Overview of EZ Guide for Water Conservation Evaluations

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INTRODUCTION

The purpose of this paper is to describe a data-driven modeling approach for evaluating water conservation options for Florida water utilities. This method has evolved over the past five years based on experience with a variety of possible methods for evaluating conservation options within problem contexts that include permitting and planning. More detailed information regarding our water conservation activities can be found at the Conserve Florida Water Clearinghouse web site (www.conservefloridawater.org). This paper describes the current version of the resultant software called EZ Guide (EZG). EZG incorporates the need for a simple and easy to use evaluation tool. However, for water conservation evaluations to be credible, they must also be based on a solid foundation of reliable information. This solid foundation is provided by calculating the water use patterns for every parcel served by the utility. This bottom-up, data-driven, approach provides the desired solid foundation of reliable information that is missing in previous water conservation models that rely on highly aggregated water use and customer data. EZG also includes a water budget section that allows the model to be calibrated to reflect observed water use patterns and provide a mechanism for explaining the nature of recent observed trends in water use, e.g., gpcd. This information is becoming increasingly important as utilities seek recognition for their past water conservation activities. Finally, the computing platform needs to be easy to use but also permit auditing of the key assumptions and calculations. In this spirit, the EZG has evolved from an online tool to a spreadsheet tool and is now being made available as an online tool that takes advantage of improved software technology. Simple examples are included to illustrate the methods.

GUIDE CHRONOLOGY

The original online guide (OOG) developed by Malcolm Pirnie was provided to the Conserve Florida Water Clearinghouse (CFWC) in June 2006 for internal and external evaluation and testing. The results of these evaluations indicated that a significant effort was required to input the requested data. Much of this requested data was available in other sections of consumptive use permit applications. The user may not know how this data was being used by the OOG. Also, the OOG included regulatory requirements that differed from the water management district regulations in some cases. CFWC released OOG 1.4 in summer 2007 that included corrections and refinements. In summer 2008, CFWC released Guide 1.6, a spreadsheet version of OOG, that greatly simplified data entry requirements, and made it easy for the user to understand the calculations. Guide 1.6 retained the OOG approach. CFWC introduced a major paradigm shift in February 2010 with the release of EZ Guide 2.0 beta that continued to use a spreadsheet platform. The major change was introducing a new bottom-up approach based on parcel-level data for each customer served by the utility. A key feature is that parcel-level attribute data are pre-populated for the user and an initial solution is provided with minimal effort on the part of the user. This method has been refined during the past eighteen months and is now being converted to an online version. Key features of this new approach are described in the balance of this paper.

EZ GUIDE ELEMENTS

EZ Guide is composed of the ten elements listed below that are done in the indicated order:

1. Profile of the utility: utility boundaries from the Water Management Districts (WMDs) are used by CFWC to pre-populate EZG with parcel level information. Current FDEP statistics on total number of customers, population and current water use are also pre-populated into the profile.
2. Historical water supply patterns: pre-populated monthly water supplied from FDEP database from January 1999 to the present-figure plus tabular summary.
3. Water loss audit: link to different audit methods, e.g., AWWA
4. Past conservation programs: being added
5. Water budget: pre-populated attributes of every parcel in the utility from FDOR plus calculated water use patterns of each customer for 4 single family, 5 multi-family, 28 commercial, 11 industrial, and 16 institutional sectors. Unaccounted for water from results of audit in step 3. The water budget is done for a specified year. Estimates of fixtures are updated to account for effect of service lives.
6. Best Management Practice (BMP) optimization: linear programming is used to find the most cost-effective combination of fixtures to change and the best replacements.
7. Measures: conservation practices that are required such as having a conservation coordinator but for which water savings have not been quantified.
8. Planning: being added. Format depends on the problem context.
9. Summary Report: being added. Format depend on the problem context.
10. Activity tracking: being added. Format depends on the problem context.

Brief descriptions of these elements are presented next. More detailed information is available at the Conserve Florida Water Clearinghouse website (www.conservefloriawater.org)

1. Utility and City(ies) Profile

The key information on the utility's profile that EZG needs to do an initial evaluation is obtained from the following sources. The utility boundaries in GIS format are needed to identify the parcels served by the utility. This information can be downloaded from water management district websites in many cases. The utility GIS shapefiles are used to query the statewide FDOR and U.S. Census databases for parcel attributes for all parcels within the utility boundaries. The CFWC currently obtains this parcel-level information from the Florida Geographic Data Library (FGDL) housed at the University of Florida (http://www.geoplan.ufl.edu/fgdl_source_links.htm). FGDL annually downloads the FDOR attribute and spatial data and adds additional fields such as parcel area, derived from the FDOR spatial data, and census block number, which allows for linking to Census data (e.g., people per home). CFWC uses the latest annual update of the FGDL data and queries for parcels to be analyzed via a utility service area boundary.

