Economic & Watershed Use Decisions in the Green Industry

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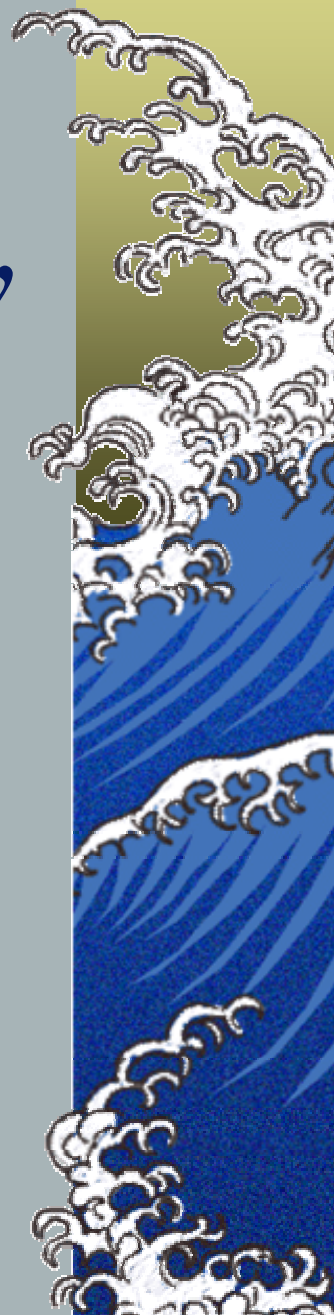
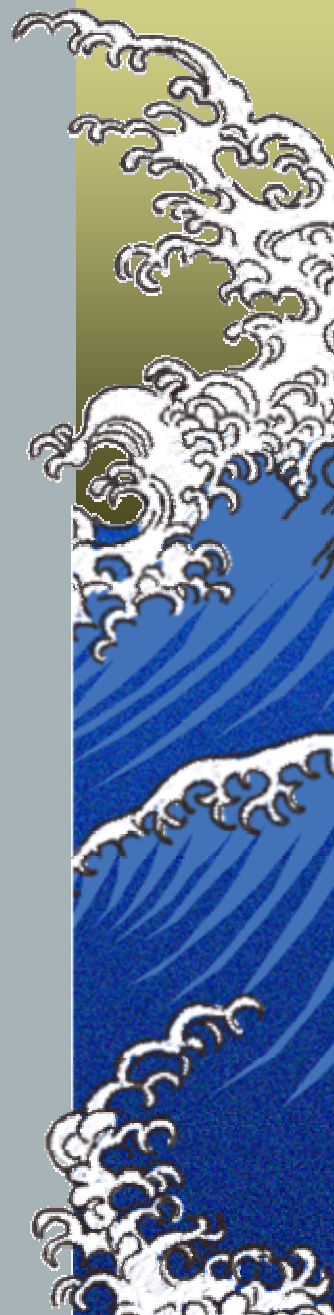


Background Information

- Greenhouse and nursery plants growers and the sod/turfgrass producers in Georgia and parts of the Southeast are in a period of legislative risk.
- Shrinking water resources and extended droughts have prompted exploratory legislation to restrict commercial water use, even face forced water turnoffs.
- So why target the “green industry”? Legislators and water authorities see water jets wetting down acres of containers, trees, shrubs, and sod, and they constantly hear of greenhouses needing more wells to cover expansion.

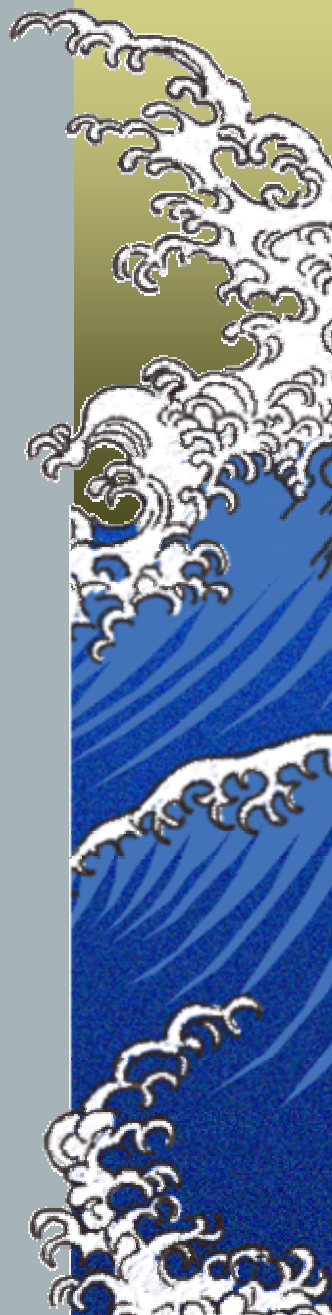


Importance of Green Industry

- *Farm gate value of $600 million, or 7% of state's total (second behind poultry with $3.5 billion, or 41% of state's total in 2002)*

