city's fabric" (Hurley 24). There was no connection with the local community's lived reality. In Malone and Parrott's retelling of Lowell's social scenes, they delineate how the waterways were the city's unofficial and most popular malls. Many residents acknowledged and celebrated these promenades' ability to both gather men and women of all classes together as well as integrate the urban landscape with the resource that lies at the foundation of its development. The promenades were extensively effective at "bringing people of different classes together and inspiring urbane, cultivated behavior through appropriate example" (Malone 30). Although the parks and promenades were

threatened by railroad construction, they remained the “most popular gathering place in the city” (Malone 29).

While designing spaces that connect people with their surroundings is crucial, connecting people with their homes’ past is also tremendously valuable. Hurley offers significant contributions to this point in his description of how the Mary Meechum Freedom Crossing sought to achieve the “direct appeal to and the active engagement of the city’s African American community” (Hurley 33). By preserving the vegetation at Meechum’s Crossing, where a barge of runaway slaves was caught, public historians have succeeded in drawing a connection between today’s local residents and the Meechum’s story on those marshy banks. Due to the lack of historical relics from the event, the preservation of the landscape serves as the primary tool of historical narrative.

It is clear with any successful revitalization project there needs to be an idea of uniqueness or purpose for the community when redesigning the space, especially in post-industrial areas. Ipek Rohloff, in his “Urban Morphologies of Mill Towns and Positive Transformations”, emphasizes the importance of redeveloping former industrial zones of mill towns into spaces that can be used by the community, such as creating or reestablishing an Arts and Innovation district (Rohloff 10). Furthermore, the David article discusses the artist colony along the Gowanus canal where local artists work collaboratively. The potential for the Lewiston-Auburn canals to attract local artists and to become a concentrated area of creative thought is an exciting possibility for the future of the canals and for the community of Lewiston-Auburn. Rohloff argues that an Arts and Innovation district should be supported by the development and rehabilitation of canals with a “canal walk”. These “canal walks” would be an important aspect of the urban

experience, as they could improve walkability in the area as well as providing a scenic view that might otherwise not exist (Rohloff 10). Rohloff's discussion of "canal walks" strengthens his argument and ideas with relation to our project because few authors even mention these factors. Comparing these ideas to Kent Robertson's discussion of redevelopment ideas for depressed cities in his "Downtown Redevelopment Strategies in the United States", we saw a clear connection between the success of a project and the incorporation of waterfront development into a downtown revitalization project (Robertson 435). Scholars state that waterfront accessibility often draws people to the downtown area not only for the visual appeal, but also because a waterfront feature is often lacking in the suburbs (Robertson).

It is important to keep in mind the viability of the project when designing a community revitalization plan. When designing the renovation and restoration of the canals, it was essential to recognize whether the plan would serve a tangible purpose for the downtown Lewiston-Auburn area. Ipek Rohloff stresses the importance of incorporating the "human experience" when planning a revitalization project (Rohloff 10). Scholars also discuss incorporating different uses for spaces as an important factor in the success of a project, as it allows for the greatest interaction between people. The more interaction between people, the more people will be drawn to the area, and the greater the likelihood of success of the project within the community (Rohloff). Additionally, Kent Robertson explains that giving the space multiple functions allows for more people to hold a stake in the downtown and help to create a stronger identity (Robertson). Identifying general stakeholders is an important part of Robertson's discussion, but he could have strengthened his argument by providing more real world examples.

Scholars note that acknowledging the current culture of a city is crucial during revitalization to retain a city's identity. Inequalities and social injustice often arise throughout revitalization projects. R. Van Deusen Jr. explores these problems of social injustice within the realm of urban life in general as well as the transformation of public spaces (Van Deusen 149). Urban designers must play an active role in their designs for the community to connect to the social roots and effects of the design, rather than work simply to satisfy the political and economic forces of the project (Van Deusen 149). The transformation of Clinton Square added depth to their project by unveiling the political policies that work to exclude certain "undesirable workers" such as street vendors (Deusen 153). Playing into these social roots of a transformation project, Kent Robertson argues that the introduction of tourism into a city economy is often a problem for the citizens of the city because low paying jobs and tourist attractions degrade the aesthetics of nearby neighborhoods (Robertson 439). His focus was drawn to New Orleans, where numerous t-shirt shops started to overrun the French Quarter during the 1990s (Robertson 439).