In addition to the above information, it is helpful to access historical information regarding previous and ongoing water permit and related land use and comprehensive urban planning activities. Much of the desired information that describes the utility's water, wastewater, and stormwater activities can be found in the WMD e-permitting databases. Some effort is required to go through the pdf files since they may not have descriptive titles. Important related information regarding the city(ies) that the utility serves can be found in the Florida Department of Community Affairs (FDCA) FloridaPAPERS databases.

2. Historical Water Supply Patterns

The FDEP public water supply ID's for the treatment plants are needed to download monthly water use data from 1999 to the present. CFWC has combined the annual data sets that FDEP makes available online (http://www.dep.state.fl.us/water/drinkingwater/download.htm) into a single database for all years. EZG begins the conservation analysis with a plot of monthly water use for the utility. For the south Florida utility shown in Figure 1, the population was stable during this period and the gross gallons per capita per day (gpcd) dropped from 160 in 1990 to 99 in 2009. Similarly, the seasonal variability in water use appears to have declined since 2000. For this utility, seasonal use is a relatively small percentage of total use. Is this because reuse and/or private wells are popular? Why is gpcd changing? Such key questions needs to be addressed in order to devise cost-effective demand management programs. A companion table in EZG provides monthly summaries of water use for each year along with summary statistics.

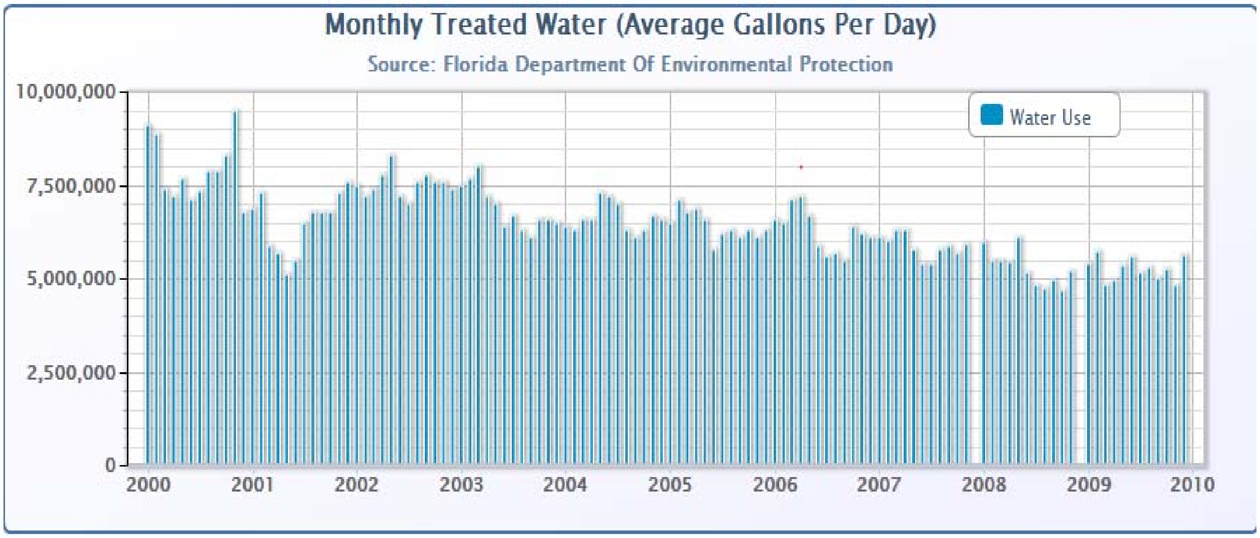


Figure 1. EZG screen capture of monthly water use for a south Florida utility from 2000 to 2009.

