4.4 Step 4 – Selection of Water Efficiency Activities

Step 4 focuses on the selection and full evaluation of the water efficiency activities for implementation. According to C.R.S. 37-60-126 (4), a requirement for developing a plan includes the full evaluation of various plan elements. This section introduces a recommended four-phased approach, shown in Figure 1, for selecting and fully evaluating an effective portfolio of water efficiency activities with accompanying supporting information and optional worksheets. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection. Details of the four-phase process are provided below.

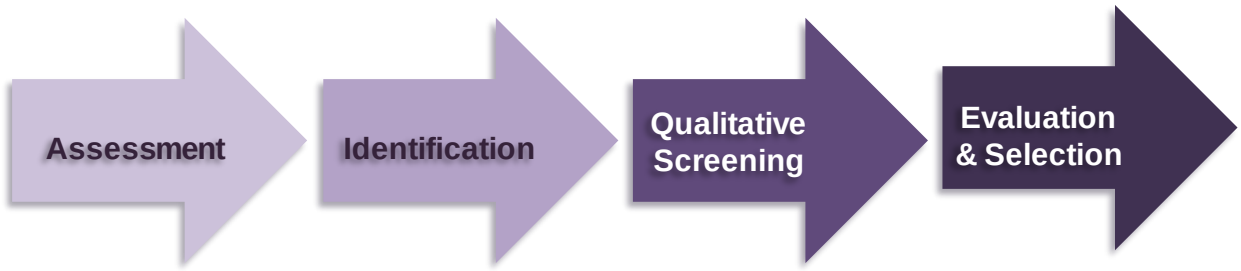

Figure 1 Four-Phase Approach to Selecting Water Efficiency Activities

Phase 1: Assessment – Collection of general information on the provider's former water efficiency activities and other aspects of their water supply system and service area. This

information may be used to identify areas where water efficiency could be improved. Key questions that can assist with this process are provided in the following subsections. The answers do not necessarily need to be documented, but should serve as a means to identify and refine the understanding of the water supply system's needs prior to identifying water efficiency activities for analysis and potential implementation.

Phase 2: Identification – Incorporates information from the assessment phase to identify a list of water efficiency activities that are generally compatible with the provider's system and needs. This list should include activities implemented in the past as well as additional activities that may be beneficial. Details such as implementation costs and potential water savings do not need to be of great consideration at this point. If there is a possibility that a certain activity may be beneficial, it should be included in the preliminary identification list for consideration. Worksheet D may be used to assist with this process.

Phase 3: Qualitative Screening – Involves the development of qualitative screening criteria used to screen the preliminary list of activities. Activities that do not sufficiently meet the screening criteria should be eliminated while the remaining activities should be carried forward into the next phase. It is recommended that at least three to four screening criteria be developed. Some or all of these criteria should reflect the qualitative goals developed in Step 3. For example, if a goal is to reduce the need for new supplies to meet peak seasonal demand, a screening criterion could be "contributes to the reduction of summer peak demands." A variety of measures that reduce irrigation water demand such as xeriscaping, water-efficient irrigation equipment, and improved irrigation scheduling would fit this criterion.

Examples of qualitative screening criteria include:

- Beneficial from a political perspective.
- High public acceptance.
- Implementable from a staff/resource perspective from initial qualitative overview.
- Technically feasible from initial qualitative overview.
- Likely to be adopted at a regulatory level (no legal issues or constraints).
- High likelihood of success.
- Economic viability/cost effectiveness.
- Sufficiently reflects goals developed in Step 3.

This phase should be conducted at a high qualitative level where activities not meeting basic criteria are eliminated. Worksheets E-G may be used to assist with this process.

Phase 4: Evaluation and Selection – This involves the development of the evaluation criteria, evaluation of the activities, and selection of the final activities for implementation. Activities

that do not sufficiently meet the criteria should be eliminated while the remaining activities may be selected for implementation. The evaluation criteria should be reflective of the qualitative and quantitative goals developed in Step 3, include estimates of implementation costs, and where possible, water saving estimates. Worksheet H may be used to assist with this process.

