Pesticides, Toxicity and Stewardship in Urban Creeks

By

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Presented through the participation and support of:

- Armand Ruby Consulting
- ADH Environmental
- Coastal Watershed Council
- EcoLayers
- CASQA
- Santa Cruz County volunteers

Five Decades Later, It's *Silent Spring* All Over Again

- Rachel Carson began working on *Silent Spring* in 1958 – 50 years ago
- Research into environmental effects of pesticides well under way in 1950's
- Organochlorines and orgnaophosphates shown to be widely harmful

THE FUNDAMENTAL ISSUE

"Pesticides don't kill bugs, people kill bugs"

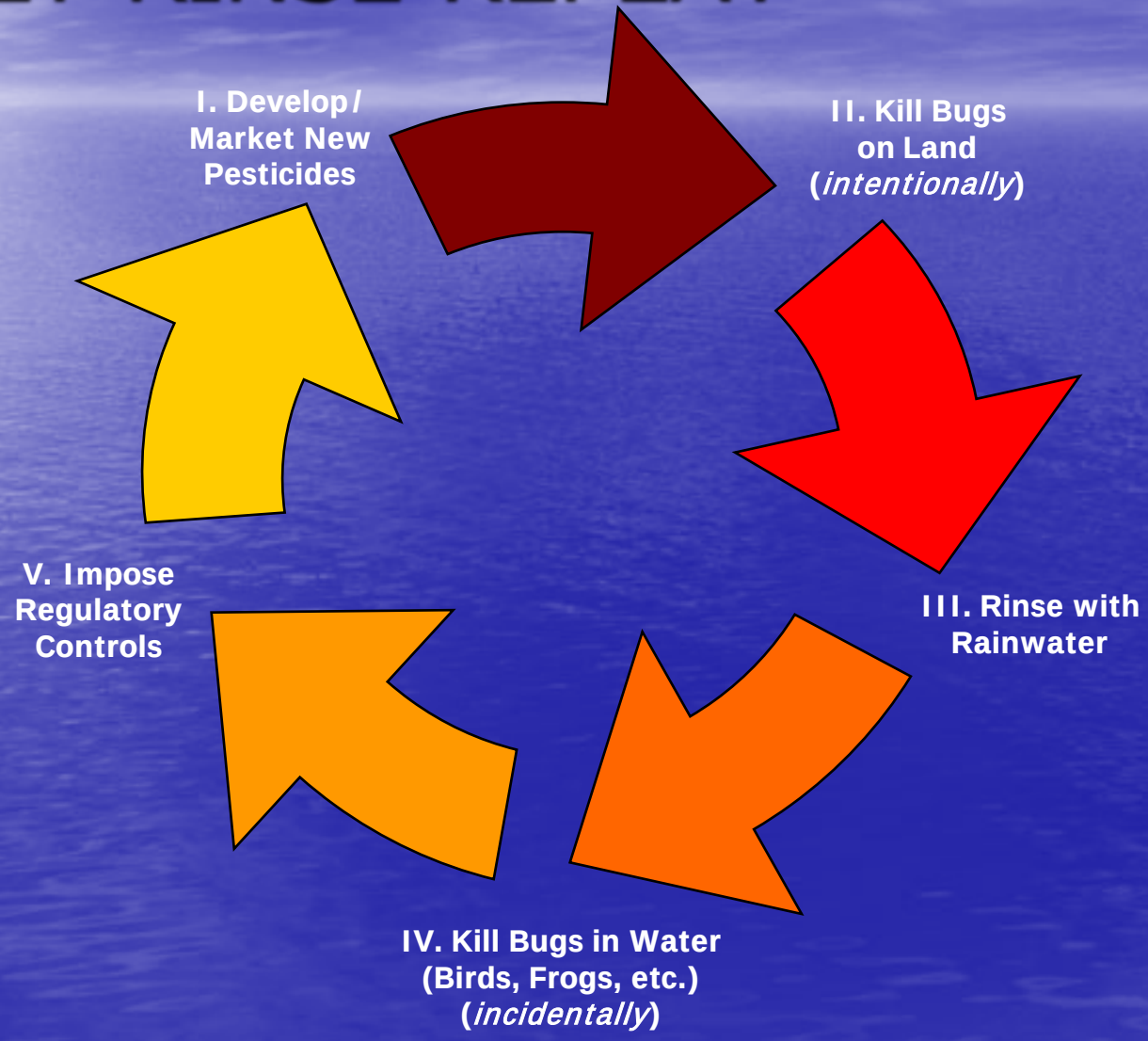
- People don't like bugs
- Chemical companies make pesticides and sell them to…
- People, who use pesticides to kill bugs

UNFORTUNATELY:

- After application, pesticides wash into storm drains, and then surface waters, where they harm aquatic life
- Pesticides are good at killing bugs in receiving waters, too! (duh)



