Action Research Project: Rainwater Harvesting Plan

Action Research Project:
Proposing a Rainwater Collector for Chicago Urban Lights Farm

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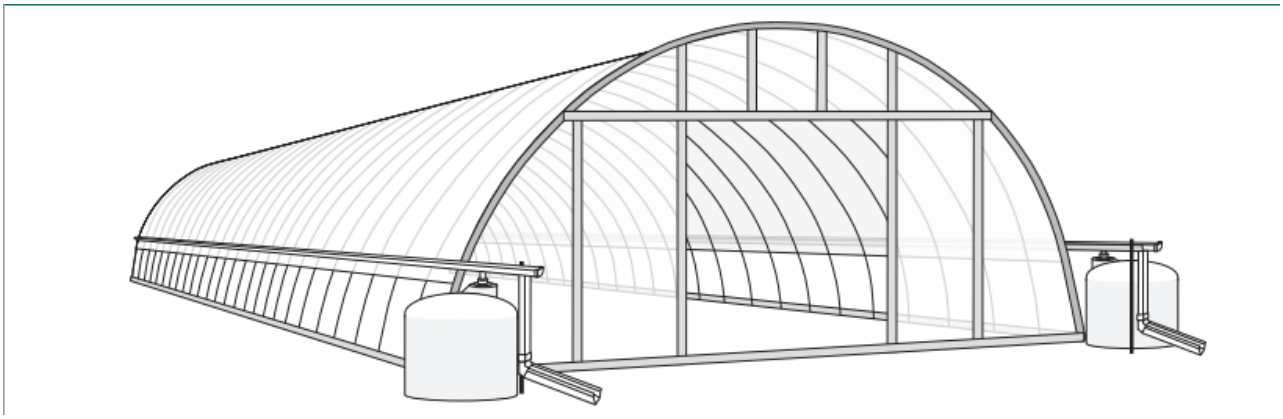
Executive Summary

The purpose of this business proposal is to minimize operating expenses, reduce water consumption, and to provide an educational tool by installing a rainwater collection system on the existing high tunnel (hoop house) structure on the CLUF farm. Currently the farm budgets $600.00 a year to receive water delivery service from the city of Chicago. This expense covers the winter months of December and January. While it is only for two months out of the year, the cost year after year becomes quite substantial. With the installation of a rainwater collection system, CLUF can expect a return on investment within one year as well as reduce public water consumption, and provide an educational tool for its workers, volunteers, and visitors. Not to mention, the farm gets to save $600.00 a year!

The System that will be used



After reviewing various rainwater systems in the market, it appears that installing gutters along the sides of the hoop house would be the most viable option. The existing

infrastructure provides a great platform and covers a significant amount of surface area to collect rain. The shape of the house naturally directs rain down the sides of the structure where the gutters will collect rainfall. From there, a pipe will transfer the rain from the gutter system into the hoop house, discharging it into the current water tank. Now, the current water tank is a lease from the city to which it may not stay with the farm for a long period of time. The advantage of this system, is that it will work with a variety of different water tanks and/or barrels. It's non-intrusive and easily adaptable to various tanks and systems. If, and, or when the tank will depart, the farm will still be left with a fully functioning system.

Answers to the critics

- *Well, what about filtration...wouldn't leaves and debris fall into the gutters?*
    - The system will include a filter mounted atop the gutters. It is designed to prevent debris and leaves from entering the system.
- *Winter months...will the gutters be able to weather the storm?*
    - Yes. We chose the hoop house specifically for its internal heating system. The heating system will provides complementary services to the rainwater collection system: preventative maintenance and provision of water throughout the winter. Since it is heated throughout the colder days, the heat will normally melt the ice and snow preventing any overbearing weight on top of the gutters. In addition, the melted ice and snow naturally turns into water which can be used for the farm during the winter.
- *Does it require electricity?*

- No. The system will be strategically installed, using gravity to direct water into the tank.

This system, as it appears, can be a great asset to the Chicago Lights Urban Farm. It's easy installation, practical purposes, and versatility offer its users daily operational benefits. According to Find-data.com, Chicago receives over 36 inches of rainfall per year. That nets to roughly 22 gallons of water per square foot every month (2012). The installation of this system will allow CLUF to capitalize on this rainfall to reduce annual costs and to promote sustainability.

Parts and Cost

Below is the proposals cost and parts to build the system. A lot of the parts can be found at common household stores like Menards or Home Depot, but for this particular proposal we decided to utilize the quality professional grade of these gutter systems that will be better equipped to handle the amount of use required at the farm.

1. Straight gutter

http://www.guttersupply.com/m-traditional-vinyl-k-style-gutters.gstml -

- $15.54 per 10ft (possibly 120 ft worth)
- 12 pieces of this siding will be required for the south side of side of the hoop house that the container is located on

- $15.54 x 12= $186.48 (total cost of the side gutter system)

2. Corner pieces

http://www.guttersupply.com/m-traditional-vinyl-inside-box-miters.gstml

$9.77 ea. (x2)
-Hardware - approx $25.00

3.) Rainwater collector

http://www.raintankdepot.com/p-187/ace-denhartog-295-gallon-vertical-nsf-61-tank-a-vt0295-42

Ace / DenHartog 295 Gallon Vertical NSF-61 Tank
-Approx.: 295 gallons

- Costs: $292.99

- Freight: $195.44

- Weight: 74 lbs. empty

4.) Filter

http://www.raintankdepot.com/p-508/rain-harvesting-leaf-eater-advanced-3-round-rh-rhad99

-Price: $29.00

Features and Benefits:

-Compact, versatile rain head for quick and easy installation.