In homage to Lewiston's history of industry, our group felt it would be appropriate to examine the city's Mill complexes. The Bates Mill Enterprise Complex website includes an overview of the Bates Mill Complex, the history of each building, their function today, and suggestions for their individual roles in the Bates Mill Complex Master Plan. In addition to speaking to each of the individual buildings that constitute the Bates Mill Complex, the website also delves into the potential for the canal system and the importance of parking. Regarding the canals, the website suggests an east-west access way between Mills #1 and #5. This corridor would allow for pedestrians to view the "still operating turbines in Mill #5 and the dramatic falls of the cross canals"(AVCNet). Our group plans on possibly

repurposing a hydropower station along the canals and having that offer itself as a potential educational opportunity. Viewing old turbines and coupling that with concrete scientific backing on the benefits of renewable energy may serve as a way for children, tourists, and locals to understand the history and power of the Mills and the Androscoggin River.

In Anibal Almeida's science paper on "*Small-hydropower integration in a multi-purpose dam-bridge for sustainable urban mobility*" the canals are being utilized for the implementation of small-hydropower in the Mondego River that powered trolleys and buses. This is similar to the image Grow L+A wanted our project to emulate. The canals near the dam-bridge are promising candidates to produce small-scale energy. However, this particular article delves more in the engineering field than just a basic understanding of installation and feasibility. In our project we are also straying away from developing a new system and instead repurposing an older hydropower station.

Clean Technia, a renewable energy company, is looking into how the water flowing to and from canals can be used for more local beneficial purposes in their article "*With Canal Hydropower, Still Waters Make Electricity*". In this short compilation the focus is on the reclamation of canals as a source of hydropower across the United States. The United States government discovered that investing in "retrofitting small-scale hydropower systems along particular canals in Western US could produce 1.5 million megawatts of energy (enough to power 30,000 homes)" (Almeida, 5094). This could have huge impacts on rural communities in the west.

This provides some insight on the growing awareness of using canals as a mode of renewable energy production in the government. One project mentioned in this article was

the “Klamath C-Drop Project” that talks about using the existing fall formed by the canals in the Klamath District in Oregon instead of building a new dam or water storage unit (Casey). This is pertinent to our project because we are looking for ways to utilize canals that are in place in Lewiston/Auburn, but are currently out of working order. All of the hydro energy stations have been properly “mothballed” and therefore are most likely in shape to be repurposed. This article is useful in the scope of our project as providing a resource page of government projects that are similar to our project involving the revitalization of the Lewiston canals.

The “*Micro-Hydro Power Systems: A Buyer’s Guide*” provided by the Canadian Government gives a detailed analysis of the necessary parameters to consider if installing a micro-hydro system. A hydro system involves complex civil engineering to understand the mechanical workings, however it is an easily accessible for those just looking to install one of their own for renewable energy purposes. Some of the important facts to think about when installing a new micro-hydro system are the costs, power output, type of power, and maintenance.

The costs of a smaller system are much smaller than that of a large-scale hydropower system like the Monty Hydropower system in Lewiston/Auburn. Each moving part has a hefty price tag, so this brings into question whether as a group we think it is better to build a completely new hydrostation or just repurpose an older one. Replacing older parts would be less expensive than completely buying all new ones. However, in the long run new pieces will sustain longer than the older ones.

