This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
Open-Source Evaluation Tool Leads to Data-Driven Program Development

Rhonda Himley
October 3, 2019
Moulton Niguel Water District

- Serve 6 cities in south Orange County
- Water, Wastewater, & Recycled Water
- Water Budget Based Rate Structure
- Data-driven utility
- Early adopters of tech, open-source tools
- One of the founding agencies of the California Data Collaborative
UC Riverside Study on MNWD’s Efficiency Programs
<table>
<thead>
<tr>
<th>Outdoor Technology/Service</th>
<th>Approximately 1 year</th>
<th>Between 1 and 2 years</th>
<th>More than 2 years</th>
<th>I do not currently use this technology/service</th>
<th>Unsure whether we have this</th>
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<tbody>
<tr>
<td>Drip irrigation</td>
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<td>Pool cover</td>
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<tr>
<td>High efficiency sprinkler nozzles</td>
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<td>Automatic sprinkler adjustment notification</td>
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<tr>
<td>Soil moisture sensor</td>
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<tr>
<td>Rain barrel</td>
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<tr>
<td><strong>Automatic weather-based irrigation controller / sprinkler timer</strong></td>
<td><strong>Approximately 1 year</strong></td>
<td><strong>Between 1 and 2 years</strong></td>
<td><strong>More than 2 years</strong></td>
<td><strong>I do not currently use this technology/service</strong></td>
<td><strong>Unsure whether we have this</strong></td>
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<tr>
<td>Automatic non-weather-based irrigation controller / sprinkler timer</td>
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<tr>
<td>Drought tolerant landscaping</td>
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</table>
Q10- Please indicate if you were aware of the rebate programs offered by MNWD.

- Drip irrigation: 26% Yes, 74% No
- High efficiency sprinkler nozzles: 28% Yes, 72% No
- Soil moisture sensor: 16% Yes, 84% No
- Rain barrel: 22% Yes, 78% No
- Automatic weather-based irrigation controller / sprinkler timer: 33% Yes, 67% No
- Turf removal: 63% Yes, 37% No
Factors Affecting Program Participation

Q37 - For each characteristic please choose the box that represents the importance of each factor in your decision to participate in a water conservation program.

- **Feedback from friends or neighbors who already have participated in the program:** 10% Very Low, 90% Moderate
- **Duration of the project until completed:** 15% Very Low, 85% Moderate
- **Water savings on your monthly water bill:** 32% Very High, 68% Moderate
- **Money savings on your monthly water bill:** 30% Very High, 70% Moderate
- **Initial investment of your time:** 19% Very High, 81% Moderate
- **Installation cost after rebate:** 38% Very High, 62% Moderate
Water Budget Based Rate Structure

- Outdoor Budget calculation elements:
  - Irrigable Area
  - Evapotranspiration (ET)
  - Plant Factor
  - Conversion Factor(s)

- Variation driven by changes in ET
Smart Timer Program

- Provides a free landscape and irrigation assessment
- Provides up to 2 free Rachio Gen 2 timers
- Targeted large lots and high users
- Reduced Flat rate for direct installation @ $165 per controller
TOTAL WATERING CONTROL AT YOUR FINGERTIPS.

Manage watering on your smartphone, and start saving money and water with a Rachio Smart Sprinkler Controller.

Upgrade to the latest smart watering technology - apply online today: www.rachio.com/mnwd

May through October!

Moulton Niguel is hosting FREE interactive irrigation classes to help customers identify and resolve common irrigation issues, learn ways to avoid over-watering in the hot summer months, and to learn about monthly water budgets.

Our "All Things Irrigation" workshops are interactive and offer education on the following topics:
- How to increase the efficiency of your sprinkler system
- Retrofitting your irrigation system
- How to calculate your water budget
- Where your water comes from

Hands-on experience

Participates will gain hands-on experience with sprinkler timers and learn how to:
- Set the timer
- Set multiple start times
- Use multiple programs for hydrozoning
- Use the seasonal adjust feature
- Manually run stations and more!