3. Water Loss Audit

The water audit component provides links to the following five different options for doing the water audit:

1. M36: Detailed guidance for conducting a water audit can be found in the 2009 edition of the AWWA M36 Manual, titled Water Loss and Leak Detection. This audit has been embedded in EZG as shown by five tabs labeled Main Audit, Source Water Audit, Source Water Data, Authorized Consumption Data, and Customer Meter Accuracy. The spreadsheets are pre-populated with the same case study as presented by M36.
2. AWWA 4.0: Free water audit software version 4.0 (AWWA 2008). It should be used in conjunction with the M36 Manual.
3. SWFWMD: Water audit instructions are available in the Water Audit Guidelines and Worksheets document.
4. SJRWMD: Water audit instructions are available to complete the Water Audit Form document.
5. Rural Water Audit: To download the spreadsheet, go to "Conservation" on the left-hand list of modules and choose "Water Audit Spreadsheet"

Friedman et al. (2009a and b) describe these alternative approaches in detail including a review of the scoring method used in the AWWA free software. The required single output from the water audit section is the estimate of percent unaccounted for water that is an important component of the overall water budget.

4. Past Conservation Programs

Water utilities have developed numerous water conservation programs during the past twenty years. For the utility shown in Figure 2, gpcd has decreased from 160 to 99. Several factors can explain why gpcd might have changed including;

1. Climate, especially precipitation and air temperature
2. More efficient indoor water use devices
3. Growing popularity of in-ground irrigation systems
4. Proportion of users irrigating with reuse water or private wells
5. Irrigation restrictions
6. Changing non-residential water use patterns
7. Water losses
8. The recent economic recession

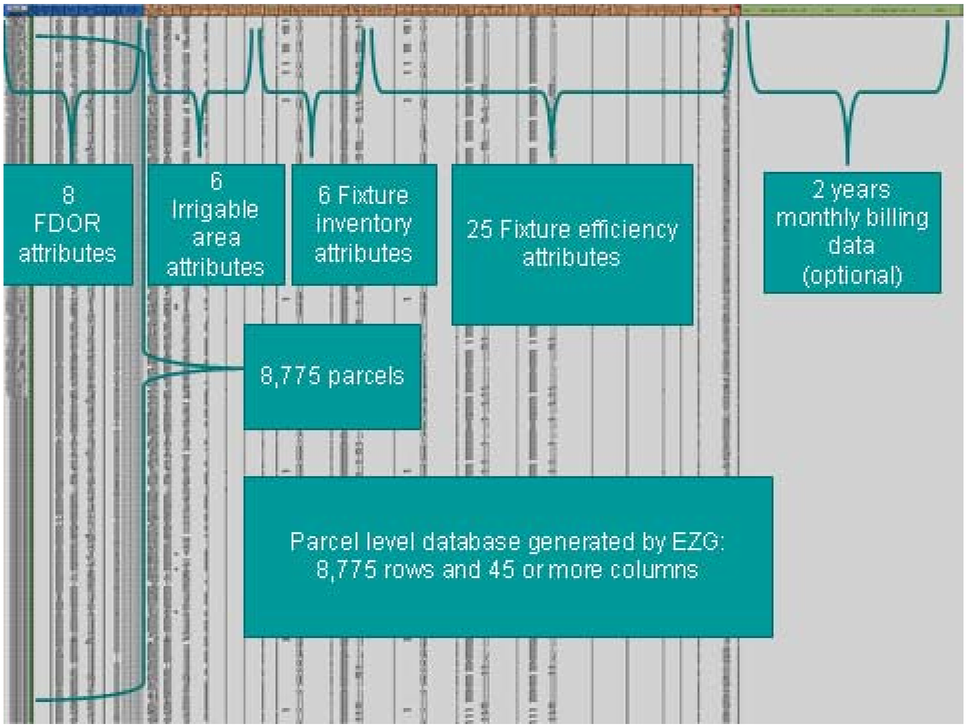
These impacts can be evaluated by calibrating the Water Budget (Item 5) to match historical vs. estimated water use. This section is being expanded to include multi-year evaluations.

5. Water Budget

A water budget for the entire utility is done for a user-selected study year, e.g., 2009. Estimates of fixture types are updated for every customer to account for effect of base replacement using a fixed service life model. Then, EZG provides pre-populated attributes of every parcel in the utility from FDOR and U.S. Census data plus calculated water use patterns for each customer for 4 single family, 5 multi-family, 28 commercial, 11 industrial, and 16 institutional sectors. Unaccounted for water is estimated from audit results from Step 3. The water use coefficients are estimated based on benchmark studies of Gainesville Regional Utilities and Hillsborough County Water Resources Services wherein parcel level billing data were evaluated for each customer. Detailed descriptions of these procedures for single family residential (Friedman et al., 2009c, 2011a), multi-family residential (Friedman et al. 2011b), and non-residential sectors (Morales et al. 2010a and b, 2011) are presented elsewhere.

