Selling End Users on Water Efficient Improvements.

Chris Le Conte, CIC, CLIA.

Milton, Ontario. Canada

cleconte@smartwateringsystems.ca

Abstract

In an effort to drive uptake of water conserving products, an irrigation professional must "sell" their client on the value of water conservation. The purpose of this paper is to evaluate the effectiveness of an alternative method to data collection compared to catch can data collection and analysis. While irrigation professionals typically want to help their clients reduce water use, the only methodology they are trained on is the use of catch cans and collection of data such as, precipitation rates and Distribution Uniformity (DU) – (Distribution Uniformity, Coefficient of Uniformity and Scheduling coefficient). The objective of this study is to (evaluate the use of) use an alternate method of irrigation analysis to produce useful information that can be used to drive client uptake of water saving products.

This study was carried out over 5 irrigation seasons (2010-2014) and consisted of evaluating multiple irrigation systems using an alternative irrigation assessment technique. Trained irrigation professionals used this alternative method to quantify water use, identify water use, annual water cost and water savings potential. This information was then used to sell end-users on the advantages to investment in irrigation system performance improvements. The intent was to achieve and sustain significant outdoor water use reductions.

Results indicate that it is Return on Investment (ROI) and total water use savings volumes that drive consumer behaviour when it comes to investment in irrigation system improvements. While DU is one way to measure zone performance, DU is not something that the end user cares about (or understands). These findings indicate that irrigation professionals can provide end users with useful information that can be collected in (approximately) half the time of a traditional (catch can) irrigation assessment. In five years of practical, hands-on, real-world experience, the assessment findings led directly to the improvement of irrigation systems resulting in the conservation of millions of litres of potable water and hundreds of thousands of dollars in water cost savings. If more assessments can be performed in significantly less time but achieve the same results, this would indicate a potentially significant revenue opportunity for irrigation professionals. If significantly greater economies of scale can be achieved with this new approach to irrigation assessments while assisting the irrigation professional in demonstrating a solid business case for irrigation water conservation, then a very promising business opportunity exists for irrigation professionals in marketing irrigation water conservation assessments and retro-fits.

Keywords

Water manager, consultant, designer, water resource management, water utility, water conservation, audit, irrigation assessment, inspection, water budget, distribution uniformity, scheduling, return on investment, water conservation audits, data collection, retro-fit.

Do we need to sell water conservation?

Water conservation generally makes sense to consumers and irrigation system end users. In the case of low flush toilets it is fairly simple. Converting a standard toilet 3 GPF (Gallon per Flush) to a 1 GPF will save water every time you use your fixture. Another example of a water saving fixture is a high efficiency shower head. These are probably the most widely used and observed conservation techniques used in the home or in commercial buildings. The savings realized from the employment of these fixtures is easy to measure, understand and "sell" to consumers. Unfortunately, selling irrigation water conservation is not as simple. Sure, the manufacturers such as Hunter, Rain Bird and Toro all have invested heavily in R&D for creation of new irrigation products that can help irrigation system owners save water, but a problem still exists. These products are not as highly used as needed since end-users do not really know exactly how much water they can save by installing these new high efficiency products.

Manufactures claims of 30% for pressure regulation, rotary nozzles, etc sound great, but in reality, a contractor does not have the information they need to answer the most common question from a homeowner or decision maker. How much water am I using right now and how much will installation of these products cost me and save me? Claims of 30% water savings are great but 30% of what? In order to sell water conservation in irrigation systems, we need more verifiable information.

Typically, an irrigation professional will attempt to gain experience and knowledge in water conservation by becoming a Certified Landscape Irrigation Auditor (CLIA). There are thousands of CLIA professionals in North America. This professional learns how to use and collect irrigation performance values and metrics such as DU, lowest quarter DU, etc. If you speak to some of these CLIA professionals you will hear consensus that typically, they are seldom paid to perform this work. Irrigation professionals regard this work as time consuming and expensive. As a result, the cost of a "catch can" audit falls outside the budgets of what a homeowner or HOA (home owners association) might consider as cost effective. It is true that if there is limited budget, spending a large portion of the budget on the audit makes little sense. The majority of irrigation assessments currently being performed are being done by not for profit organizations that have funding to carry out irrigation assessments as part of the overall "water conservation" mandate. Typically these agencies are performing this work for cities and towns as part of their water conservation strategy. If a more efficient and cost effective method of performing irrigation assessments existed, irrigation professionals would start to perform more assessments, and this in turn, will result in the implementation of water conserving products and behaviours.