- *Sales per household in 2003:*

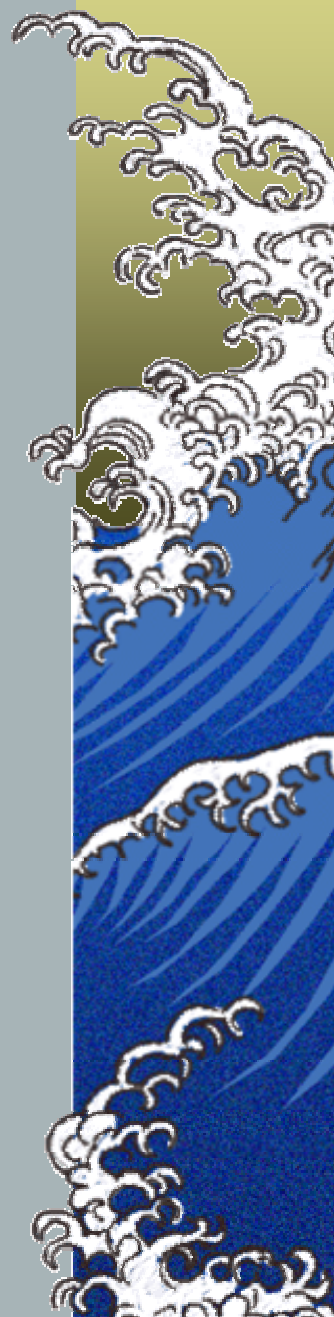
Floriculture	*$ 45.57*
Nursery crops	*86.48*
Sod	*18.70*
Total	*$150.75*



Spatial & Watershed Concerns

- *Large container- and field-nurseries and sod production facilities located in major river watersheds, such as the Savannah, Chattahoochee, Flint, and Oconee River basins, with wells as backup water sources.*

- *Greenhouse operations typically located nearer municipalities, and nearly all greenhouse operations rely on well water from aquifers, with municipal water systems as backup water sources.*

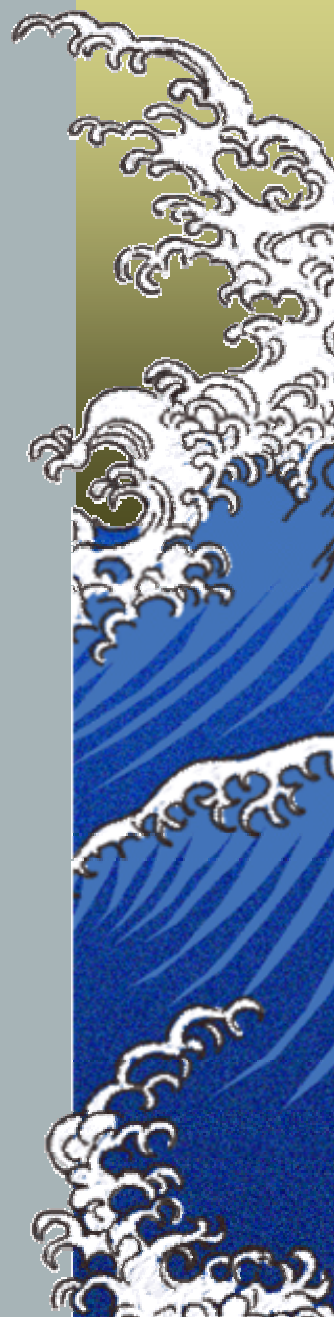


How much water is being used? Why conduct a water audit?