Upcoming Workshop Dates and Times
- Wednesday, May 8th | 6pm
- Wednesday, June 8th | 6pm
- Saturday, June 15th | 9am
- Wednesday, July 10th | 6pm

*Registration is required

Register by visiting mnwd.com/workshops
Smart Timer
Program Activity

Residential Outdoor Devices
Moulton Niguel Water District

No. Of Applications

Jan '16  Apr '16  Jul '16  Oct '16  Jan '17  Apr '17  Jul '17  Oct '17  Jan '18  Apr '18  Jul '18  Oct '18

- Nozzles
- Rain Barrel
- Smart Timer
- Smart Timer – Direct Install
Open-Source Tools

• Non-proprietary and free programming languages and tools
• R and Python: programming languages
• R-Shiny: data visualization program
• Github: code sharing site where others can adapt and redeploy
• Best advice: Get a data science intern
Program Analysis Tool

Choose one:
- Difference from Budget
- Percentage of Budget Used

Smart Timer Water Savings
Pre Install vs Post Install

Installation Date Range

Average Difference of Usage from Budget (cf)
Smart Timer Program – Analysis Summary

Select an Installation Date Range
2017-07-01 to 2017-12-31

Choose a starting Year for Usage
2013

Choose one:
- Difference from Budget
- Percentage of Budget Used

Choose method of Installation
DIY or Professional

Minimum number of months post installation
12

Smart Timer Water Savings
Pre Install vs Post Install

Percentage of Budget Used %

Time

Number of Accounts in the chosen installation date range: 413
Average Usage per bill period before Installation (ccf): 22.6
Average Usage per bill period after Installation (ccf): 19.29
Average Water Savings per bill period (ccf): 3.31
% of Budget used before installation on average: 89.42 %
% of Budget used after installation on average: 84.25 %
Program Analysis – Phase 2

• Accounts must have 12 months post-install data
• Regression analysis of several program variables
  • Landscape condition
  • Irrigation condition
  • DIY v. Professional Installation
• Professional Installation had greatest effect on program outcome
### Program Analysis – DIY v. Professional Installation

<table>
<thead>
<tr>
<th></th>
<th>DIY Installation</th>
<th>Professional Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of accounts in installation date range</td>
<td>303</td>
<td>110</td>
</tr>
<tr>
<td>Average use per bill before installation (CCF)</td>
<td>22.25</td>
<td>23.57</td>
</tr>
<tr>
<td>Average use per bill after installation (CCF)</td>
<td>19.24</td>
<td>19.44</td>
</tr>
<tr>
<td>Average water savings per bill period (CCF)</td>
<td>3.01</td>
<td>4.13</td>
</tr>
<tr>
<td>Average % of Budget used before installation</td>
<td>86.69%</td>
<td>96.98%</td>
</tr>
<tr>
<td>Average % of Budget used after installation</td>
<td>82.81%</td>
<td>88.17%</td>
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</tbody>
</table>

*Installations between 7.1.17 – 6.9.18 with 12 months post-installation data*
## Program Analysis – DIY vs. Professional Installation

<table>
<thead>
<tr>
<th>DIY or Professional</th>
<th>Min Pre history (months)</th>
<th>Min Post History (months)</th>
<th>Avg Water Savings per Bill Period</th>
<th>% of budget used before installation on avg</th>
<th>% of budget used after installation on avg</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIY</td>
<td>12</td>
<td>12</td>
<td>2.01</td>
<td>88.89%</td>
<td>86.13%</td>
<td>2.76%</td>
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<tr>
<td>DIY</td>
<td>12</td>
<td>24</td>
<td>2.44</td>
<td>90.50%</td>
<td>86.48%</td>
<td>4.02%</td>
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<tr>
<td>DIY</td>
<td>12</td>
<td>12</td>
<td>1.78</td>
<td>86.53%</td>
<td>84.53%</td>
<td>2.00%</td>
</tr>
<tr>
<td>DIY</td>
<td>12</td>
<td>24</td>
<td>2.16</td>
<td>88%</td>
<td>85%</td>
<td>2.43%</td>
</tr>
<tr>
<td>Professional</td>
<td>12</td>
<td>12</td>
<td>2.57</td>
<td>95%</td>
<td>90%</td>
<td>4.76%</td>
</tr>
<tr>
<td>Professional</td>
<td>12</td>
<td>24</td>
<td>3.10</td>
<td>96.24%</td>
<td>88.62%</td>
<td>7.62%</td>
</tr>
</tbody>
</table>

*Smart timer installation from 2017 - present*
Smart Timer Program 2.0

- Provides up to 2 free Rachio Gen 3 timers
- Targeted large lots and high users
- Free professional installation for each controller
- Continue to offer $330 rebate on smart controllers
Data Science Team
Contact Us

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