A screen capture of the flat file that is generated for the illustrative south Florida utility with 8,775 customers is shown in Figure 2. The first eight columns represent parcel data from FDOR and U.S. Census. These eight attributes provide the basis for calculating six irrigable area, six fixture inventory, and 25 fixture efficiency attributes. Thus, each parcel has a total of 53 attributes, 45 of which are derived from the eight FDOR attributes. Ideally, the utility has linked its attribute data to its billing data. However, this is atypical. In the absence of billing data, water use rates are calculated based on the results of the two test bed utilities, for which billing data are available. All calculations are done as database queries or pivot tables from this flat file. This approach provides the user with flexibility in how they want the results aggregated, e.g., by commercial sector, by pre-1983 one-bath houses.

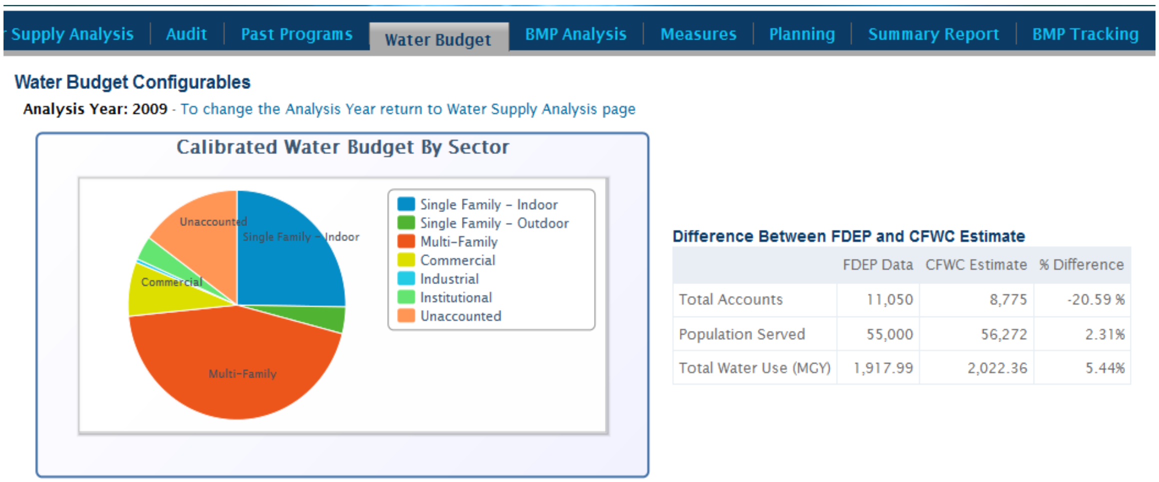
Figure 2. Flat file of parcel-level attributes for a south Florida water utility with 8,775 parcels.



The initial results of this evaluation, summarized in Figure 3, show the total number of accounts, population served, and total water use divided into seven groups. These results are compared with the FDEP data for the study year. The total water use estimate is within 5% of the FDEP value. The population served is only high by 2.3%. However, the number of accounts is low by over 20%. This seemingly large error in the estimated and reported number of accounts can be explained because of the differences between billing accounts and parcels. The errors are most pronounced in utilities with a relatively large multi-family residential sector such as this utility where multi-family residential is the largest sector. Friedman et al. (2011b) discuss the nature of these differences and how to handle them.

A tabular summary of the water use by sector, expressed in gpcd, is shown in Figure 4. EZG partitions water use into 64 sectors. A six category summary is shown in Figure 4. The user can get to the 64 sector level of disaggregation by clicking on the Details link. For this utility, multi-family residences are the largest single sector with an average of 71 gpcd. Single family residences have a total per capita of 77 gpcd of which 10 gpcd represents outdoor water use. The average monthly gallons per heated square foot for each category is the area weighted average for this utility. This weighted average is unique for each utility since it is based on the total heated area in each group.

Figure 3. EZ Guide screen capture of uncalibrated water budget for test utility.



Difference Between FDEP and CFWC Estimate

	FDEP Data	CFWC Estimate	% Difference
Total Accounts	11,050	8,775	-20.59 %
Population Served	55,000	56,272	2.31%
Total Water Use (MGY)	1,917.99	2,022.36	5.44%

Figure 4. EZ Guide screen capture of uncalibrated water use by sector.