The criteria should also take into consideration the system-wide collective effects of the remaining candidate activities. Examples of such criteria include:

- Candidate activities collectively reflect goals developed in Step 3.
- Candidate activities collectively meet the targeted savings specified in Step 3.
- Implementation costs are feasible from a financial and staff resource perspective (e.g. budget and time).
- Practical from a cost/benefit standpoint.
- Candidate activities are logically sequenced using the SWSI Framework levels.
- Candidate activities collectively target appropriate customer categories.
- Candidate activities are complementary to each other (e.g. work well together).

C.R.S. 37-60-126 (4) Requirement: Either as a percentage or in acre-foot increments, an estimate of the amount of water that will be saved through water efficiency when the plan is implemented.

It is important to note that according to C.R.S 37-60-126(4), all State approved plans must include an estimate of the amount of water that will be saved through water efficiency efforts as a percentage[22] or in acre-foot increments. These estimates should represent annual projected savings of each individual activity or at a minimum, the projected savings of each relevant SWSI Levels Framework category level introduced in Section 4.4.1 (e.g. Ordinances and Regulations - Level 1).

Plans should also include a brief summary of this four-phase process and a list of the final activities selected. Detailed intermediary results of the four-phased process may be presented in an appendix using tables and brief narrative. Worksheets D-H can be used to develop these tables.

4.4.1 Demand Management Activities

For purposes of this Guidance Document, the water efficiency activities are organized according to the SWSI Levels Framework. The SWSI Levels Framework was developed as a component of the 2010 SWSI update to organize demand management activities into a model that assists municipalities in prioritizing and selecting water efficiency activities.

[22] Although there is not a standard method, percentages may be expressed as the volume water saved divided by the total annual water demand.

The SWSI Levels Framework selection process provides the following advantages:

- Prioritizes and selects activities that make sense from a business perspective by initially focusing on the Foundational Activities.
- Limits amount of documentation necessary for the intermediary assessment, screening, and evaluation phases through a series of worksheets.[23]
- Focuses on the documentation of the selected activities which are most essential to implementation.

Additionally, this framework will be used by the State to assess statewide municipal conservation through SWSI and the Inter Basin Compact Committee (IBCC) process. The framework may be represented as a cylinder consisting of the following four categories in Figure 22.[24]

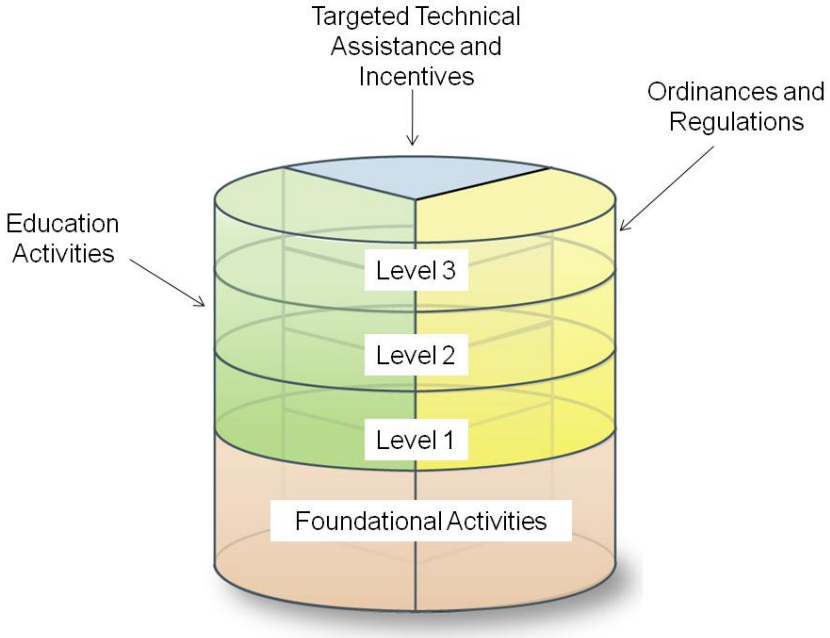

Figure 22 SWSI Levels Framework

- *Foundational Activities* – The base of the cylinder shown in Figure 22 comprises the foundational activities common to effective plans. It is recommended that providers have these foundational activities in place prior to undergoing other extensive activities.