CURRENT REGULATORY SCHEME: APPLY-RINSE-REPEAT



PESTICIDE INDUSTRY RESPONSE - RECENT CASE

- Several years ago, USEPA banned urban uses of diazinon, chlorpyrifos (OPs)
- Manufacturers replaced OPs with different active ingredients *approved by USEPA* (pyrethroids)
- Urban customers continued buying products, and using them

KEY MOMENTS IN RECENT CA HISTORY:

- *Mid-late 1990's:* OP pesticides (esp. diazinon) cause toxicity in urban streams
- *Early 2000's:* USEPA limits urban uses of diazinon and chlorpyrifos due to *human health concerns*; manufacturers switch to pyrethroids
- *Early-mid-2000's:* first 303(d) Listings, TMDLs for OP pesticides (Central Valley, SF Bay Area)
- *Mid-2000's:* Research documents toxicity due to pyrethroids *in sediments* of streams receiving urban and agricultural runoff

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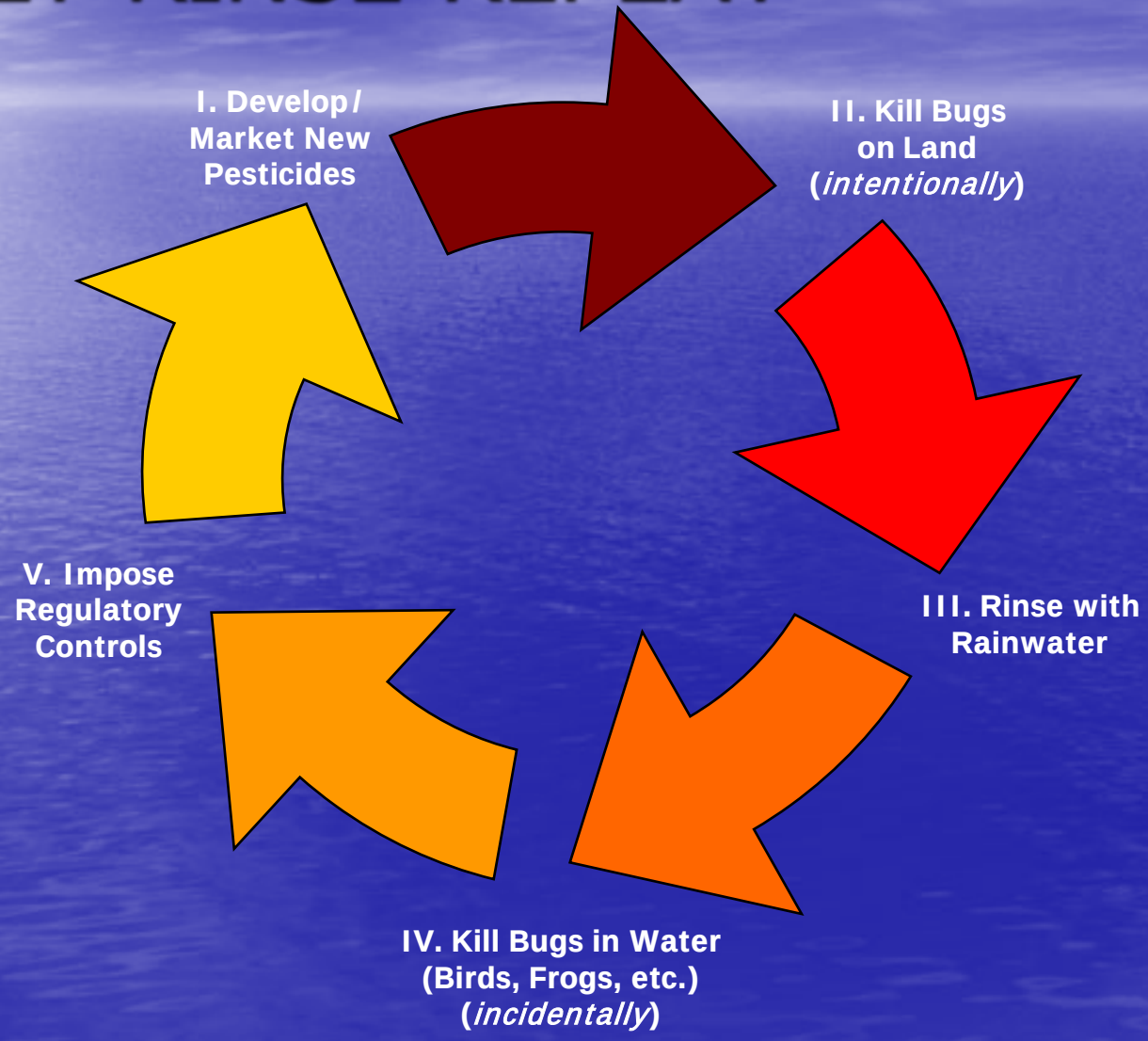
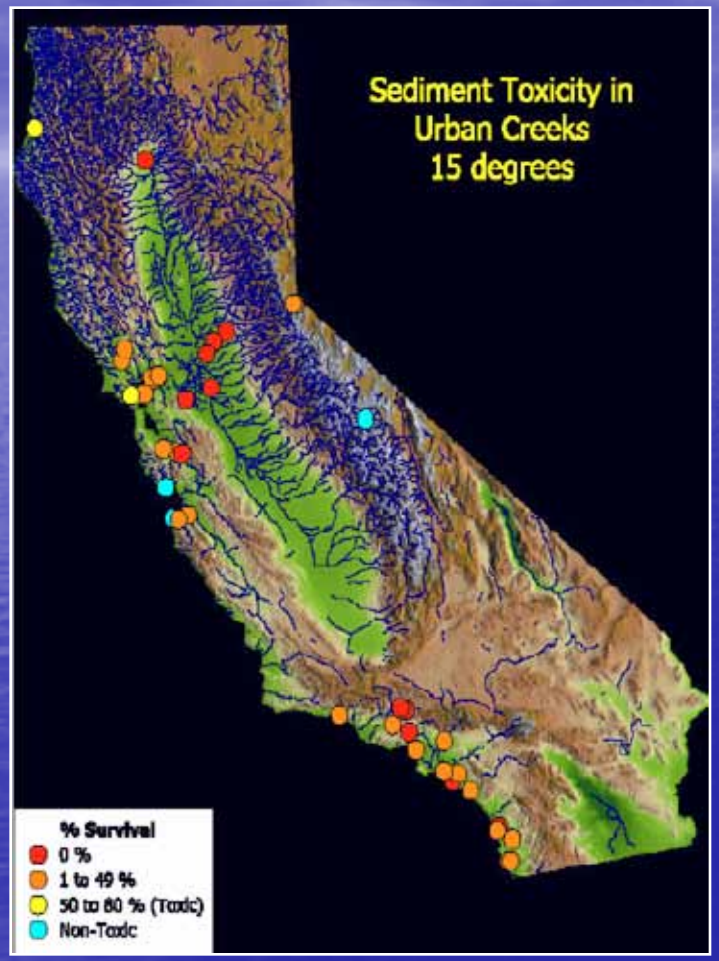