Water Use Summary By Sector

Sector	% Water Use	Residential GPCD	Gross GPCD	Average Gallons Per Heated Square Foot Per Month	Links
Single Family	29.0 %	77	29	4.17	
Single Family - Indoor	25.3 %	67	25	3.60	Details
Single Family - Outdoor	3.8 %	10	4	0.58	Details
Multi-Family	44.4 %	71	44	6.61	Details
CII	11.6 %	--	11	2.89	Details
Commercial	7.6 %	--	8	3.38	
Industrial	0.5 %	--	0	0.76	
Institutional	3.4 %	--	3	3.17	
Unaccounted	15.0 %	--	15	4.23	
Total	**100.0 %**	**--**	**99**	**5.66**	

The calibration exercise can be done by utility and other professional personnel who have the best insights into the possible sources of error. The calibrated water budget provides valuable information regarding the relative importance of the various water use sectors. Detailed calibration procedures are described in Cornejo et al. (2010).

6. BMP Optimization

The original online Guide (OOG) partitioned the utility into three sectors (single family residential, multi-family residential, and non-residential) and five best management practices (BMPs). For example, a single family ultra-low flow flush toilet rebate would save an expected 26.6 gallons per account per day. This average savings is assumed to apply to all toilet retrofits. This water savings approach is used by other water conservation models. It has some severe limitations by not including:

- Water savings = usage before – usage after a retrofit. Thus, it is important to partition the entire sector into categories and determine how many fixtures are in each category.
- Water savings depend on how many people use the device. Thus, it is important to estimate the number of people and the number of fixtures per establishment Average water savings vary among utilities, depending on existing fixture efficiencies within a utility and the number of users in various categories such as one toilet homes built before 1983.

Based on the above two limitations, it is inaccurate to assume a single savings rate, especially over a major category such as single family residential.

The bottom-up approach provides a powerful way to go from only 15 or 20 choices to hundreds of choices in developing the optimal water conservation program. EZG partitions water users into 64 sectors instead of 3. Some water using devices such as toilets apply to all 64 sectors whereas others such as clothes washers only apply to 10 sectors. Furthermore, EZG uses three age categories based on when plumbing codes were enacted. Each age category has a different water use coefficient. The number of fixtures depends on the number of bathrooms in the establishment, e.g., houses have 1 to 4 bathrooms. The decision variables are the water using, or end use, devices, e.g., toilets. Thus, a house with a single 5 gallons per flush (gpf) toilet can change it to a 1.6, 1.2, or 0.8 gpf model and save 3.4, 3.8, or 4.2 gpf. EZG calculates the savings for each option for every parcel in the utility and determines which retrofit options are best. Thus, the single estimate of savings is replaced by 12 savings rates, one for each of the 3 age groups and 4 toilets per house combinations as shown in Table 1 for the case where toilets are retrofit to 0.8 gpf models. For the 0.8 gpf option, the savings are seen to vary from as little as 3.1 gallons per toilet per day to 59.9 gallons per toilet per day with a weighted average savings rate of 13.3 gallons per toilet per day. This weighted average savings rate changes from year to year. EZ Guide calculates the mix of all end uses for a given year based on the assumed service lives of each end-use device. A key advantage of the bottom-up approach is that the number of toilets in each of the twelve categories is known as shown in Table 1. This information is automatically uploaded by EZG. The overall importance of an option is based on its savings rate and the number of toilets in this category. The highest daily water savings rate of 59.9 gallons per toilet is not that significant since only 10, pre-1983, 5 gpf toilets remain in 2009. If the study year was 1999, instead of 2009, then a much larger number of toilets would be in this category. In EZG, the single point estimated water savings rate is replaced by a water savings function based on 13 data points that shows the total water savings as a function of the number of fixtures changed. A key feature to note is that the rows in Table 1 are sorted from highest to lowest savings rates since the higher water savings rates are preferred to the lower water savings rates.

Current Fixture Group	Toilets/ House	2009 Toilets	Cumulative 2009 Toilets	2009 Gal./ toilet/ day	0.8 Gpf Retrofitted Gal./toilet/ day	Water Savings Gal./toilet/ day	Cumulative Water Savings, Gal./ day
Pre 1983 (5 gpf)	1	10	10	71.03	11.13	59.91	599
1983-1994 (3.5 gpf)	1	6	16	50.23	11.13	39.1	834
Pre 1983 (5 gpf)	2	1,502	1,518	35.52	5.56	29.95	45,819
Pre 1983 (5 gpf)	3	1,446	2,964	23.68	3.71	19.97	74,695
1983-1994 (3.5 gpf)	2	640	3,604	25.11	5.56	19.55	87,207
Pre 1983 (5 gpf)	4	213	3,817	17.76	2.78	14.98	90,398
1983-1994 (3.5 gpf)	3	1,524	5,341	16.74	3.71	13.03	110,256
1995-2008 (1.6 gpf)	1	49	5,390	23.53	11.13	12.4	110,863
1983-1994 (3.5 gpf)	4	613	6,003	12.56	2.78	9.78	116,858
1995-2008 (1.6 gpf)	2	1,560	7,563	11.76	5.56	6.2	126,530
1995-2008 (1.6 gpf)	3	1,650	9,213	7.84	3.71	4.13	133,345
1995-2008 (1.6 gpf)	4	1,044	10,257	5.88	2.78	3.1	136,581
Total		10,257					
Weighted Average				17.57	4.26	13.32	

Table 1. Development of the 2009 water savings function for toilets in the south Florida utility that are converted to 0.8 gpf models.