Typically irrigation improvements do have to be “sold”. An HOA, for example, may know that they have a high summer water bill but typically they do not know why. They are likely aware that sprinklers are the cause but they don’t really know if they “are they using more water than they need too”. The consultative selling aspect is necessary to explain where the saving opportunities are and what level of investment is necessary to achieve a desired water use reduction outcome. The selling part of this process is demonstrating that an investment in water conservation makes financial sense. Sure there are other benefits to water conservation but usually it comes down to money. Traditionally an irrigation audit sets out to determine the level of performance for an irrigation system. Irrigation performance is described in terms of Distribution uniformity (how evenly water is applied) and precipitation rate (depth of water per unit of time). These operating characteristics are then used to program proper irrigation schedules. Neither of these performance metrics are helpful to the end user if making an investment decision. From personal experience, an end user will get a “glazed over look in their eyes” as soon as there is mention of distribution uniformity and other industry “jargon”. The end user just wants to know how they can save water (while maintaining a healthy landscape) and how to prioritize their investment dollars.

A change in approach

After initial consult with a local water utility conservation department, it was clear that in order to meet their goals for the number of irrigation assessments performed, a new approach would have to be used. Since system assessment reports were going to be sent directly to the property management team, a new method of communicating water conservation potential had to be determined. The aim of this assessment program was to give property managers the information they needed to review the water savings opportunity with their contractor and then act on the recommendations.

After consideration, it was decided that savings potential would be identified by setting a weekly target of .50” (inches) per week. Using historical billing data and landscape size estimates it was hypothesized that over a 20 week irrigation season, on average, the landscape would require no more than a total of 10” of precipitation supplied by irrigation. While Evapotranspiration during this time period (May-September) typically totalled over 20 inches, rainfall was typically over 15” during the same period. Any weekly zone irrigation application amount in excess was deemed to be waste. ***Note- the .5” target is applicable for the climate of the study. In Hot arid climates this number would need to me raised.***

In order to achieve reductions in application rate to .5” per week, irrigation deficiencies such as leaks, mixed precipitation, over-pressurization and overspray would need to be corrected. If corrected, it was believed that an additional savings of .15” per week could be achieved with installation of a smart controller and .20” of savings with installation of an irrigation management system that included flow sensing.

The Methodology

Once a landscape had been selected, an irrigation assessment would be scheduled and an assessment performed. During the irrigation assessment key information was collected using an ultra-sonic flow

sensor, measuring wheel, soil probe, sprinkler pressure gauges, and camera. During the inspection of each zone, the following information is collected:

1. Zone flow rate
2. Zone area of the landscape only (no hardscape)
3. Sprinkler head dynamic pressure
4. Sprinkler head count and type
5. Documentation of deficiencies (leaks, etc)
6. Picture of gauges, soil probe, leaks, overspray and landscaped areas
7. Irrigation program run times, start times and days of operation

Panametric/Ultra-sonic flow sensor

Soil sample

Example of a leak

Example of a leak- Some deficiencies are more visible than others.

Pressure gauge

Overspray- visible waste

With the above information, zone weekly application amounts were determined and used as the evaluation metric of performance. A zone with over .5” of weekly application was deemed to be over watering. Over watering can be a result of a leak, improper scheduling or other infrastructure problems. Identifying zones with over .5” per week of application leads the irrigation professional to zones that potentially require a closer look to determine the cause of the over watering.

Here is an example of an irrigation system assessment data chart:

Table 1 - Zone Summary: IMAX - 2010

Zone Number	Zone Location	Area, m^2	Landscape Type	Rotors	Sprays	PSI	Flow rate, L/min	run time min/cycle	cycles/week	mm/week	inches/week	m3/year	Leak Observed	Potential Savings, m^3/yr: Hardware Savings[1]	Additional w/ Smart Controller[2]	Additional w/ Central Controller[3]
1	NE corner of bldg	1,171	TURF/TREES	15	•	38	120	40	4	16	0.65	384		87	119	149
2	E side of bldg	471	MIXED	12	•	40	108	45	4	41	1.62	389		269	48	60
3	Boulevard between driveways	1,310	TURF/TREES	20	•	22	130	45	4	18	0.70	468	✓	135	133	166
4	S boulevard	641	MIXED	19	•	26	122	45	4	34	1.35	439		276	65	81
5	E side of pond	2,137	MIXED	14	•	45	108	45	4	9	0.36	389			63	117
6	N and S of pond	1,918	TURF/TREES	9	•	46	115	45	4	11	0.43	414			122	170
7	N of pond, S of bldg	2,731	TURF/TREES	14	•	34	147	45	4	10	0.38	529			113	182
8	S side of bldg	676	MIXED	9	•	33	112	45	4	30	1.17	403		231	69	86
9	Planting Beds at bldg entrance	552	SHRUBS/TREES	•	18	35	160	15	4	17	0.68	192		52	56	70
10	Lunch courtyard	487	SHRUBS/TREES	•	12	38	115	10	4	9	0.37	92			18	30
11	S side of bldg	1,076	TURF/TREES	13	•	32	125	40	4	19	0.73	400		127	109	137
12	NW side of shipping driveway	279	TURF	•	17	25	150	30	4	65	2.54	360	✓	289	28	35
13	W side of parking lot	242	TURF	•	14	36	120	30	4	59	2.34	288		226	25	31
14	N side of parking lot	166	TURF/TREES	•	12	35	104	30	4	75	2.95	250		207	17	21
15	E side of parking lot	230	TURF	•	10	32	86	30	4	45	1.77	206		148	23	29
16	N boulevard	1,479	TURF/TREES	13	•	34	105	45	4	13	0.50	378			153	190
17	E side parking lot and around naturalized area	2,146	TURF/TREES	15	•	34	108	45	4	9	0.36	389			62	116
18	POND FILLER VALVE															
19	N corner of bldg	914	TURF/TREES	15	•	40	150	40	4	26	1.03	480	✓	248	93	116
												Total Annual Irrigation Demand, m3/year =				
												6,450				
												Total Estimated Annual Savings, m3/year =		**2,296**	**1,315**	**1,788**
												Percentage Savings =		**36%**	**20%**	**28%**

Potentially over-watered zones

1 Via fixing leaks, replacing spray heads with rotors, and adjusting run times/schedule to achieve 0.5 inches/week for 20 weeks

2 Via reducing average irrigation application rate to 0.30 inches/week for 20 weeks.

3 Via reducing average irrigation application rate to 0.25 inches/week for 20 weeks.

The above chart is then sent to the property manager as part of a comprehensive report with cost estimates of the recommendations on total costs per zone and an anticipated return on investment (ROI) from water savings in each zone assuming repairs are made, performance enhancements are made and scheduling is adjusted. Once the system changes are implemented, a return to the site is necessary to verify "new" water use information. The purpose of the post inspection is to verify that changes had been made and to document the results. Here is an example of a post monitoring data collection chart:

Comparison between 2010 water use and 2011 water use

Changes were made to sprinkler nozzles, zones changed from sprays to drip, run-times adjusted

Average savings equal 27%

Zone Number	mm/week in 2010	inches/week in 2010	m3/year in 2010	mm/week in 2011	inches/week in 2011	m3/year in 2011	Overall reduction m3/year	Overall reduction Gallons/year	Percent Reduction
1	16	0.65	384	12	0.46	276	108	28,531	28%
2	41	1.62	389	27	1.07	257	132	34,871	34%
3	18	0.70	468	11	0.45	298	170	45,015	36%
4	34	1.35	439	22	0.87	283	156	41,211	36%
5	9	0.36	389	9	0.35	378	11	2,853	3%
6	11	0.43	414	10	0.41	396	18	4,755	4%
7	10	0.38	529	9	0.35	490	40	10,461	7%
8	30	1.17	403	31	1.20	414	-11	-2,853	-3%
9	17	0.68	192	12	0.47	132	60	15,850	31%
10	9	0.37	92	10	0.40	98	-6	-1,691	-7%
11	19	0.73	400	10	0.38	206	194	51,144	48%
12	65	2.54	360	25	0.97	137	223	58,963	62%
13	59	2.34	288	28	1.09	134	154	40,577	53%
14	75	2.95	250	36	1.42	120	130	34,237	52%
15	45	1.77	206	24	0.93	108	98	25,995	48%
16	13	0.50	378	12	0.46	346	32	8,559	9%
17	9	0.36	389	8	0.31	342	47	12,363	12%
18	POND FILLER VALVE								
19	26	1.03	480	18	0.70	324	156	41,211	33%
						Total =	**1,711**	**452,051**	
						Cost savings at $1.525/m3	**$2,610**		

In total, an average savings of 27% annually was achieved through system infrastructure improvements and the repair of deficiencies.