[23] Worksheets D through I coincide with the SWSI Framework selection process and are designed to document the intermediary screening and evaluation phases. The worksheets can simply be filled out and put into Plan appendices, reducing the efforts necessary to document the intermediary phases.

[24] These categories were initially introduced the 2010 SWSI Conservation Level Analysis Final Report as a component of CWCB's water conservation technical platform. Note: The SWSI Levels Framework terminology has been updated since this report.

- *Targeted Technical Assistance and Incentives* – A collection of activities that rely on indoor water efficient technologies and water-wise outdoor practices. These activities may be implemented on three levels based on the following type of targeted customers: 1) utility/municipality facility water efficiency; 2) customers with the largest water use; and 3) management of remaining customer demands.

- *Ordinances and Regulations* – A series of ordinances and regulations that promote or enforce water efficiency. Similar to the Targeted Technical Assistance and Incentives, Ordinances and Regulations may be implemented on three levels based for the following targeted groups: 1) existing service area; 2) ordinances for new construction; and 3) ordinances for point of sale of existing building stock.

- *Education Activities* – Variety of techniques and venues to convey water efficiency information to the public. These activities may be comprised of: Level 1, one-way education; Level 2, one-way education with feedback; or Level 3, two-way education. Stakeholder steering committees where information from the public is used directly for implementation of water efficiency activities is an example of the Level 3, two-way education.

The remainder of this section lays out a systematic SWSI Levels Framework selection process for determining a final portfolio of demand management activities. This incorporates the four-phase assessment, identification, screening, and evaluation and selection process introduced in Section 4.4 while also incorporating the SWSI Levels Framework categories. This process is shown in Figure 23 where the Foundational Activities are initially selected followed by the Targeted Technical Assistance and Incentives, Ordinances and Regulations, and Education.

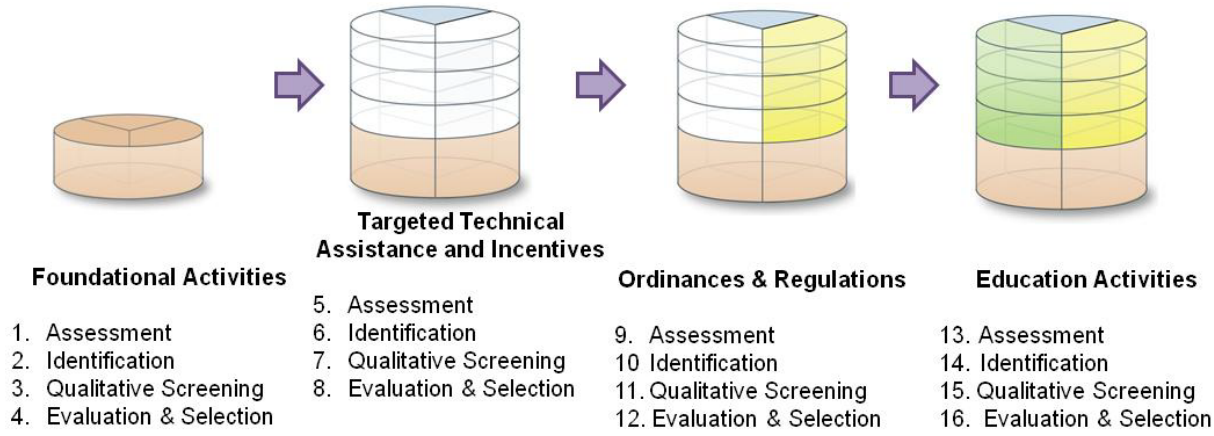

Figure 23 SWSI Framework Selection Process

Foundational Activities

As previously mentioned, Foundational Activities should be in place prior to implementing other activities. They focus on system operations and water efficiencies, are under the provider's direct control, and can significantly improve the effectiveness of the overall water efficiency plan by ensuring sufficient metering and data tracking. These activities are grouped into the

categories shown in Figure 24 and detailed information on each of these groupings is provided below. Worksheet D provides a comprehensive list of individual activities for each group.