Pyrethroids are:

- Synthetic versions of naturally-occurring pyrethrins
- More toxic and longer-lasting when released into the environment
- More likely to bind to particles (and persist in sediments) than OP pesticides

SEDIMENT TOXICITY IN CA



From: California's Surface Water Ambient Monitoring Program (SWAMP; R. Holmes/ UPC 7/19/07)

- Pyrethroids are principal cause of toxicity, per final report, ES&T 2008

Urban Use and Toxicity

- Permethrin and cypermethrin most widely used in California urban areas
- But pyrethroid toxicity varies…
- Cypermethrin and bifenthrin account for most “toxicity equivalents”

Source: TDC Environmental, 2008: “Urban Pesticides Use Trends Annual Report 2008”

Re-evaluation (DPR)

- CA Dept. of Pesticide Regulation (DPR) has initiated regulatory process known as “re-evaluation” for pyrethroid products
- Due to discovery and publication of toxic effects of pyrethroids in California
- Allowable uses may be adjusted and mitigation measures required

CASQA's Role

- CASQA: CA Stormwater Quality Association
- Pesticides Subcommittee is tracking pyrethroids re-evaluation process
- Providing data and participating in discussions with DPR, USEPA
- Retained Armand Ruby Consulting to investigate and compile available monitoring information

Pyrethroids Data Compilation Project

- Purpose: compile all available data to document presence and effects of pyrethroids in ***urban surface waters*** in California

Pyrethroids Monitoring Data Compilation- Results

I. Expanding diversity of pesticides research
II. Shift in research from agricultural to urban areas
III. Pyrethroids are present – and toxic – *in both water and sediment*
IV. Evidence widely distributed throughout CA
V. Effects on aquatic organisms are widespread throughout aquatic biosphere
VI. Shift in toxic effect from water flea (*Ceriodaphnia dubia*) to amphipods (*Hyalella azteca*)
VII. Analytical detection issues understate the extent of the problem

Rachel Carson, *Silent Spring*, 1962:

"...we have allowed these chemicals to be used with little or no advance investigation of their effect on soil, water, wildlife... Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world..."

The issues are real...

