Multi-Objective O&M (MOOM) Case Studies

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San Lorenzo River Levee Project
Multiple Objective Operations and Maintenance (MOOM) Case Study

Presentation:
• Present Context of O&M within CVFPP
• Introduce Concepts of Multiple Objective O&M
• DWR O&M Challenges
• MOOM Case Study Investigation
• Key Findings
• Recommendations in Review
A Stressed System, the Need for Action

- Central Valley people, property and assets at risk
- Current flood risk management path unsustainable
- Lack of funding for capital works and for ongoing operations and maintenance of existing infrastructure
- In 2008, the Legislature enacted the Central Valley Flood Protection Act, which authorized and required development of the Central Valley Flood Protection Plan (CVFPP) to address these issues
2017 Update to the CVFPP

- CVFPP is a dynamic, programmatic plan, updated in five year cycles – CVFPP first adopted in 2012, first “Update” in 2017
- 2017 Update has same goals 2012 CVFPP
- The planning horizon is the 30 years
- Refines and updates the State Systemwide Investment Approach (SSIA)
- Adds specificity about recommended near and longer-term investment and financing approach
- Provides broad guidance about more resilient risk management
- Coordinated and aligned with other major flood management efforts
Technical Work to Support CVFPP Goals

- Technical analyses informing a reasonable, balanced and cost-effective approach
- Emphasis on sustainable, integrated flood management
- Diverse array of actions to improve flood protection
- CVFPP Public Draft December 2016

CVFPP GOALS

Primary Goal: Improve flood risk management
- Reduce the chance of flooding
- Reduce damages once flooding occurs
- Improve public safety, preparedness, and emergency response

Supporting Goals
- Improve Operations and Maintenance
- Promote Ecosystem Functions
- Promote Multi-benefit Projects
- Improve Institutional Support
2016 OMRR&R Technical Memorandum Completed to Define and Solidify O&M Challenges and Costs
OMRR&R Multi-Objective O&M Case Studies: CVFPP, OMRR&R and MOOM

**CVFPP supporting goals:**
- Improve operations and maintenance
- Promote Ecosystem Functions
- Improve Institutional Support
- Promote Multi-Benefit Projects

**OMRR&R:** Defines problems, needs and costs

**MOOM:** How to create and implement programmatic O&M to meet CVFPP supporting goals
OMRR&R Multi-Objective O&M Case Studies

• The overall goal of the MOOM investigation is:

To evaluate and summarize successful ongoing MOOM programs in California to gain insight into how the activities and practices implemented by each program could be incorporated into Central Valley OMRR&R to improve efficiency, effectiveness, resiliency, and sustainability at the local, State, and federal levels.
1. Changing standards
   - with respect to outdated O&M manuals and evolving environmental stewardship and policies/regulations

2. Permitting and mitigation
   - related to ongoing challenges as well as streamlining the permitting process

3. Insufficient and uncertain funding
   - regarding meeting changing standards, including PL 84 99 requirements, and addressing increasing and often substantial environmental compliance costs

4. Barriers to MOOM Implementation
   - DWR/CVFPB/LMA responsibilities under agreements with Corps for Single Purpose Projects, prohibitions on multiple objective activities (e.g. habitat restoration, recreation etc.) and land ownership and encroachment permitting (CVFPB and 408)
MOOM programs are flood system maintenance programs that incorporate other objectives, such as habitat stewardship and enhancement, recreation, water quality, water supply, and public education.
Single Objective vs. Multi-Objective O&M

**Single Objective O&M**
Individual projects do not reveal long-term plan

**Multiple Objective O&M**
Long-term Program Defined

- Multiple Objectives
  - Flood Protection
  - Water quality
  - Ecosystem
  - Socio-economic

Actions incorporating enhancements and impact mitigations as project elements

- Monitoring/Tracking
  - Feedback

Adaptive Management

Permitting

O&M Project → Multiple Objective Impact Analysis → Mitigations

Multiple Objective Analysis Applied as Impact Analysis

Results in Uncertain and Delayed outcomes

Single Objective vs. Multi-Objective O&M

Multiple Objective O&M

2017 ROADMAP
• Identify specific examples of programmatic, MOOM practices that can be applied to the OMRR&R of the SPFC
  – Programmatic permitting elements
  – Performance-based approach to effectively achieve desired, measurable outcomes
  – Integrated elements of watershed stewardship, such as flood risk management, land use, water quality protection, ecosystem vitality, recreation, and water supply
The following case studies represent O&M experiences from multiple agencies using programmatic approaches over the past 25 years.