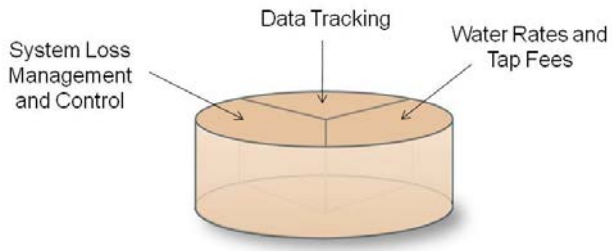

Figure 24 Foundational Activities

Data Tracking – Metering and Demand Data Collection

While metering and data collection may not directly result in water savings, it makes sense from a practical business perspective to initially invest in a means to track water usage and identify areas where water efficiency can be improved. These areas can then be targeted with other demand management activities.

The majority of Colorado's municipal water supply systems are now metered. However, meter testing as well as meter upgrades can be an important component to managing water use. Large multi-family units and raw water systems (non-treated water for irrigation purposes) are often not metered and are an area for improvement. Additionally, metering not only provides information on customer usage, but is essential for measuring non-revenue water.

C.R.S. 37-60-126(4) Statute Requirement: Billing systems designed to encourage water efficiency in a fiscally responsible manner must be fully evaluated.

Demand data collection is an important component to the monitoring effort addressed in Section 4.5.2. However, it is also included here in the Step 4 activity selection process to emphasize the importance of demand data. Billing systems have traditionally been used for water billing purposes. However, as billing system functionality has increased so have the opportunities for increased demand data collection. Billing systems often dictate the type of demand data available for monitoring purposes. For example, systems that are able to track and record water use by multiple customer categories (e.g. residential, commercial, municipal facilities and irrigation) on a monthly basis can provide a much more comprehensive data set for monitoring purposes than billing systems that are limited to one or two customer category designations. According to C.R.S. 37-60-126(4), billing systems designed to encourage water efficiency in a fiscally responsible manner shall be fully evaluated for implementation. This may include improvements or upgrades to the existing billing system to improve data collection.

Water Efficiency Oriented Water Rates and Tap Fees

Water efficiency pricing has been one of the most effective methods in influencing customer behavior and reducing water use. A common water efficiency pricing structure consists of inclining block rate structures that discourage excessive customer water use. Customers are charged more money per gallon as they use more water. According to C.R.S. 37-60-126(4), a

water efficiency oriented rate structure shall be fully evaluated for implementation during the water efficiency planning process.[25]

Some providers currently implement inclining block rate structures that do not encourage water savings. The blocks are either too large or not effectively tied to excessive water use. Alternatively, some provider's water bills have a very small percentage of the bill directly tied to water use. There are other more significant charges such as costs for new infrastructure and for securing new water supplies. In these cases, inclining block rates can be insignificant when compared to the other charges and consequently do not effectively influence customer behavior. In order for a block rate structure to be effective and considered a demand management activity, there must be noticeable difference in the pricing rates of each block to incentivize efficiency water use.

C.R.S.37-60-126 (4) Requirement: Water rate structures designed to encourage water efficiency in a fiscally responsible manner must be fully evaluated.

Tap rate fees may also be used as a means to reduce water usage for new development. Various incentives could be attached to the tap fee to encourage efficient water use. For instance, new homes outfitted with water efficient fixtures and appliances could receive a discount on their tap fee.

System Water Loss Management and Control

Leaks in water distribution systems can reduce the system's effectiveness and impact overall profitability. Effective leak detection and repair is critical to a provider's overall water resource management program. However, in Colorado some small utilities and water companies have reported losses as high as 50%. These losses are a combination of apparent and real losses (non-revenue water). [26]

C.R.S. 37-60-126 (4) requires providers to fully evaluate leak detection and repair for implementation. As general maintenance protocol, providers should have a reliable leak repair program. However, rigorous leak detection programs that proactively identify leaks throughout the distribution system are strongly recommended as well.[27] The most effective leak detection programs incorporate leak detection with rigorous meter testing and replacement programs as well as system-wide audits using the American Water Works Association (AWWA) standard methodology for determining water loss for municipal water providers (2009 AWWA M36 Manual of Practice – *Water Audits and Loss Control*

C.R.S 37-60-126(4) Requirement: Distribution system leak identification and repair must be fully evaluated .