- and the behaviors and attitudes of the public are important factors

Accentuating the Positive

- There is a largely-untapped resource available to improve urban runoff quality through public education/outreach - by encouraging people to be good stewards

Accentuating the Positive – A New Approach

- This approach represents a 180° shift in thinking in two key ways:
  - the focus is on facilitating *positive* behaviors and actions that can be undertaken voluntarily by individual citizens
  - the communication flow is two ways – with equal emphasis on getting feedback and information from public participants

Good Progress/Examples from the Pesticides/IPM Sector

- Green Gardener Program
  - http://www.greengardener.org/ (Santa Barbara)
  - http://www.green-gardener.org/ (Monterey Bay)
- Our Water/Our World
  - http://www.ourwaterourworld.org/
- Bay-Friendly Landscaping and Gardening
  - http://www.bayfriendlycoalition.com/index.shtml

Coastal Watershed Council – Stewardship Initiative

- CWC's Mission: *to preserve and protect coastal watersheds through monitoring, education, and **stewardship***
- Foster stewardship by individual citizens by promoting measures to:
  - Reduce Runoff Quantity, and/or
  - Improve Runoff Quality

Coastal Watershed Council – Stewardship Initiative

- Step 1: create Stewardship ToolKit – on-line resource for citizens

  http://www.coastal-watershed.org/CWC_Library/Reduce_Impact/Impact.htm

- Step 2: create on-line data portal for public entry of stewardship sites using EcoLayers software (www.EcoLayers.com)
- Step 3: publicize ToolKit and data portal; foster neighbor-to-neighbor education/outreach
- Step 4: summarize information for MS4s

CWC's Stewardship ToolKit – Rain Gardens example

- Rain Gardens

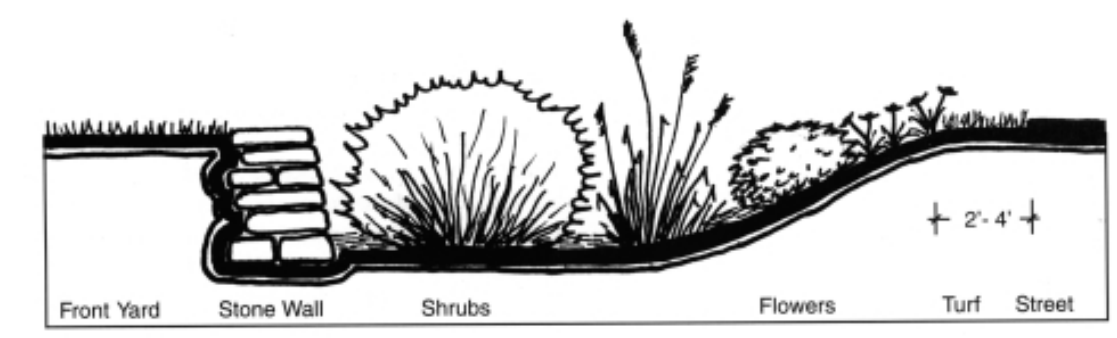
  Rain gardens serve as colorful stormwater detention areas, which help to reduce the quantity of runoff during peak flow events and treat infiltrating water.

CWC's Stewardship ToolKit – Rain Gardens example, cont'd

Ø Benefits:

- Reduces the volume of runoff from a single-family property where space is limited but runoff management is desired
- Provides some water treatment by removing suspended solids, metals, and nutrients
- Provides an aesthetic amenity to a property
- Supports groundwater recharge
- Flowering plants and grasses appeal to beneficial insects such as bees and butterflies
- An effective and less costly means to stormwater management compared to some of the more sophisticated devices

CWC's Stewardship ToolKit – Rain Gardens example, cont'd



Installation/ characteristics:

- Determine the size and shape of the garden based on the surface area of impervious surface draining to the garden (for gardens within 30 feet of a building, most runoff will be coming from downspouts; each downspout contributes about 25% of a buildings runoff; calculate the draining surface area by finding the length and width of the bottom of the house to approximate the roof area and then multiply this number by 25% to find the volume of runoff coming from one downspout)
- The slope of the lawn or ground on which the garden is to be built should be between 3-10%
- For clay soils which drain slowly, the area of the garden should be 60% of the draining surface area (surface area of the roof)