-Patented single screen technology for advanced debris shedding.

-Minimal maintenance.

-Pivot the outlet to suit vertical or horizontal (rear outlet) downpipes.

-High flow rate performance.

-Superior catchment efficiency at low and high flow rates.

-Single screen with 0.955mm aperture mosquito proof stainless steel mesh.

-Available in 3" or 4" outlet.

Items	**Costs**
Straight Gutter 10ft.	$15.54
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Straight Gutter 10ft.	$15.54
Corner Pieces	$9.77
Corner Pieces	$9.77
Ace water tank	$292.99
Freight delivery for tank	$195.44
Hardware & miscl	$25.00
Filter	$29.00
Estimated Total	$748.45

Estimated Costs of all Equipment Required.

Installation & Labor

As we can see the cost of purchasing the rainwater collector closely mirrors the cost of obtaining water from a delivery system provided by the city. Though this may seem to be a rather hefty amount of money to pay, the average monthly rainfall in Chicago will be able to at least offset the cost of obtaining the water collector. The installation of the system will not require any outside laborers.

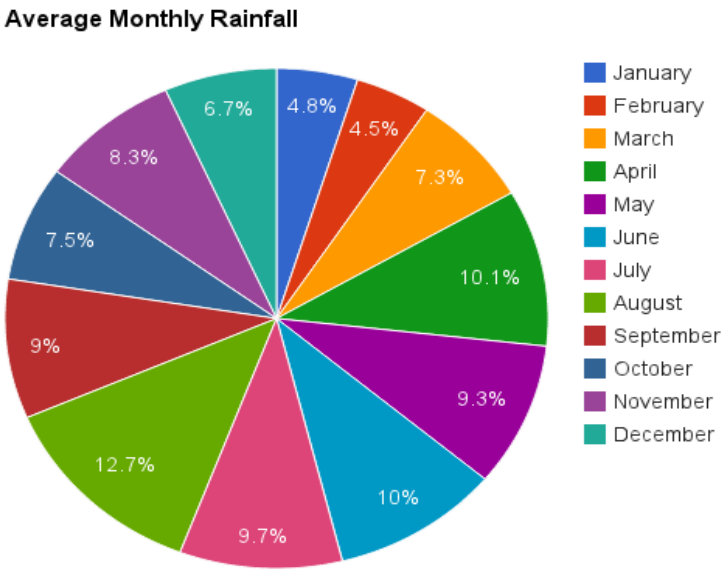
The system is simple enough to be installed by the Youth Core and volunteers. CLUF might need to get into contact with local contractor to provide advice on how to install the side running gutter without interfering with the integrity of the hoop house. Other than that, I do believe that the members of the Youth Core and their supervisors are more than capable of installing the system. Thus, there should be no labor costs, except the cost of the Youth Core.

Estimated Annual Rainfall in Chicago/ Month

Annual Precipitation	36.27 inches
January	1.75 inches
February	1.63 inches
March	2.65 inches
April	3.68 inches
May	3.38 inches
June	3.63 inches
July	3.51 inches
August	4.62 inches
September	3.27 inches
October	2.71 inches

November	3.01 inches
December	2.43 inches

Source: www.findthedata.org



Estimate Monthly Rainfall of Chicago, IL. Source: www.findthedata.org

As we can see from the charts above, the amount of rain that falls in the winter months in Chicago is still a relatively substantial amount, especially in December. Simply having a collection unit on the property would greatly benefit the farms ability to be as sustainable as possibly. Even if the collector only offsets the cost of purchasing

water for the month of December, that will save the farm $200.00 for that month. If we use this as a measure to calculate ROI, the system will gain its ROI within 4 four years at a minimum. Again, this is only assuming the system offsets the cost of water purchased for the month of December. Though we can assume that the system will continue to collect water and act as a backup unit for the existing system. The estimated ROI does not take into consideration weather and/ or rainfall that exceed the estimated annual monthly rainfall in Chicago.

References

Find-data.com. (2013). *What is the average rainfall in Chicago?.* Retrieve from **http://average-rainfall-cities.findthedata.org/q/86/445/What-is-the-average-annual-rainfall-in-Chicago-Illinois**

http://www.guttersupply.com/p-gutter-guards-10-off-sale.gstml

http://www.leopold.iastate.edu/sites/default/files/pubs-and-papers/2012-01-rainwater-catchment-high-tunnel-irrigation-use.pdf

http://www.raintankdepot.com/p-508/rain-harvesting-leaf-eater-advanced-3-round-rh-rhad99

http://www.raintankdepot.com/p-187/ace-denhartog-295-gallon-vertical-nsf-61-tank-a-vt0295-42