[25] Sufficient reasoning and supporting data should be provided in the screening or evaluation portion of either the plan or appendix on why a water efficiency oriented rate structure was not chosen for implementation. For instance, this include meeting minutes from a public meeting where there was significant community opposition to changes in the rate structure.

[26] Source: Great Western Institute. 2010. *SWSI Conservation Levels Analysis Final Report.*

[27] If a provider chooses to not include leak repair and/or leak detection as a foundation activity, sufficient reasoning should be provided in the screening or evaluation portion of the report or in an appendix.

Programs (3rd Edition)). System-wide audits assess real and apparent losses thus defining how much loss is from physical leaks, rather than metering inaccuracies or data errors.

Key Assessment Questions

The following key questions should be asked during the Foundational Activities Phase 1 assessment.[28]

- Could metering be improved by installing additional meters?
- Could improvements be made to the billing system where specific desired types of demand data would be more easily accessible?
- Could improvements be made to the water rate structure or prices to promote water efficiency while maintaining a reliable revenue stream?
- Would changes in the water rate structure or individual prices be supported from a political standpoint? If not, is this an obstacle or could sufficient levels of education generate support?
- Would water rate changes be fair from an environmental justice standpoint? If not, how would environmental justice concerns be addressed?
- Have routine system-wide water audits been conducted to assess apparent and real losses in the distribution system? If so, has the provider used the AWWA M36 methodology for conducting the system-wide water audit? Are there known leaks/inefficiencies in the distribution system that could be improved?
- Are there any operational changes/adjustments that could be made to improve efficiencies?

It is recommended that the screening and evaluation phases be conducted using Worksheet D and Worksheet H, respectively. These worksheets may be filled out and included in an appendix for documentation.

Targeted Technical Assistance and Incentives

The Targeted Technical Assistance and Incentives category covers various actions providers and customers can do to improve existing water efficiency. This can entail the installation of water efficient fixtures and appliances, low water use landscapes, water efficient commercial and industrial water using processes through incentives. Worksheet E provides a comprehensive list of the possible activities. Reuse of water by using reclaimed water is also considered a water efficiency activity. Reclaimed water is often used to meet a water demand that would otherwise need to be met through other first-use supplies. This saves water since the second-use reclaimed

[28] As discussed in Section 4.4, answers to these key questions do not need to be documented. The main purpose of the assessment process is to characterize system-wide needs and traits prior to identifying water efficiency activities for screening and potential implementation.

water reduces the amount of first-use water necessary to meet the total demands of the service area.

C.R.S 37-60-126(4) requires that the activities specified in the call out box below are fully evaluated for implementation through the Phase 2 screening and/or Phase 3 evaluation processes. These specific activities are specified in the box below.[29] These activities align with the Targeted Technical Assistance and Incentives category shown in Figure 25.

C.R.S. 37-60-126(4) Requirement- The following must be fully evaluated:

- *Water-efficient fixtures and appliances such as toilets, urinals, clothes washers, showerheads, and faucet aerators*
- *Incentives to implement water efficiency techniques such as rebates to customers to encourage the installation of water efficient fixtures and appliances*
- *Low water use landscapes such as drought resistant vegetation, removal of phreatophytes and efficient irrigation*
- *Water-efficient industrial & commercial water-using processes*
- *Water reuse systems*

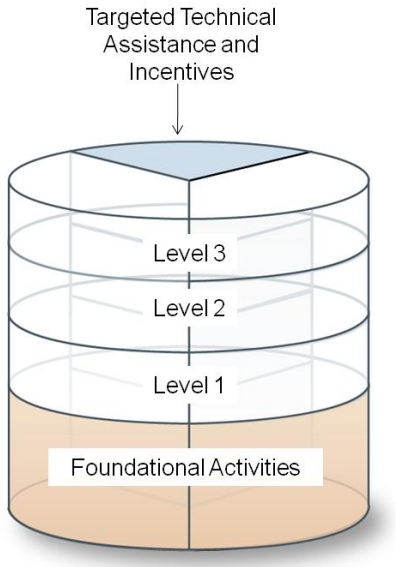

Figure 25 Targeted Technical Assistance and Incentives

Targeted Technical Assistance and Incentives may be organized according to the following levels:

[29] If one or more of the activities is not selected for implementation, sufficient reason should be provided why the activity was eliminated during the screening or evaluation process. These reasons must be provided directly in the report or in an appendix. Worksheets E and H can be used for this purpose. Example limitations for reuse include: a provider's water rights portfolio does not have legally reusable water, reuse is not cost effective or there is not sufficient demand for reuse at this point in time to warrant such investment. Supporting data such as a description of challenges, impracticalities of installing a reclamation system or estimated costs (these may be high order of magnitude costs) should be provided.

- *Level 1: Utility/Municipal Facility Water Efficiency* – Applies to the water use at facilities that the provider and/or municipality directly manages and has direct control over. This could include administration buildings, recreational centers, parks, etc. These facilities generally have water use patterns that can be easily characterized and managed. Improving water efficiency at these facilities positions the provider as a leader in water efficiency who is leading by example.

- *Level 2: Management of Largest Customer Demands* – Demand management activities targeting large water users can be some of the most cost effective activities. If providers have limited funds, working with fewer, but larger, water users to customize water efficiency activities can provide significant water savings relative to the financial investment. Large water user customers may consist of industrial firms (such as factories and breweries), commercial properties and the larger residential water users.

- *Level 3: Management of Remaining Customer Demands* – Demand management activities that focus on the customer service area as a whole and can be more difficult to monitor and less cost effective than focusing on the Level 1 and 2 customers, yet can result in significant savings. From a business perspective, it may make the most sense to initially focus on the Level 1 and 2 customers and then target other Level 3 customer categories within the service area.

Key Assessment Questions

The following key questions should be asked during the Targeted Technical Assistance and Incentives Phase 1 assessment. These questions can assist in focusing on target customers and appropriate level(s).[30]

Level 1

- How water efficient are utility/municipal facilities?

- Would water audits at provider/municipal facilities provide valuable information?

- What operational changes/training can be conducted to encourage staff to save water?

- Could reuse be a means to improve water efficiency and meet future demands?

Level 2

- Who are the largest water users?

- Is there a reasonable opportunity for water savings?

[30] As discussed in Section 4.4, answers to these key questions do not need to be documented. The main purpose of the assessment process is to characterize system-wide needs and traits prior to identifying water efficiency activities for screening and potential implementation.

- Can water audits be performed for the largest users and would this provide useful information?

- What changes in customer water use patterns would be necessary to save water?

Level 3

- What customer categories should be targeted?

- How can these customers be targeted?

- Where can the greatest water savings be achieved?

It is recommended that the screening and evaluation phases be conducted using Worksheet E and Worksheet H, respectively. These worksheets may be filled out and included in an appendix for documentation.

Ordinances and Regulations

Ordinances and Regulations (shown in Figure 26) consist of locally adopted policies that encourage water efficiency. C.R.S. 37-60-126 (4) requires Ordinances and Regulations that encourage water efficiency be fully evaluated for implementation through the Phase 2 screening and/or the Phase 3 evaluation processes. Common ordinances and regulations include water wasting policies and water restrictions.[31] Worksheet F provides a comprehensive list of ordinances and regulations.[32]

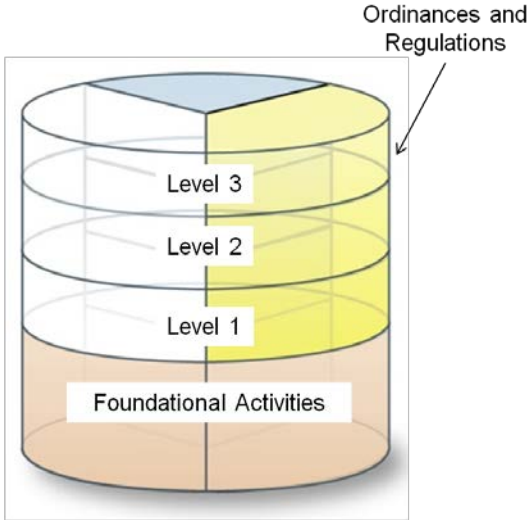

Figure 26 Ordinances and Regulations

[31] Water restrictions are often used for drought response during a temporary water shortage. However, water restrictions may be considered a water efficiency activity if they are implemented over a long-term period to achieve a desired operational objective, such as regulating peak day water usage.