- *Knowing how much water is being used will not only aid the green industry participants in determining their potential to save water, it will also give them the facts needed when approached by legislators, regulators, and water authority boards as to water use history.*
- *A true water audit is usually performed by a professional irrigation consultant or by an official of a state regulatory agency; however, growers are certainly able to assess their own situations for management decisions involving technology upgrades and changes in growing practices.*

Conducting a Water Audit

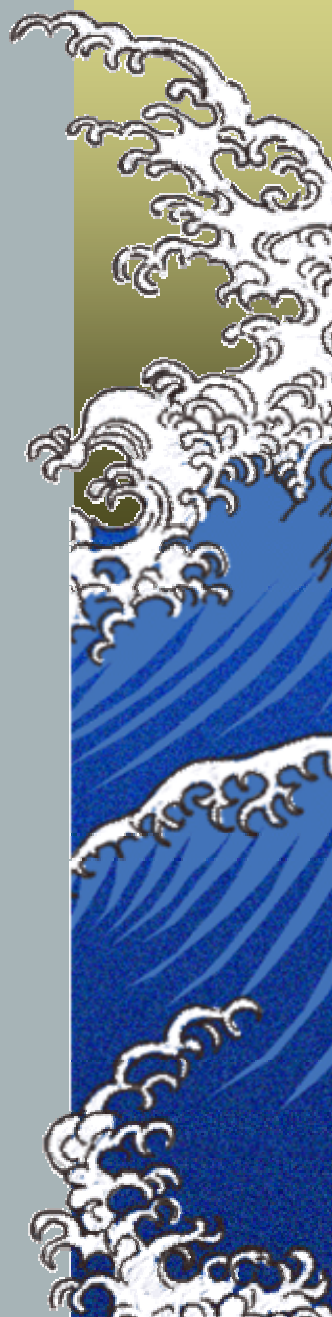
- Conducting a water audit certainly enables a grower to assess the situation and use the information for decisions involving technology upgrades and changes in growing practices.
- Basic arithmetic of calculating water use and adequacy of water source, storage and pumping capacity is more common sense than higher mathematics and formulas.
- Challenge and decision making arises in evaluating changes, such as shifting from traditional hand watering to drip irrigation and/or to ebb-and-flow greenhouse floors.



Self-Initiating a Water Audit

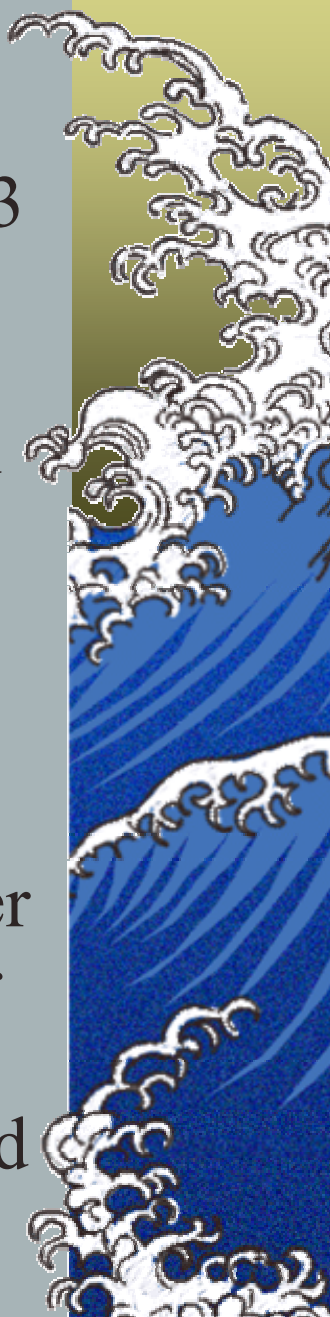
- Calculating water use in a greenhouse: 2 ways--
  (a) purchase and install a flow meter; or
  (b) use emitter flow-rate and bucket estimate.

- Calculating outdoor production water use:
  - One acre-inch of water equals 27,000 gallons.
  - Under hot dry conditions, 3"/day may be needed due to wind and sun increasing evaporative loss.
  - Recommended irrigation volume/one-gallon container/watering event is one pint (0.125 gallons), so multiply times number of containers.
  - In field production, if 1½" to a ½ acre every other day, 20,250 gallons required/watering event.



Calculating Storage Capacity

- A 3-day water supply is encouraged (storms, power outages, etc.), so gallons needed per day x 3 = needed storage capacity.
- Gallons required ÷ 7.5 = cubic feet of capacity.
- Beyond the needs for a 10,000 cubic foot capacity tank (75,000 gallons), a grower should investigate the cost of installing an earthen pond for water storage.
- Using a flow meter to measure the maximal use over several hot summer days, take the mean water usage of 10 days to get info as to how much water is needed to store given the plant inventory, space efficiency, square footage of production space, and water use efficiency.