The resulting water savings function is shown in Figure 5. It exhibits diminishing marginal productivity as the savings rate decreases with increasing number of toilet retrofits. This is a familiar result from production economics (James and Lee 1971).

In order to find the optimal number of toilets to retrofit, it is necessary to add an objective function that places a unit value on the water saved and assigns a unit cost for each new toilet. This objective function represents benefits and costs as seen be the utility. The utility can reduce water use by providing monetary incentives to its customers to switch to less water using devices. In some cases, matching funding is available from the water management districts, e.g., SWFWMD (2011). As a minimum, the utility saves the operation and maintenance costs associated with delivering water to its customers. Also, they may save money by deferring a capacity expansion that would otherwise have been needed. For this example, assume that the value of the water saved, p, is \$5.00/1,000 gallons. The daily cost of the new toilet to the utility can be estimated as the total cost of the toilet incentive divided by its service life assuming that the inflation and discount rates offset each other. Assuming a toilet incentive cost of \$365 and a service life of 20 years, then the unit cost of the 0.8 gpf toilet, c, is \$0.05/day.

The objective function for this problem is:

$$\text{Maximize } Z = py - cx$$

Where Z is the monetary net benefits in \$/day. This objective function can be plotted onto Figure 6 by solving for y and assuming a trial value of Z, or

$$y = Z/p - (c/p)x$$

This process is repeated for different trial values of Z until the objective function line is tangent to the water savings function, or

$$dy/dx = c/p$$

The resulting maximum net benefits are about $285/day for retrofitting 5,400 toilets. Expanding beyond 5,400 toilets would reduce net benefits, e.g., net benefits would fall to $206 if 9,200 toilets are replaced.

