A case study from the lower Santa Clara River, CA: Strategic planning for control of *Arundo donax* and restoration of riparian vegetation in semi-arid landscapes

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STILLWATER SCIENCES

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UC SANTA BARBARA
WATERSHED IMPACTS

- Agriculture
- Water supply development
- Levees and urban development
WATERSHED IMPACTS

- Invasion by giant reed (*Arundo donax*)
COMPONENTS OF THE SCR PARKWAY RESTORATION PLANNING EFFORT

1. Historical flood mapping and fluvial geomorphic analysis
2. Riparian vegetation mapping and classification
3. *Arundo donax* percent cover mapping (also *Tamarix*)
4. Riparian vegetation dynamics analysis
5. Synthesis to inform restoration strategies and management decisions
6. Develop strategic plan for arundo control and riparian restoration (*just beginning*)
FLOOD DYNAMICS:

- Vegetation infilling (encroachment) during ‘normal’ or drier periods

JUNE 2002
FLOOD DYNAMICS: El Niño Rules!

Vegetation reset after large floods in El Niño years
FLOOD DYNAMICS: Post-flood Response

- Rapid vegetation response after large resetting floods
### Flood Mapping

- **Highly dynamic mainstem**

<table>
<thead>
<tr>
<th>Year</th>
<th>Flow (cfs)</th>
<th>Flood Recurrence Interval</th>
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<tbody>
<tr>
<td>1938</td>
<td>120,000</td>
<td>14 year</td>
</tr>
<tr>
<td>1969</td>
<td>165,000</td>
<td>24 year</td>
</tr>
<tr>
<td>1978</td>
<td>102,200</td>
<td>11 year</td>
</tr>
<tr>
<td>1992</td>
<td>104,000</td>
<td>12 year</td>
</tr>
<tr>
<td>1995</td>
<td>110,000</td>
<td>13 year</td>
</tr>
<tr>
<td>2005</td>
<td>136,000</td>
<td>16 year</td>
</tr>
</tbody>
</table>
FLOOD MAPPING

40% reduction in historical floodplain extent
Diverse and dynamic riparian vegetation

- “Classic” cottonwood-willow types plus more xeric alluvial scrub types
- 58 alliances and 130 map unit types
Invasion by Arundo

- Replaces native vegetation
- Alters ecosystem processes
- >5,000 acres
RESTORATION OPPORTUNITIES & CONSTRAINTS

- Floods and dynamic channel and vegetation are both the asset and the hazard.
1. Acquire Floodplain Lands from Willing Sellers
2. Increase & Improve Floodplain Connectivity
3. Promote Revegetation via Natural Recruitment & Active Planting (in appropriate areas)
4. Implement Strategic Actions to Control Arundo
STRATEGIC ACTIONS TO CONTROL ARUNUDO

Multi-scale Top-Down Approach
  • Upstream to downstream (watershed, main river corridor, tributaries)
  • Upslope to downslope (corridor, reach, site)

Priorities based on economic cost, ecological benefit, & feasibility
  ▪ Protect & enhance high quality habitat
  ▪ Reduce fire and flood risk to infrastructure and habitat

Contingency Plans
  ▪ Post-flood control actions in flood reset zone
  ▪ Post-fire actions to promote native plant recovery
APPLICATION OF APPROACH

Flood Reset Zone

Terrace

Terrace
Example application at site scale

- Severely constrained floodplain and limited extent of riparian vegetation
Vegetation Types

- Dense Arundo
- Mixed Willow-Arunudo
- Willow Forest
High Resolution Topography to Model Relative Elevation
Historical Flood Mapping & Flood Frequency Analysis
Delineation of Primary Flood Reset Zone
High Priority Arundo Removal & Revegetation

High Priority Protection & Enhancement

Low Priority: Post-flood contingency action?
STRATEGIC ACTIONS TO CONTROL ARUNUDO

• Multi-scale Top-Down Approach
• Priorities based on economic cost, ecological benefit, & feasibility (including permitting)
• Contingency Plans
• We are just in the initial stages of developing the strategic arundo control plan:
  - If you’re willing to tell us about lessons learned from other efforts we’d love to talk with you!
FOR MORE INFORMATION

Bruce Orr
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Stillwater Sciences Website
www.stillwatersci.com

Santa Clara River Parkway Website
(includes project reports plus data layers viewable with Google Earth)

www.santaclarariverparkway.org

Also see our poster or join the Saturday field trip