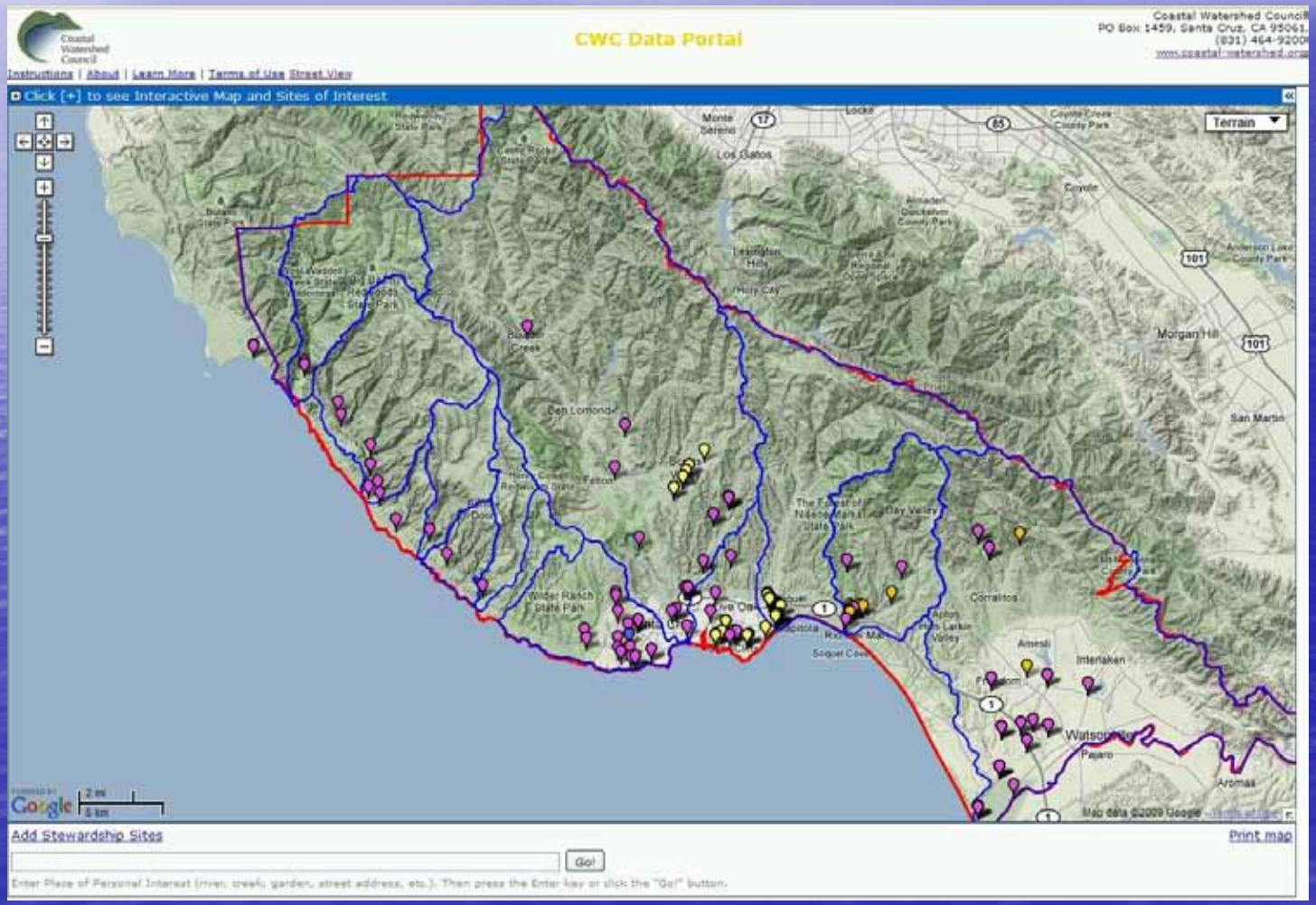
Stewardship Data Portal

- Developed using EcoLayers software
- Allows two-way communication between the public and agencies
- Provides means for citizens to inspire and inform each other
- Allows agency to compile information on citizen runoff-reduction and pollutant-reduction efforts