Although organized on smaller scales than DWR’s O&M program, the issues are similar in terms of organization, permitting, funding, and integration into other water resources programs.

Five programs were identified for further evaluation:

1. Santa Barbara County Flood Control and Water Conservation District (SBCFC) Stream Maintenance Program
2. Santa Clara Valley Water District (SCVWD)
3. Napa County Flood Control and Water Conservation District (NCFCWCD) Maintenance and Watershed Management Program
4. San Lorenzo River Levee Project Maintenance Program (SLR)
5. San Luis Obispo County Public Works Department – Arroyo Grande Creek Management Plan (SLOFC)
What Are Performance Based O&M Activities?

- Performance based O&M uses quantitative metrics, methods, and tools to set objectives for flood performance and other goals such as ecosystem management goals.
  - Incorporates channel dynamics/mobile boundary phenomena that can affect peak flood conditions – e.g. scour and fill
  - Use actual flood capacity objectives and manage vegetation to target roughness; account for natural processes of vegetation bending/scouring away
  - Links natural processes to O&M activities – scour and recruitment, vegetation enhancement, and bank protection
- DWR challenge: current O&M Manuals are vague and do not fit diverse site conditions.
OMRR&R Multi-Objective O&M Case Studies Fact Sheets and Workflow

Multi-Objective Operations and Maintenance

Case Study Fact Sheet — Santa Barbara County Flood Control and Water Conservation District Stream Maintenance Program

The Santa Barbara County Flood Control District’s Annual Routine Maintenance Program has been in effect for 25 years. It was organized under a Program Environmental Impact Report which was certified in March 1992 and updated in 2001. The Annual Plan process was developed in coordination with multiple agencies. The District has recently acquired 35-year permits after numerous legal issues. The District has incorporated habitat restoration as an O&M activity and has received grant funds for fish passage projects, removed unneeded sediment detention facilities, and other projects working with local NGOs.

General Information

- Flood Management Authority: Federal (USACE), Non-Federal (Santa Barbara County, City of Santa Barbara, City of Santa Maria, City of Los Osos)
- Levees Present: Yes (1.7 miles)
- By-passing Structures: Yes (Cross-section of Bradley Canyon/Santa Maria River)
- Constructed Channels Present: Yes
- Other Flood Structures: Culverts, bridges, pumphouse, levee
- Annual Rainfall (in): Ranges from 13-31 inches depending on the location
- Type of Land Use: Agricultural, urban, open space and wilderness.

Listed/Special Status Species

- Fish/Aquatic: unarmored three-toed slimeback, midwater gray, southern steelhead.
- Reptiles/Amphibians: Arroyo southwestern toad,
  California tiger salamander, California red-legged frog
- Birds: Southwestern willow flycatcher, least bitterns

Permitting

- State: GDFW Section 360, CEQA
- Federal: USACE 404, 403

Rivers/Streams (Sample of 45 streams)

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<th>Name</th>
<th>Drainage Area (acres)</th>
<th>Length (ft)</th>
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<td>San Jose Creek (south)</td>
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<td>Mission Creek (south)</td>
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<td>San Antonio Creek (north)</td>
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<td>Santa Maria River (north)</td>
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O&M Activities

- Vegetation Management
- Sediment removal
- Dredging
- Channel lining
- Log and debris clearing
- Erosion control

Funding Source(s)

- County general funds
- Special tax districts/flood zones
- Grants

Related DWR Challenges

- Changing standards
- Permitting and mitigation
- Insufficient and uncertain funding

Prerequisites

- Complete CEQA FER, full suite of O&M activities, related impacts, and BMPs
- Acquire federal and state permits
- FER and permits require agency and public review of AMP

Annual Maintenance Plan

- Complete biological surveys and monitoring
- Complete draft and send for review (June)
- Complete work in fall

Finalize Annual Maintenance Plan

- Circulate to agencies and for CEQA review
- Hold public meetings in each flood zone
- Complete review and finalize

