California Stormwater Quality Association (CASQA) Approach to Municipal Program Effectiveness Assessment

EPA Webcast
June 4, 2008
Introduction to the Guidance Manual and Key Concepts
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CASQA
History of Guidance Document

- Regulatory requirements in permits
- Municipalities unsure how to conduct these assessments
- CASQA identified a need for a guidance document
- San Diego and wastewater community provided a foundation

White Paper ~ 2 Years Guidance Document
CASQA Approach

- Overview of key concepts
- Assessment strategy
- Description of different assessment methods
- Applicability to program elements/minimum control measures
Why Conduct Effectiveness Assessments?

Use the Results to:

- Determine if the program is progressing towards its goals
- Determine if data is meaningful
- Focus/modify the program
- Identify resource needs
- Meet permit requirements
Adaptive Management with Assessment

STEP #1 PLANNING

STEP #2 IMPLEMENTATION

STEP #3a IMPLEMENTATION ASSESSMENT

STEP #3b WATER QUALITY ASSESSMENT

INTEGRATED ASSESSMENT
Where are We in Adaptively Managing the Programs?

Planning

- Audience characterization
- Baseline information
- Existing program review

Implementation

- Tracking progress
- Achieving milestones
- Meeting expectations

Assessment

- Goals achieved
- Most successful strategies
- Future needs/next steps

In Progress

In Progress

In Progress
How Do We Currently Assess Effectiveness?

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Protecting Receiving Waters

Impact

Implementation

Some

Most
Outcome Levels and the SWMP

Level 6 -- Receiving Waters

Level 5 -- Improving Runoff Quality

Level 4 -- Reducing Loads from Sources

Level 3 -- Changing Behavior

Level 2 -- Raising Awareness

Level 1 -- Documenting Stormwater Program Activities

Program (Levels 5-6)

Element (Levels 2-5)

Activity (Levels 1-4)
Does the Result Measure:

- If a permit activity was conducted? **Level 1**
- A change in awareness, knowledge, or attitude? **Level 2**
- An action taken by target audience? **Level 3**
- A pollutant or waste stream? **Level 4**
- Runoff quality? **Level 5**
- Receiving water or environmental condition? **Level 6**
## Outcome Level Applicability

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Outcome Levels</th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
<td>Level 4</td>
<td>Level 5</td>
<td>Level 6</td>
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<tr>
<td>Program Management</td>
<td>X</td>
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<tr>
<td>Construction</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Maintenance</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Public Education</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Monitoring</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
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</table>
Effectiveness Assessment Strategy

- Determining Assessment Focus
- Determining Baseline Condition
- Selecting Assessment Method(s)
- Using the information
Establishing Assessment Focus

- What are you trying to achieve?
  Goal
- Where are you starting from?
  Baseline
- How will you know if the goal has been achieved?
  Target
- What is the desired outcome?
  Outcome Level
Assessment Focus

- Is the activity being implemented (**Level 1**)?
- Does the activity/element raise awareness (**Level 2**)?
- Does the activity/element change behavior (**Level 3**)?
- Does the activity/element reduce loads from sources (**Level 4**)?
- Does the element/program result in improved runoff quality (**Level 5**)?
- Has a measurable change been observed in receiving waters (**Level 6**)?
Effectiveness Assessment Strategy

- Determining Assessment Focus
- **Determining Baseline Condition**
- Selecting Assessment Method(s)
- Using the information
Example Baseline Information

- What have we done - what do we know? (Level 1)
- Is the target audience aware – did they change behavior? (Level 2)
- Can we use a past survey? (Levels 2, 3)
- Do we have baseline monitoring data? (Levels 4, 5, 6)
Effectiveness Assessment Strategy

- Determining Assessment Focus
- Determining Baseline Condition
- Selecting Assessment Method(s)
- Using the information
Selecting Assessment Methods

- Confirmation
- Tabulation
- Surveys
- Inspections/Observation
- Quantification
- Monitoring
Effectiveness Assessment Strategy

- Determining Assessment Focus
- Determining Baseline Condition
- Selecting Assessment Method(s)
- Using the information
Methods & Outcome Levels

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Protecting Receiving Waters

Observation

Inspections

Quantification

Tabulation

Surveys

Tracking

Monitoring

Confirmation
Example - Setting a target/Selecting a method

- **Goal:** Reduce pesticide use.

<table>
<thead>
<tr>
<th>Target</th>
<th>Data Collected</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use protocols to reduce pesticide use by municipal staff by 50%</td>
<td>Pounds of pesticide used by location and toxicity category</td>
<td>Tabulation Quantification</td>
</tr>
<tr>
<td>Conduct outreach to reduce pesticide use by residents by 10%</td>
<td>Reported Use Shelf survey, sales tracking</td>
<td>Surveys Tabulation</td>
</tr>
</tbody>
</table>
Using the information

- Data analysis
- Future planning
- Reporting & communicating
Using the information

- Data analysis
  - Observed changes
  - Trends
  - Quantitative analysis

- Linear (Biomass (kg/m²))

- Biomass (kg/m²) Excluded Linear (Biomass (kg/m²))

- R² = 0.9848

- Year

- Biomass (kg/m²)

- Number of Participants

- Pounds Collected

- Pounds of Waste

- Sources: County of Orange Integrated Waste Management Department

- 1999/00 2000/01 2001/02 2002/03 2003/04

- 85,000 80,000 75,000 70,000 65,000 60,000 55,000 50,000 45,000 40,000 35,000 30,000 25,000 20,000 15,000 10,000 5,000 0,000
Interpreting Data for Future Planning

• Theatre slides more effective than signs
• Relate message to wetlands
• Move from awareness to behavior change
Overall Program and Water Quality Assessment

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Protecting Receiving Waters

Increasing Difficulty
Case Studies – How the Guidance Document Has Been Used Within California - Karen Ashby
Example Annual Reports
Outcome Levels and the SWMP

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Receiving Waters

Is the activity being implemented?
Example – Outcome Level 1

- Submitted plans
- Updated and implemented internal guidelines
- Developed inspection forms
- Conducted inspections
- Provided brochures
- Attended meetings/events
Outcome Levels and the SWMP

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Receiving Waters

Does the activity/element raise awareness?
Example – Outcome Level 2

Consistent with findings from 2003, education, traffic congestion, safety, and jobs continue to trump pollution as top issues for elected officials to address.