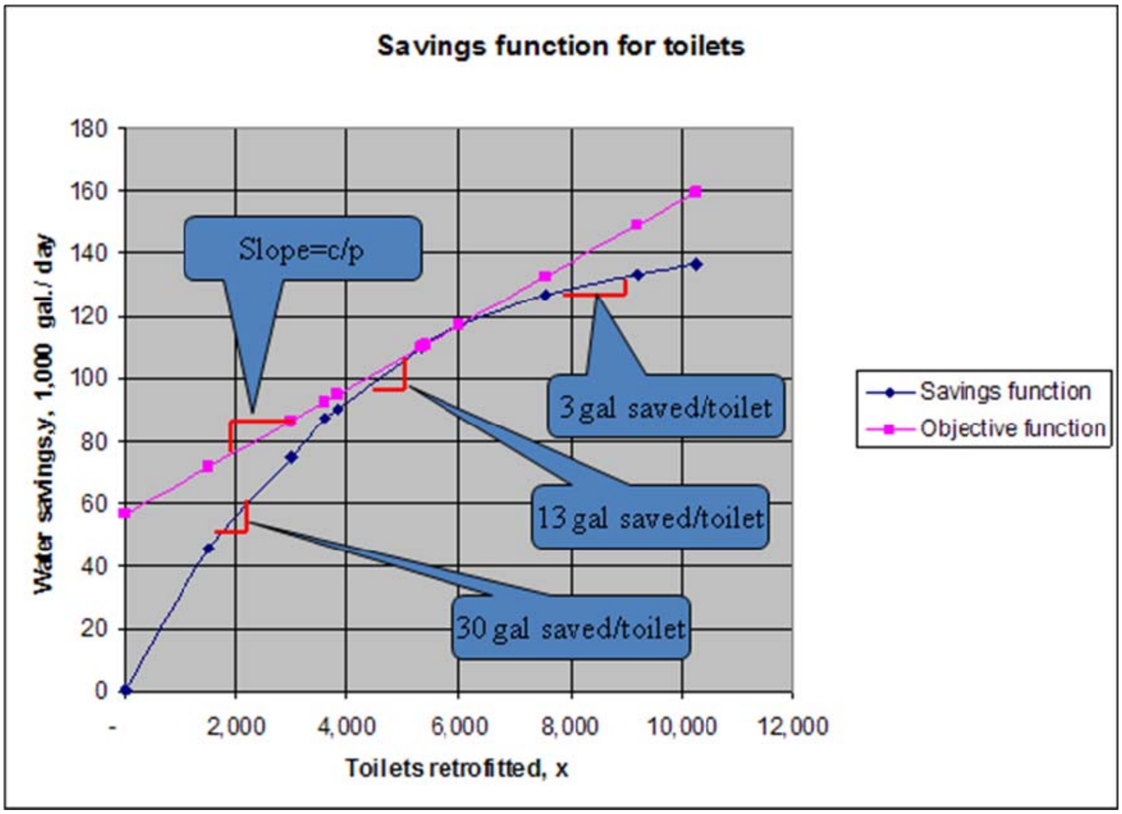


Figure 6. Graphical solution to the problem of finding the optimal number of toilets to retrofit.

Alternatively, this problem can be solved mathematically by fitting an equation to the water savings function data. For example, a simple Cobb-Douglas production function can be fit to this data to yield the following expression:

$$y = ax^{b} = 1.372x^{0.5046}$$

The optimization problem is:

$$\text{Maximize } Z = py - cx$$

subject to $y = ax^b$

$x \geq 0$

The marginal condition for the optimal solution is:

$$dy/dx = c/p = abx^{b-1}$$

The optimal number of toilets to retrofit, x*, can be calculated directly by solving this equation for x yielding:

$$x^* = \left[\frac{c}{pab}\right]^{\frac{1}{b-1}}$$

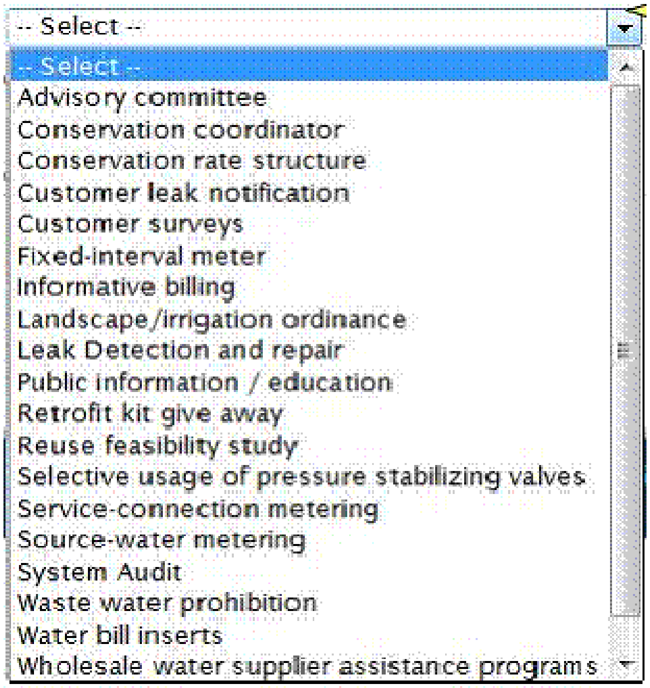
Substituting the known values for a, b, c, and p, yields an optimal solution of x* = 5,188, y* = 102.8, and Z* = $255. The mathematical solution yields a lower estimate of the maximum net benefits than the graphical solution. It is important not to take the solution too literally. However, it is safe to say in this case, that the optimal solution is in the range from 5,200 to 5,400 toilets.

Graphical solutions are a nice way to explain the principles of how to find the optimal solution. The classical mathematical representation also works well for this simple problem. However, neither method is practical for the real problem of finding the optimal blend of all BMPs wherein you have hundreds of decision variables. In this case, it is advisable to use linear programming to find the optimal solution. The linear programming model approximates the savings functions using piecewise linear segments, 12 in this example. EZ Guide solves a linear program to find the optimal solution. This procedure is described in Friedman et al. (2011).

7. Measures

In EZ Guide, Measures are defined as conservation practices that are required such as having a conservation coordinator but for which water savings have not been quantified. A Measure can become a BMP if savings and costs are quantified. This definition of Measures is not uniform across the conservation field, even within the state of Florida. In the context of a consumptive use permit application, an applicant can be asked to simply state “yes” or “no” as to whether they have instituted a Measure. The existing partial list of possible measures is shown in Figure 7. The user can add other Measures as needed. A recent review of water use permit requirements regarding conservation indicated that South Florida (2009), St. Johns R. (2010), and Southwest Florida Water Management Districts have different requirements regarding how Measures are described. It is advisable to visit these websites to get current information on required reporting requirements

Figure 7. Screen capture of some of the Measures that can be included in the evaluation.