Perform O&M

- Complete O&M consistent with AMP and FER BMPs

Mitigation Implementation

- Perform mitigation as required by FER, including one-time 1.1 replacement of vegetation in allowable areas in streambed or at streambank toe and on banks in same area where vegetation was removed
- Conduct ongoing plantings and maintenance under contract with a landscape company

Postconstruction Reporting

- Compile and report previous year’s O&M in following year’s AMP
- Includes recommendations for future O&M, BMP, and mitigation revisions

Santa Barbara County Flood Control Stream Maintenance Program Flow Chart

Complex O&M projects with significant and unavoidable impacts unique to site

- Separate FER and permits

Monitoring and Reporting

- Measure vegetation factors for compliance with multiple maintenance objectives
- Measure and document erosion sites in need of treatment
devise plan using biometrics to extent possible with revegetation key component
- Document locations by GPS note past O&M history on site
- Measure geomorphic factors to define flood O&M zones on streambed
- Examine restoration plantings
- Develop O&M and remediation measures as needed
- Measure large woody debris in channel, and assess removal or cutting based on risk of bridge debris sliding or erosion hazard
- Compile data in GIS for AMP and for future monitoring
- Compile information on mitigation planting success and areas restored for reporting in AMP

2017 ROADMAP

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Santa Barbara County – Routine Maintenance Program

- Annual Plan is prepared by SBFC Engineer, Biologist and Field Crew. Review process conducted over summer, approvals reached by late summer early fall work implemented.
- Habitat Restoration is an O&M Activity.

Permitting: PEIR; Multiple Year Permits (now 10-year) 404 with Section 7 on Steelhead and Red Legged Frog, 1600

Results

- Accomplish needed maintenance with net increase in habitats
- Program successful for 25 years.
Integrated Flood and Ecosystem O&M Case Studies

- San Lorenzo River (City of Santa Cruz)
  - Retrofitted Levee project due to sedimentation impacts of 1955 project.
  - Included development of interim and final maintenance plans for riparian vegetation and sediment incorporated into project design.
  - Annual maintenance plan includes annual monitoring to measure vegetation and roughness to design upcoming annual maintenance.
  - Results: Targeted “Vision for River Habitat” Habitat quality and diversity increased substantially (now rearing steelhead) all within parameters of a flood control design and O&M requirements.
OMRR&R Multi-Objective O&M Case Studies

Key Findings:

• **Category 1 – Organization** (i.e., how MOOM case study programs are organized and structured)

• **Category 2 – Programmatic Permitting** (i.e., the approach to managing impacts and mitigation)

• **Category 3 – Funding and Cost Controls** (i.e., how MOOM programs are funded and costs are controlled)

San Lorenzo River Levee Project Before and After MOOM Program
OMRR&R Multi-Objective O&M Case Studies

Recommendations In Review

- Organize OMRR&R on a larger scale with a long-term vision
- Use performance-based O&M
- Integrate ecosystem / habitat improvements as part of O&M activities
- Establish connections between O&M and CVFPP planned habitat restoration projects
- Develop an integrated GIS-based tracking system for O&M planning, habitat management and performance.
- Reconcile desired MOOM practices with O&M Manuals
- Use an annual work plan cycle
- Engage agencies early and often for permitting and CEQA
- Review, refine, and improve MOOM programs as part of ongoing program implementation and adaptive management
Next Steps: The following next steps are provided to guide the development of a systemwide MOOM program for the SPFC using information from the MOOM case studies. Accomplishing this will require decision making at various levels of DWR, and working with specific LMAs and RFMP leads.

Step 1: Define Multiple Objective Operations and Maintenance Planning and Service Areas for governance
Step 2: Prepare a Master Project Description for the Existing Operations and Maintenance Activities
Step 3: Produce a Refined Set of O&M Activities as a Result of Performance-Based Multiple Objectives
Step 4: Develop an Opportunities and Constraints Analysis Based on Central Valley Flood Protection Plan Multiple-Objective Planning
Step 5: Develop Management Plans for Each Operations and Maintenance Service Area
Step 6: Develop a Final Overall DWR Multiple-Objective Operations and Maintenance Program
Step 7: Prepare and Implement a Systemwide Programmatic Environmental Review and Permitting Strategy
Step 8: Compile a Final Operations and Maintenance Program from Environmental Review and Permitting Results
Step 9: Implement the Operations and Maintenance Program