There are many important issues facing Orange County. Although they ALL may be important, which ONE of the following is MOST important for your elected officials to address?

- Improving public education
- Reducing traffic congestion
- Reducing crime, improving public safety
- Attracting new businesses, creating jobs
- Pollution of the Pacific, local rivers, creeks, bays
- Managing growth and development
- Improving neighborhoods
- (don't know/nothing)

2005: 34% 25% 16% 14% 8% 8% 3% 3%
2003: 25% 14% 14% 11% 9% 10% 3% 2%

Pollution of the ocean and waterways and air pollution are top environmental concerns. Intensity has increased regarding air pollution concerns over the past two years.

Please tell me if you are very concerned, somewhat concerned, not too concerned, or not at all concerned about each of the following issues in Orange County.

- Ocean pollution
- Pollution of local bays and harbors
- Pollution of local creeks and rivers
- Air pollution or smog

2005
2003

Lake Research Partners
January 2006

*Split sampled questions
Outcome Levels and the SWMP

Level 6 -- Receiving Waters
Level 5 -- Improving Runoff Quality
Level 4 -- Reducing Loads from Sources
Level 3 -- Changing Behavior
Level 2 -- Raising Awareness
Level 1 -- Documenting Stormwater Program Activities

Does the activity/element change behavior?
Example – Outcome Level 3

### Inspections and Resulting Compliance Over Time

<table>
<thead>
<tr>
<th>Cycle (Calendar Years)</th>
<th>Total Number of Industrial Facilities Requiring Inspection</th>
<th>Total Number of Industrial Facilities Inspected</th>
<th>Inspection Results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of Facilities Adequately Implementing BMPs</td>
<td>Number of Facilities Requiring Additional BMPs</td>
</tr>
<tr>
<td>First Cycle (2003-2004)</td>
<td>392</td>
<td>155</td>
<td>98</td>
<td>57</td>
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<tr>
<td>2004-2005</td>
<td>245</td>
<td>245</td>
<td>216</td>
<td>29</td>
</tr>
<tr>
<td>(2005-2006)</td>
<td>269</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### Industrial Program

![Graph showing inspections and compliance over time](image)
Outcome Levels and the SWMP

Does the activity/element reduce loads from sources?

Level 6 -- Receiving Waters

Level 5 -- Improving Runoff Quality

Level 4 -- Reducing Loads from Sources

Level 3 -- Changing Behavior

Level 2 -- Raising Awareness

Level 1 -- Documenting Stormwater Program Activities
Example – Outcome Level 4

Municipal Program

Removal of debris over time
Outcome Levels and the SWMP

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Receiving Waters

Does the element/program result in improved runoff quality?
Has a measurable change been observed in receiving waters?

Level 1 -- Documenting Stormwater Program Activities

Level 2 -- Raising Awareness

Level 3 -- Changing Behavior

Level 4 -- Reducing Loads from Sources

Level 5 -- Improving Runoff Quality

Level 6 -- Receiving Waters
Example – Outcome Level 6
Aquatic Toxicity in Urban Creeks
Water Quality Assessment
Receiving Water Quality – Diazinon and Aquatic Toxicity

- San Francisco Bay Area Urban Creeks
  - Variability in data – Medium to Low (consistently high concentrations)
  - Degree of change – 100% (near complete phase-out)
  - Timeframe to detect change – 1 to 3 years
  - Confidence in measurement – High (~95% certain)
Aquatic Toxicity in Urban Creeks

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-92</td>
<td>17</td>
</tr>
<tr>
<td>1992-94</td>
<td>26</td>
</tr>
<tr>
<td>2002-03</td>
<td>13</td>
</tr>
<tr>
<td>2003-04</td>
<td>13</td>
</tr>
<tr>
<td>2004-05</td>
<td>17</td>
</tr>
</tbody>
</table>

Legend:
- Red: Reduced Survival
- Yellow: No Effect
Example – Outcome Level 6
Newport Bay Nutrient Reduction
Newport Bay Nutrient Reduction

- 1998 TMDL – Set Nutrient Reduction Targets for Total Nitrogen and Total Phosphorus
- Nutrient Controls implemented
  - Urban runoff controls
  - IRWD San Joaquin Marsh
  - Regulation of nursery discharges
Nitrogen Trends 1976 – Present

Average Summertime TN Load from San Diego Creek

Calendar Year

TN Load (lbs/day)

Dec 31, 2002 Target

Dec 31, 2007 Target
Visual progress (Site 7)

1997

2007
In Summary….

- Guidance Document is one approach for demonstrating effectiveness
- Assists in completing the iterative process
- Evaluates activities and impacts of program
- Can demonstrate intermediary progress towards program goals
- Approach is still evolving – stay tuned
For More Questions……

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Thank You!