Adequacy of Water Source and Pumping Capacity

- At 30 gallons/minute with a pump cycling on 45 minutes per hour, can pump 32,400 gallons of water per day, 24::7::52.

- If a one day's supply of water stored in a 30,000 gallon tank with a distribution pump capable of delivering several hundred gallons per minute, and an automated watering delivery system has been installed using an efficient watering technology, a grower could water the entire facility within a few hours, rather than days.

Investment Analysis of Automating an Irrigation System

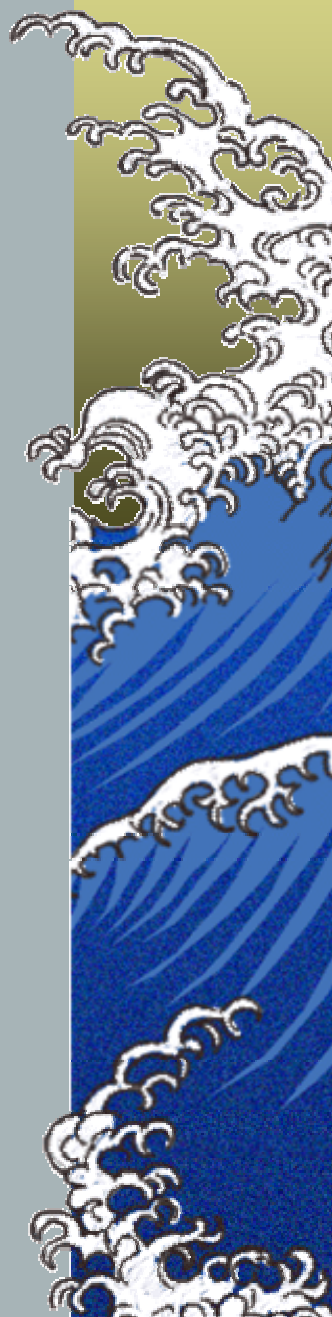
- Using computer controlled water conserving systems, many growers report a minimal 35% savings in labor, a 25% savings on fertilizer costs, and an average of 30% less water used per year.
- Consider an example of a greenhouse operation with 8 double-poly, 30’ x 100’ greenhouses with 80% space utilization. If a drip irrigation system is installed for 2,400 square feet of 6” pot crops and 200’ of 10” hanging baskets per house, what are the $$ savings of the change?

Economics of Traditional and Drip

- Installation of drip system includes tensiometers (2 x $350, $700); cycle timers with controller boxes (2 x $140, $280); header tubes and emitters at one per container (6,260 x 50¢, $3,130); redesign of existing pressure lines ($500); labor to install materials (2 x 10 hours x $8.40/hour, $168) for total investment per greenhouse of $4,778, with a ten-year expected useful life.
- Traditional hand watering costs per year per greenhouse includes equipment (150’ garden hose, watering wand, check valve -- $100); labor (1 man-hour at $8.40/hour per greenhouse per day and 183 days/year, $1,537); water (½ gallon/pot for 6,260 pots and 183 days at nominal cost of 1¢/gallon, $5,730) or a total cost of $7,367 per year per house using traditional hand watering.

- Using a drip irrigation system, the annual costs per greenhouse include labor (1 worker at $8.40/hour for ½ hour/greenhouse/week for 52 weeks, $218) and water (0.3 gallon/pot for 6,260 containers for 183 days at nominal cost of 1¢/gallon, $3,437) for a total cost of $3,655 per year per greenhouse using the drip irrigation system.

- Net savings per greenhouse per year is $3,712 ($7,367 minus $3,655 = $3,712), or for the entire eight greenhouses, $29,696.