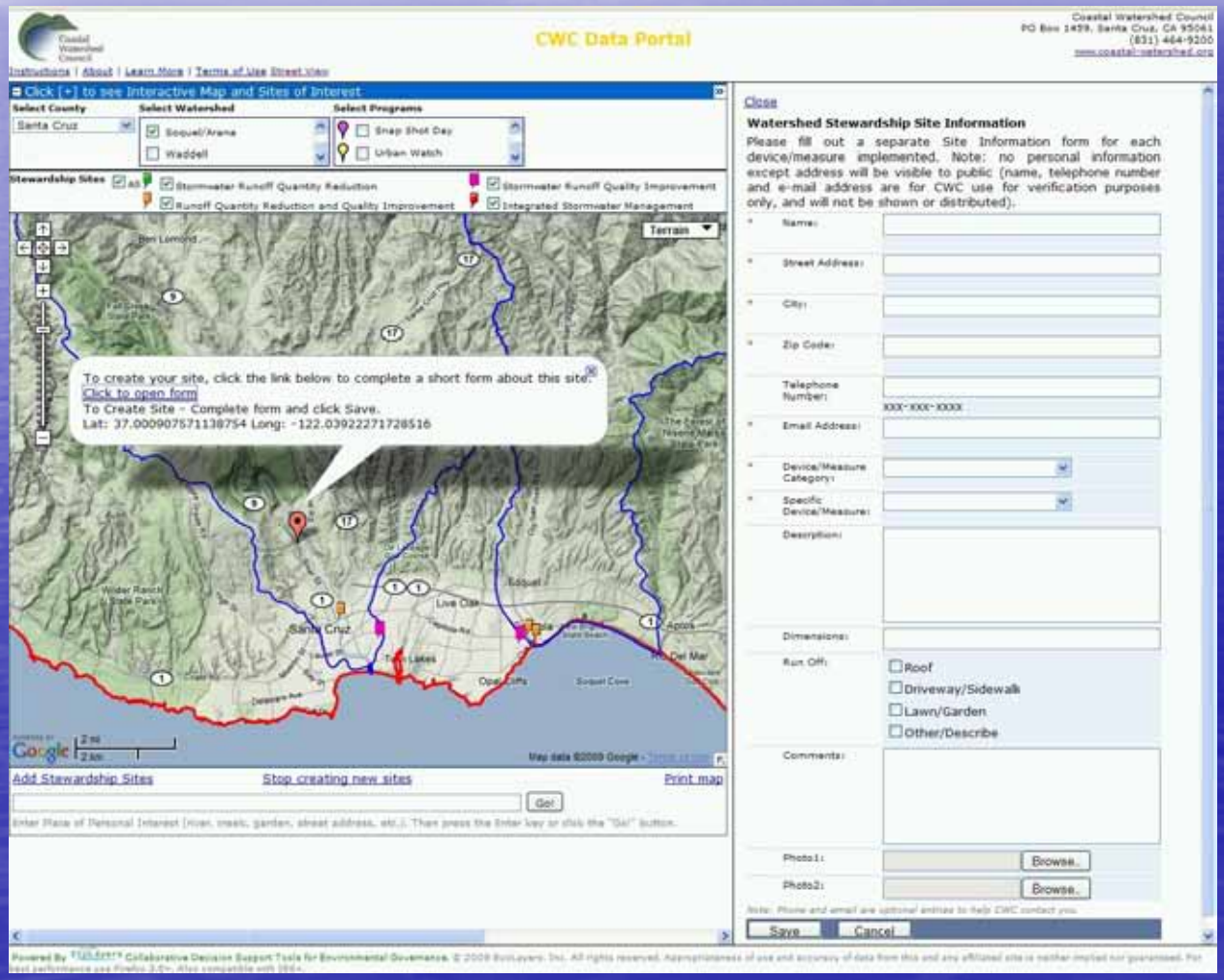
CWC's Homepage

CWC's Water Quality Data Portal

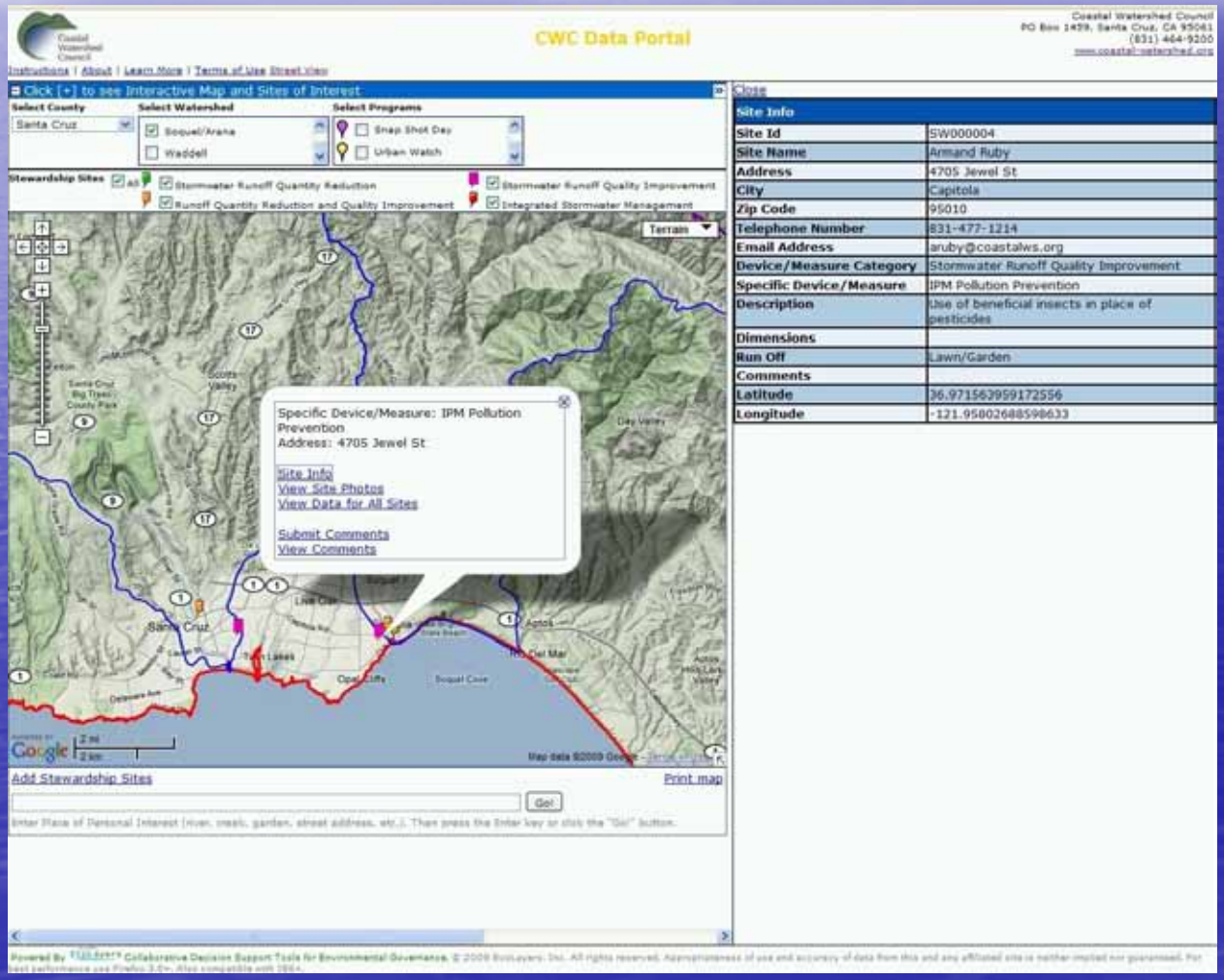
- Could also be applied to SPCWC data...