9. Planning

EZ Guide has been used for regional water supply planning by some of the water management districts. A key feature of the Planning section is the inclusion of projected activities during the planning horizon. Each water management district has its own procedures for water supply planning and associated reporting requirements. The results of the BMP optimization from Section 6 describe the overall activities that are needed to reach a particular target such as a specified gross gpcd by the end of the planning horizon. Sometimes, intermediate targets may also be specified, e.g., at least one half of the savings must be achieved by the end of the 10^{th} year of a 20 year planning horizon. Given a planning context, it is straightforward to extend the results of the BMP optimization to develop a master plan that shows yearly targets.

10. Activity Tracking

As with the Planning section, the Activity Tracking section provides a template for evaluating the actual realizations for each period of interest during the planning horizon. Regulatory requirements for Activity Tracking vary so it is important to specify the type of information that is desired.

SUMMARY AND CONCLUSIONS

Water conservation analyses are done for a variety of applications including regional water supply planning and as part of water permit applications. EZ Guide uses a bottom up approach based on data at the individual parcel level for every parcel in the state of Florida. This information can be aggregated at any desired spatial scale, e.g., all commercial water users. The calibrated EZ Guide water budget model is very helpful in explaining cause-effect relationships regarding the nature of changes in water demand patterns. The Conserve Florida Water Clearinghouse seeks to work with utilities in using EZ Guide to address their needs for a simple evaluation tool that is supported by a solid foundation of parcel-level attribute and water use data that is provided by the Clearinghouse.

References

Cornejo, C., Friedman, K., and J. Heaney. 2010. Pre-Population and Calibration of the EZ Guide 2. *Proc. Florida Section of AWWA Fall Conference*, Orlando, December.

Friedman, K. and J. Heaney. 2009a. Water Loss Management: Conservation Option in Florida's Urban Water Systems. *Florida Water Resources Journal*, August. http://www.fwrj.com/techarticles/0809%20FWRJ%20tech1.pdf.

Friedman, K. and J. Heaney. 2009b.Validity of Water Audit and Water Loss Evaluations for Florida. *Proc. Florida Section of AWWA Fall Conference*, Orlando, December.

Friedman, K. 2009c. Evaluation of Indoor Urban Water Use and Water Loss Management as Conservation Options in Florida. M.E. Thesis, Dept. of Environmental Engineering Sciences, U. of Florida, Gainesville, Fl.

James, L. and R. Lee. 1971. Economics of Water Resources Planning, McGraw-Hill, New York.

Friedman, K., Heaney, J., Morales, M. and J. Palenchar. 2011a. Water Demand Management Optimization Methodology. Accepted for publication in *Jour. AWWA.*

Friedman, K., Heaney, J., Morales, M., and R. Switt. 2011b. Parcel Level and Population Estimates for the Multi-Family Residential Water Use Sector. Submitted to Florida Water Resources Journal.

Morales, M., and J. Heaney. 2010a. Predominant Commercial Sectors in Florida and their Water Use Patterns. *Florida Water Resources Journal*, August.

Morales, M., Friedman, K., and J. Heaney. 2010b. Estimating End-Use Devices in the Commercial and Institutional Sectors. *Proc. Florida Section of AWWA Fall Conference*, Orlando, December.

Morales, M., Heaney, J., Friedman, K., and Martin J. (2011). "Estimating Commercial, Industrial, and Institutional Water Use on the Basis of Heated Building Area." *Journal American Water Works Association*, Vol. 103, No. 6.

SJRWMD. 2010. Applicant's Handbook: Consumptive uses of Water, Chapter 40-C, F.A.C., December 27. Appendix I. Water Saving Measures for Water Conservation Plans **http://www.sjrwmd.com/handbooks/cuphandbook.html**

SFWMD. 2009. Consumptive Use Permit Application Water Conservation Plan Guidelines, Draft, July 22. http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wc_plan_template.pdf

SWFWMD. 2010. Water Use Permit Information Manual. January 27. http://www.swfwmd.state.fl.us/files/database/site_file_sets/14/WUP_Complete_Manual_as_of_110209_2009042_SB2080.pdf

SWFWMD. 2011. Cooperative Funding Initiative: FY 2012, Water Conservation, http://www.swfwmd.state.fl.us/files/database/site_files/WaterConservationFY2012[1].pdf