[32] If ordinances and regulations are not selected for implementation, sufficient reason why should be provided. These reasons must be provided directly in the report or in an appendix. Worksheets F and H can used for this purpose.

While ordinances and regulations have an advantage in that they can potentially penetrate 100% of the customer base (e.g. they can potentially reduce water usage for all of their customers), their overall effectiveness often depends on whether they are enforced, which in turn is dependent on the resources dedicated to enforcement. In some cases, providers are not the local government and consequently do not have the authority to adopt and enforce ordinances. This can present some challenges, yet also provides an opportunity to coordinate efforts with the local government to adopt and enforce ordinances.

C.R.S. 37-60-126(4) Requirement: Regulatory activities designed to encourage water efficiency must be fully evaluated.

Water providers should focus on ordinances and regulations that they can adopt and enforce either directly or through partnerships with their local government. They may be applied to the following areas of need:

- *Level 1: Existing Service Area* - This may apply to the whole service area (100% penetration rate) or specific categories of customers, such as single-family homes or commercial. The majority of regulations and ordinances in Colorado currently focus on this tier of customers.

- *Level 2: New Construction Regulations* – Communities experiencing large growth rates can significantly decrease future water demands by enforcing regulations and ordinances at Level 2. This level applies to ordinances and regulations that target new development. For example, landscape ordinances requiring proper soil amendments for all new residential and commercial construction is a relatively common ordinance implemented at Level 2. While these regulations are proactive in that they are addressing water efficiency at the construction phase, additional costs necessary to meet a regulation (e.g. extra costs for soil amendments) must be borne by either the seller/developer or purchaser of the newly constructed property. Depending on the scale and magnitude of additional costs involved, this could meet a certain level of opposition.

- *Level 3: Point of Sales Ordinances for Existing Building Stock* – Communities that experience relatively high rates of turnover can most significantly benefit from Level 3 ordinances. Regulations and ordinances enforced at a Level 3 require water efficient modifications to be made (e.g. replacement of certain fixtures and appliances with more water efficient fixtures and appliances) upon sale of the property. Similar to Level 2, Level 3 ordinances and regulations could meet opposition. For instance, the costs for new fixtures and appliances need to be incurred by some entity and this often ends up being the purchaser or seller of the home. In 2010, the Water Conservation Sub-Committee of the Inter Basin Compact Committee recommended investigating statewide real estate point of sale legislation in the coming years. This would address replacement of household fixtures such as toilets, dishwashers and clothes washers with efficient models. Education on the long-term cost saving benefits as a result of higher water efficient fixture and appliances may help reduce concerns for purchasers that have to bear the upfront costs.

Key Assessment Questions

The following key questions should be asked during the Ordinances and Regulations Phase 1 assessment. These questions can assist in focusing on target customers and appropriate level(s).[33]

- Does the provider have a water waste ordinance? (This is recommended at minimum).
- What ordinances would be beneficial and reasonable from a water efficiency standpoint?
- Are there any broad political/social obstacles to, or positive pushes for, adoption of certain ordinances and regulations?
- What staff and financial resources are available for enforcement?
- What is the projected rate of new growth? Is there significant potential in water savings through regulation and ordinances on new development?

It is recommended that the screening and evaluation phases be conducted using Worksheet F and Worksheet H, respectively. These worksheets may be filled out and included in an appendix for documentation.

Education Activities

Education activities (shown in Figure 27) are generally not as effective in changing customer behavior and reducing water usage when carried out as standalone programs. However, when coupled with other water efficiency activities they can greatly enhance the overall savings of a water efficiency program. Education activities primarily educate the public on the benefits of water efficiency, inform customers on how they can reduce their water usage, and publicize water efficiency activities the provider is implementing. Targeted advertisement campaigns can greatly enhance the effectiveness of water efficiency activities by informing and engaging the interest of the customer.