CWC's Stewardship Data Portal – Data Entry Form



CWC Stewardship Portal - example site



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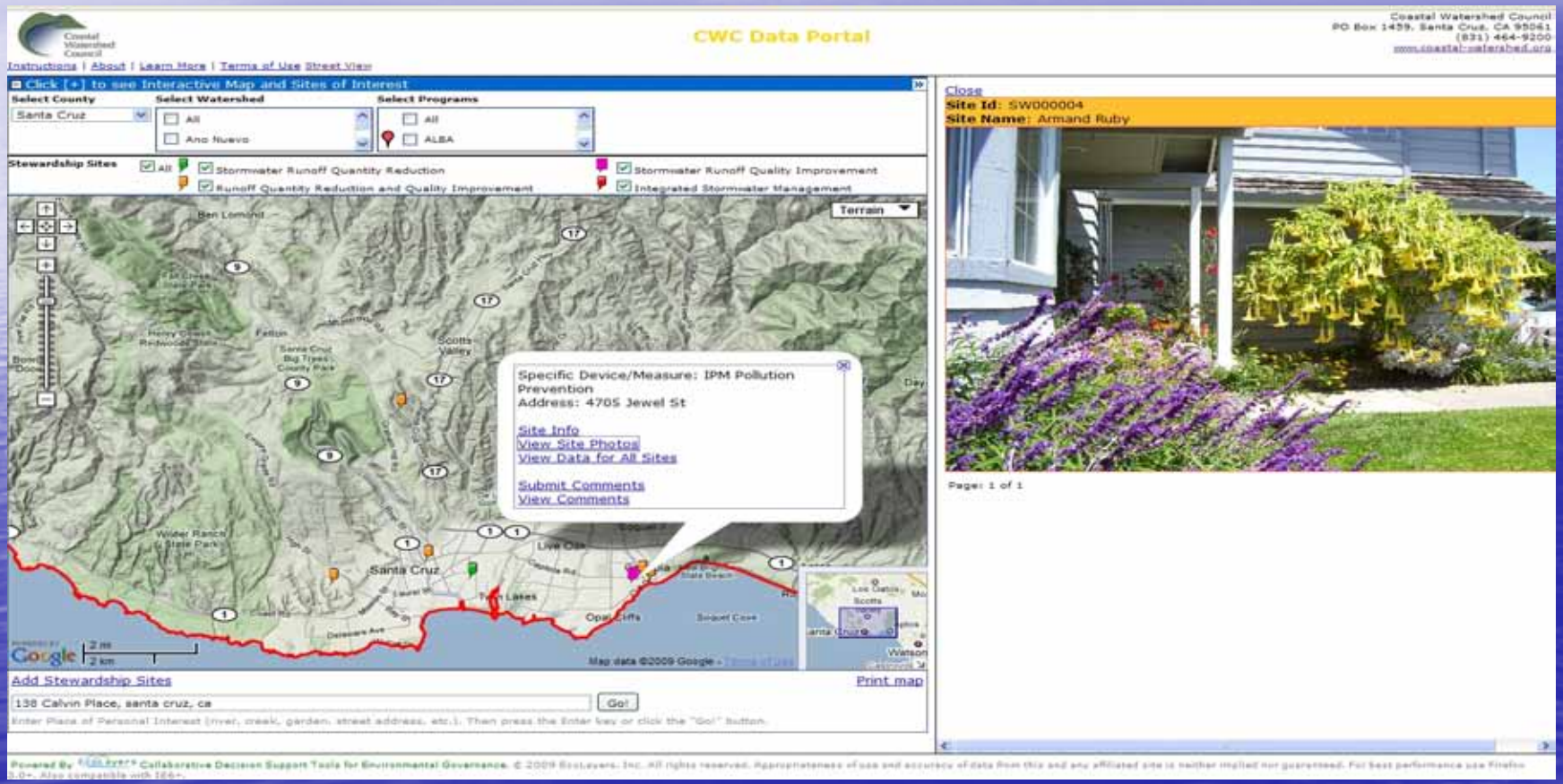