When combined with scheduling change savings, the results are even more dramatic (see chart below):

Comparison between 2010 water use and 2011 water use

Changes were made to sprinkler nozzles, zones changed from sprays to drip, run-times adjusted
Watering days adjusted by SMART Controller
Average savings equal 45%

Zone Number	mm/week in 2010	inches/week in 2010	m3/year in 2010	mm/week in 2011	inches/week in 2011	m3/year in 2011	Overall reduction m3/year	Overall reduction Gallons/year	Percent Reduction
1	16	0.65	384	9	0.35	207	177	46,758	46%
2	41	1.62	389	20	0.80	193	196	51,831	50%
3	18	0.70	468	9	0.34	223	245	64,669	52%
4	34	1.35	439	17	0.65	212	227	59,914	52%
5	9	0.36	389	7	0.26	284	105	27,817	27%
6	11	0.43	414	8	0.30	297	117	30,908	28%
7	10	0.38	529	7	0.26	367	162	42,796	31%
8	30	1.17	403	23	0.90	311	93	24,489	23%
9	17	0.68	192	9	0.35	99	93	24,568	48%
10	9	0.37	92	8	0.30	74	18	4,808	20%
11	19	0.73	400	7	0.28	155	245	64,775	61%
12	65	2.54	360	18	0.72	103	257	67,998	72%
13	59	2.34	288	21	0.82	101	187	49,453	65%
14	75	2.95	250	27	1.06	90	160	42,162	64%
15	45	1.77	206	18	0.69	81	125	33,127	61%
16	13	0.50	378	9	0.34	259	119	31,384	31%
17	9	0.36	389	6	0.24	257	132	34,950	34%
18	POND FILLER VALVE								
19	26	1.03	480	13	0.52	243	237	62,609	49%
						Total =	**2,896**	**765,016**	
						Cost savings at $1.525/m3	**$4,416**		

Combined with scheduling savings from installation of a smart controller, total annual water use reductions of 45% we achieved. This amounted to 2,896,000 litres per year (765,000 US Gallons) at a cost savings of $4,416.00 in 2011. At the 2014 current water rate, these savings now equal over $5,647.20 per year.

Here are some additional examples:

Microsoft	
PRE	
PRE Irrigation Demands per 20-week season	5,994 m^3
Area of Irrigation	10,073 m^2
Weekly Irrigation Demands	30 mm/week
Maximum Target (estimated) savings	4,715 m^3
POST	
POST Irrigation Demands per 20-week season	2,128 m^3
Weekly Irrigation Demands	11 mm/week
Savings	
Actual water savings	3,866 m^3
Percentage water savings	64%
Percentage of Target Savings Achieved	82%

Meadowvalve (2000 Argentia Road)	
PRE	
PRE Irrigation Demands per 20-week season	10,463 m^3
Area of Irrigation	21,125 m^2
Weekly Irrigation Demands	25 mm/week
Maximum Target (estimated) savings	7,244 m^3
POST	
POST Irrigation Demands per 20-week season	4,503 m^3
POST Irrigation Demands per 20-week season	11 mm/week
Savings	
Actual water savings	5,960 m^3
Percentage water savings	57%
Percentage of Target Savings Achieved	82%

With over 100 assessments performed using this methodology, here are some findings:

1. Over 50% of all zones were over watering (1000 zones)
2. On average there were 3 leaks per irrigation system
3. Overspray existed on every system
4. Scheduling responsible for approximately 50% of total savings
5. Very few functioning rain sensors
6. Over pressurization and mixed precipitation rates were commonly found
7. Irrigation contractors in general were happy with the results since it drove business for them.
8. Resulted in uptake from 50% of participants.
9. Over 50 new controllers installed.
10. Resulted in additional site visits for contractors for mid-season inspections.
11. Irrigation assessments could be completed in 5-7 minutes per zone compared to 20 - 30 minutes per zone using the catch-can approach.

Conclusion

Based on the findings from over 100 Industrial, Commercial, and Institutional (ICI) assessments using the alternative assessment methodology outlined above, it is clear that property managers are able to make irrigation water saving investment decisions without needing to know DU values or precipitation rates. Return on investment is a key performance metric for decision makers that are deciding on where to spend their "sustainability dollars".

While there was only 50% uptake of recommendations from assessment participants, the percentage of uptake was not believed to be influenced by the assessment methodology. In speaking with program participants, the typical reasons for lack of participation were:

1. Change in corporate priorities
2. Contractor not fulfilling request for proposals
3. Change in personnel that resulted in project being postponed
4. Funds not available due to unforeseen circumstances
5. Longer ROI than deemed acceptable for investment (typically the acceptable rate of return for an investment decision is 35%. ROI with over 4 years typically become a secondary priority)

Irrigation professionals that are looking to grow their business through system improvement within their existing clientele, would see a significant benefit from utilizing the assessment methodology outlined above. Time savings would be significant and challenges such as wind speed (that are a limiting factor in catch-can assessments), would not impede performance of irrigation assessments that are scheduled.

While not all irrigation professionals have access to an ultra-sonic flow meter, this assessment methodology has been tested using readily available flow rate calculators and manufacturers sprinkler nozzle charts. If an accurate estimate of flow rate is achieved, the results of the assessment are in line with an assessment performed using ultra-sonic flow readings.