Power output is of obvious importance to anyone contemplating a micro-hydro installation. There are tables and conversion equations listed in this report that offer power

outputs (usually in kilowatt hours) depending on the size and connectivity to the central power grid. Another consideration to make when looking into the installation process, is whether to attach the hydropower system to the central power grid, as AC-direct, or to use a battery based system. The AC-direct will supply more power to a wider expanse of the community. While, the battery operated option is more ideal for storage of energy for a smaller area. For our group project, the battery based system appears to be the better option since we are not focusing on this microhydro system to be a potential source of alternative renewable energy for locals, but rather an opportunity to incorporate historical narrative, renewable energy education, and community space into a repurposed system. We talked about possibly using this system as an educational opportunity by having the power output of the hydrostation being utilized to power lights along, especially since the battery storage could work into the night.

Historical narrative, community conscious urban renewal, and repurposing micro hydro electric power systems have been the three primary pillars in our research. In historical narrative, scholars have suggested that waterfront projects enhance the local residents experience with their waterways and their city's past. From the scholarly analyses on community conscious urban renewal, we can see that it is extremely important to focus on the needs of the community to create revitalization projects that will be inclusive and encourage growth. If we are to fully revitalize the canal, we must understand its potential today to be put back to work. Incorporating all these elements, our research has fostered a stronger sense of revitalizing the canals in the most cohesive manner possible.

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Detailed Methods

- Visited canals and recreated the older pictures we received from Museum L-A.
- Keywords used in our searching for scholarly resources on our project included: “urban renewal,” “historical narrative on waterfronts,” “community revitalization,” “post-industrial waterfronts,” “micro-hydropower,” “canal beautification,” and “Lewiston canals.”

Interview Schedules:

- Monday, September 16th 5:15-6:15 Meeting with Grow L+A
- Wednesday, September 25rd 12:00-1:00pm Meeting with Grow L+A
- Friday, November 1st 3:30-4:30pm Meeting with Jonathan LaBontè
- Tuesday, November 12th 1:00-2:00pm Conference Call with Thomas Mapletoft
- Wednesday, November 13th 12:00-1:00pm Beverly Johnson's hydrogeology class with a presentation by Steve Shepard
- Wednesday, November 13th 2:00-3:30pm Group Meeting with Steve Shepard

Supplemental Results

Notes for Conference call with Tom from Brookfield on 11/12/2014

- Introductions
- Overview of talking points: interested in knowing flow rates and express interest in our vision for the canals to serve historical and educational purpose

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- Flow rates
 - Stagnation flow through canal
 - Monte (larger station) finished 1987/1988
 - Before Monte, the canals were smaller
 - 4/5 canals belonged to Brookfield; 1 belonged to the city
 - A part of FERC
 - Most efficient to focus on larger and out phasing smaller
 - Cost efficient to update technology rather than installing entire
 - Generators all covered; dirty, are a safety hazard
 - The most lucrative would be the one owned by the city—the new station
 - It is important to note that there is a minimum flow rest of the water flows through hydrostation and Lewiston falls
 - For this specific data: look at the FERC website to find the Monty license
 - Criteria listed for license of Monte project will stipulate minimum flow
 - Should be around ~100-150 cfs
 - We expressed our interest to Tom of focusing on microhydro but also to integrate canals into history/ community

- Brookfield's Sustainable Development Initiative
 - Not well publicized because corporations get overwhelmed by requested; the projects are often proposed by community then Brookfield recognized a need and subsequently develops a relationship
 - Look for local projects to benefit the community nearby to make use of canal system
- Brookfield's main concern is SAFETY
 - The canals partially freeze over which can pose a risk (ex. with soccer ball)
- Around high voltage areas; watersheds
- Water energy and electrical energy
- Needs to be safe for the public
- It would be economical to reuse the old microhydro
- Need to look at conditions of stations
- Unlikely to be economically feasible to build a new system
- Brookfield has invested in Sustainable Development Initiative
- Other canal projects-Cohoes
 - Ex. canal being used for energy
- There is a public park between canal and waterfall;
- Although in Lewiston the situation is different; overlooks park