[33] As discussed in Section 4.4, answers to these key questions do not need to be documented. The main purpose of the assessment process is to characterize system-wide needs and traits prior to identifying water efficiency activities for screening and potential implementation.

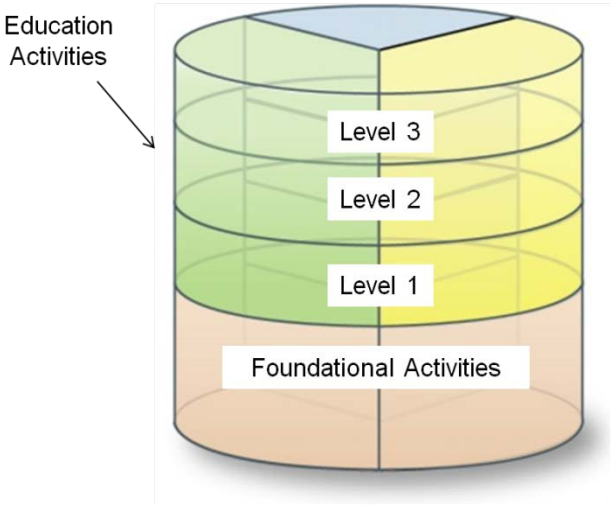

Figure 27 Education Activities

C.R.S. 37-60-126(4) requires the full evaluation of Educational Activities for implementation through the Phase 2 screening and/or Phase 3 evaluation processes. It is recommended that the selection of Education Activities be deferred until the majority of other activities have been selected. This enables the provider to select Education Activities that promote and convey compatible messages consistent with the selected activities. Worksheet G provides a comprehensive list of activities and Section 5.2 provides additional information on public participation in the plan implementation and monitoring stages.[34]

C.R.S. 37-60-126(4) Requirement: Dissemination of information regarding water efficiency activities, including by public education, customer water use audits, and water-saving demonstrations must be fully evaluated.

Education Activities may be organized by the following levels:

- *Level 1: One-Way Education* – Information is conveyed to the public without tracking or specific follow-up. This method of communication is the most common mode of communication among water providers in Colorado. It is used to convey water efficiency messages and can be very effective in advertising and informing the public on other water efficiency activities (e.g. rebate program). Popular forms include bill stuffers, email, untracked web sites, and xeriscape demonstration gardens.

- *Level 2: One-Way Education with Feedback* – Water providers convey information to the public and receive feedback on the effectiveness and applicability of its water efficiency activities. Tracking of public responses can also provide information on who is receiving and reacting to the information. This enables providers to adjust a message based on feedback. Examples of one-way education with feedback include water festivals, interactive websites, and customer surveys.

[34] If Education Activities are not selected for implementation, sufficient reasoning should be provided on why. Reason(s) may be provided directly in the report or in an appendix. Worksheets G and H can be used for this purpose.

- *Level 3: Two-Way Education* – Providers actively engage customers in developing and implementing the water efficiency plan. This can involve the development of stakeholder advisory boards or focus groups to address specific water efficiency issues. It can be an excellent medium for receiving comprehensive feedback from the customer perspective. Section 5.2 provides additional information on Level 3 Two-Way Education.

Key Assessment Questions

The following key questions should be asked during the Phase 1 assessment. These questions can assist in focusing on target customers and appropriate communication level(s).[14]

- What level of financial and staff resources can the provider dedicate towards educational efforts?
- How can Education Activities be complementary to the other water efficiency efforts?
- What selected water efficiency activities would be greatly enhanced through advertising and appropriate targeted education?
- What types of media are most conducive for communicating with the public?
- What public members should be targeted?

It is recommended that the screening and evaluation phases be conducted using Worksheet G and Worksheet H, respectively. These worksheets may be filled out and included in an appendix for documentation.

[14] As discussed in Section 4.4, answers to these key questions do not need to be documented. The main purpose of the assessment process is to characterize system-wide needs and traits prior to identifying water efficiency activities for screening and potential implementation.