AN ECONOMIC ANALYSIS OF WATER HARVESTING AT THE DERRICKSON AGRICULTURAL COMPLEX

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INTRODUCTION OF WATER HARVESTING

These demonstration sites will serve as the proving grounds for practices that are being evaluated for potential cost share eligibility.

OBJECTIVES

1. To evaluate water-harvesting uses prior to implementing them on select operations
2. Developing the best management practices pertaining to storm-water management and harvesting it for indoor/ outdoor use
3. Establishing demonstration sites for water harvesting and conservation outreach
4. Determining the environmental co-benefits in addition to the economic analysis
5. Identifying the environmental advantages water harvesting has on agricultural operations

HOW IT WORKS:

ADVANTAGES

1. COLLECTION - Stormwater is collected from the catchment
2. PRE-STORAGE TREATMENT - Trash, gross solids and particulate matter are removed from harvested stormwater
3. PRE-STORAGE TREATMENT - The storage reservoir for harvested stormwater
4. PRE-STORAGE TREATMENT - Biological or chemical treatment of harvested water stormwater
5. DISTRIBUTION SYSTEM - Pipes and pumps remain to distribute harvested water for use in indoor/outdoor use

MAJOR COLLABORATORS

1. Commonwealth of Kentucky
2. Morehead State University
3. University of Kentucky

THE ECONOMIC ANALYSIS

POND

- Contractor labor, materials, and equipment use for excavation and plumbing ($232,000)
- Rock for heavy traffic pads ($430 at ~$429 per load)

INITIAL COST: $232,000

BENEFITS

Assumptions: 256 Days of use for 40-head cattle drinking
10,000 gallons per day at $5.30/gallon, an unlimited life, and 2% discount rate.
Annual use of water: (40/10,000) x 365 x 256
= $500,000/year

100,000 gallons = $430 x 365 = $14,500/year
1,000,000 gallons = $430 x 365 x 256 = $14,500 x 256
= $14,500/year

Greenhouse evaporative cooling water harvesting system

If the pond has an extended lifetime, the value of the pond: 430.84.00 = $21,012.00
Even though the value of the pond is not worth the initial investment, the additional benefits associated with this project increase the non-monetary value significantly.

GREENHOUSE

- Evaporation cooling system repair and upgrade (~$440)
- Water harvesting tanks (4 x 2,504 gallon tanks) / Delivery ($4,540)
- Contractor labor and equipment use for excavation ($3,000)
- Rock for heavy traffic pads ($430 at ~$429 per load)
- Planning materials ($400)
- Rolf of green house fabric and pins ($400)

Initial Investment= $5,146

BENEFITS

Assumptions: 20-year life, 2% discount rate
Required Annual Benefits=Investment / (1 - 1/(1.02)^20) = $5,146 x (1.02)^20

Based off the equation of Net Present Value, $507 should be equal to the monopoly and non-monetary benefits to justify this investment.

ADDITIONAL BENEFITS

Water harvesting provides many benefits, monetary and non-monetary. Although the initial investment in these systems may not equal the monetary benefits provided based off municipal water savings, the environmental benefits justify these investments. The reduction of erosion and storm water run off associated with these investments are essential to maintaining productive soil and water quality, which are necessary to maintain productive agricultural land. In addition to the environmental benefit of these investments is the benefit of technology transfer. The educational outreach associated with these investments will provide additional benefits to those who adopt water harvesting practices, which should also be considered when justifying these investments. The application of the harvested water may also provide additional benefit to water driven markets, providing additional monetary benefits. When considering all of these benefits associated with water harvesting, the investment in these systems being implemented at the Derrickson Agricultural Complex are more than justified.

CITATIONS:

1. Morehead State University (2020). Demonstration and economic benefits of water harvesting at the Derrlickson Agricultural Complex. Morehead State University, Morehead, KY.