Financial Criteria for Change

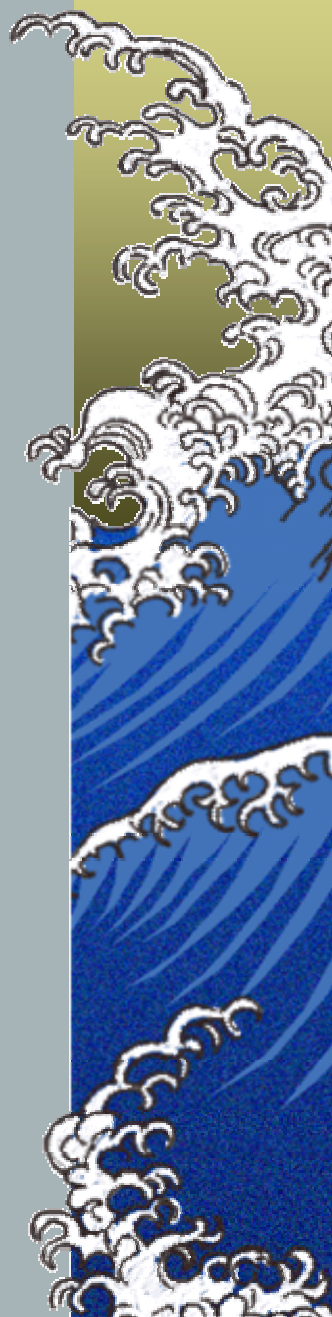
- Most growers would agree that a significant capital purchase is acceptable if the considered investment meets certain criteria.
- For this type of investment (the installation of a drip irrigation system), personal preference on the priority of acceptance and standards for decision criteria are:
  - Net present value (NPV) > investment of $5,000
  - Benefit-cost (B/C) or performance ratio > 1.0
  - Internal rate of return (IRR) > 15%
  - Return on investment (ROI) > 20%
  - Payback period < 2 years

Financial Investment Analysis

- ***Payback*** = net investment ÷ annual cash flow savings = $4,778/$3,712 = 1.26 years [15 months]
- ***Return on investment*** = cash flow savings ÷ net investment = $3,712/$4,778 = 77.7%
- ***Net present value***, using 6% as a normal opportunity return and a 10-year life = present value of cash flow minus present value of net investment = ($3,712 x 7.36 factor [from present value of $1 table]) - $4,778 investment = $22,542
- ***Internal rate of return*** = discount or interest rate when the calculated net present value is zero = approximately 65%
- ***Benefit-cost ratio*** or profitability index = present value of inflows or benefits ÷ present value of outflows or costs = $27,320/$4,778 = 5.7

Financial & Non-Monetary Observations

- Excluding tax and depreciation considerations, automating the irrigation process appears to be a very good investment.
- Payback is under 1½ years; ROI is over 75%; NPV at 6% for 10 years is greater than $22,000; IRR exceeds 60%; B/C ratio is over 5.0.
- Non-monetary and intangible benefits would include more uniform plant growth; labor freed up to do other more pressing work; less total laborers needed; conservation effects of 30% water savings; public relations gain from being seen as efficient and a team player.



Closing Comments on Water Audit

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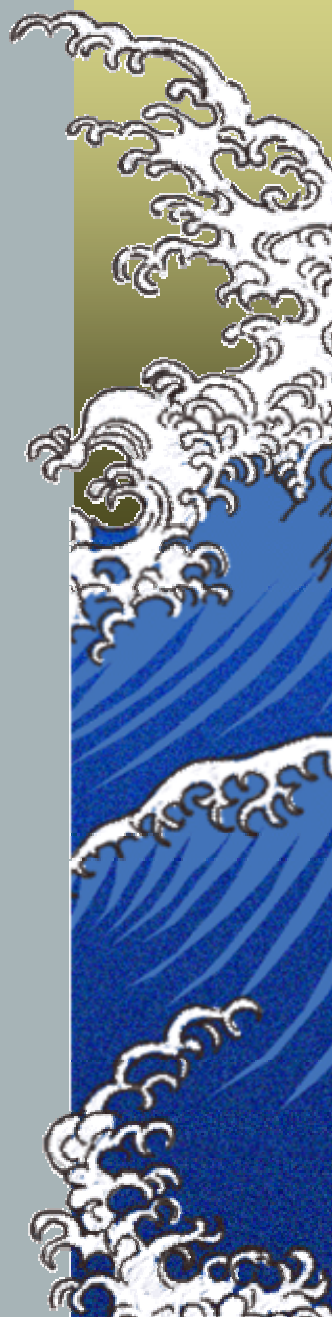
Watershed Use Observations

- *In greenhouse production, which is less a water-waster than container- and field-nursery production under traditional overhead sprinkler and water jet watering systems, water use savings is at least 0.2 gallon per 6-inch pot and 0.3 gallon per 10-inch basket each watering, which for the example greenhouse means an annual water savings of 232,766 gallons per greenhouse.*
- *For container- and field-nurseries, the water use savings is even more spectacular.*



Thank you for your attention.
Any questions that I may answer?