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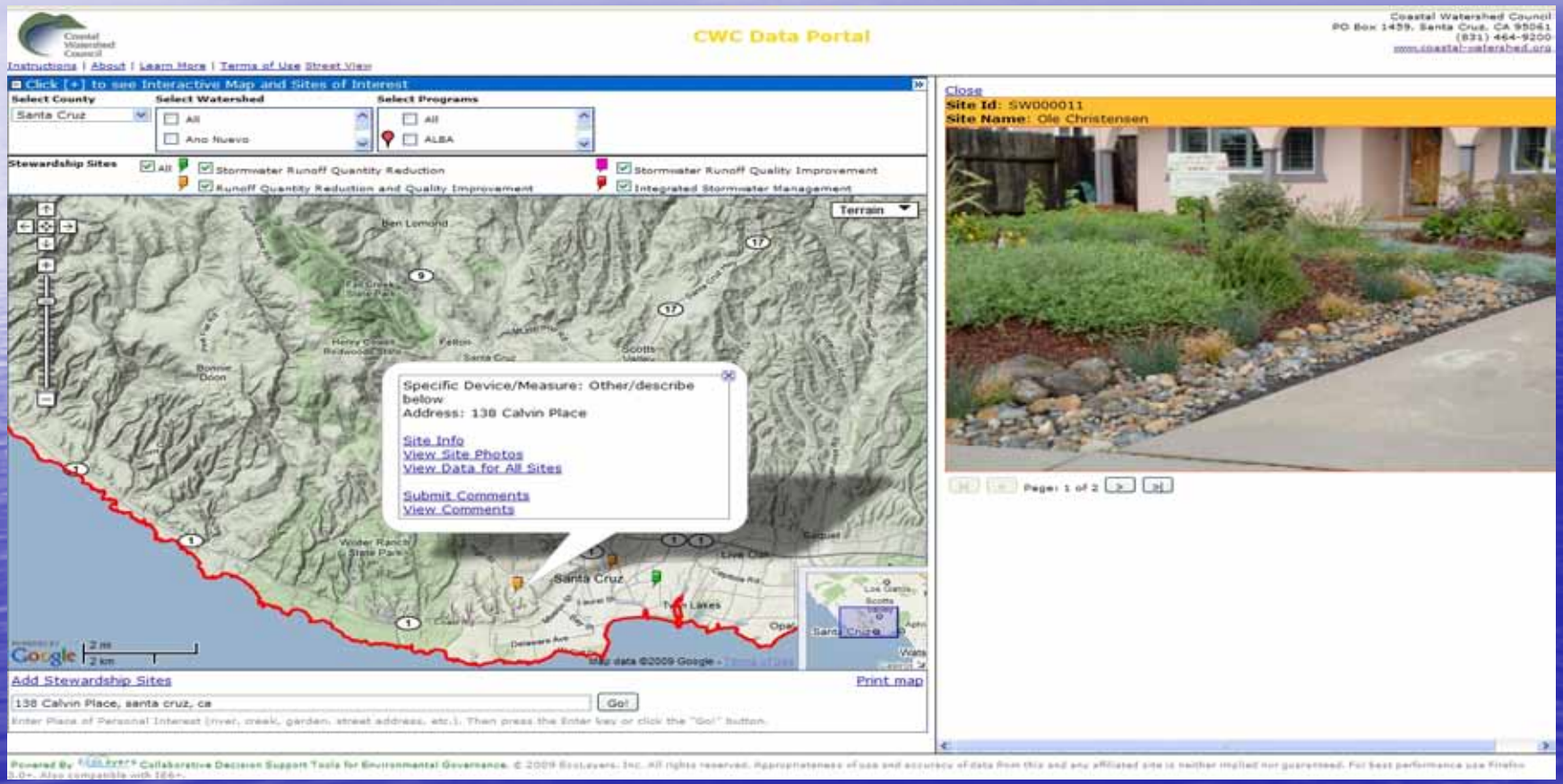

Next Steps

- Publicize Stewardship/Data Portal functions to public
- Acquire financial support for CWC's Stewardship Initiative
- Compile and summarize results for MS4s:
  - Permittees can incorporate runoff volume reductions/runoff quality improvements in annual reports to regulatory agencies
  - EcoLayers output includes plots, tables, graphs

KEY RESOURCES

- Coastal Watershed Council:
  www.coastal-watershed.org/
- EcoLayers:
  www.EcoLayers.com/

KEY RESOURCES

- UP3 Project: www.up3project.org/
  (*sign up for UPC e-mail list*)
- PANNA – Pesticide Action Network:
  www.panna.org/
  - Esp. PAN Pesticides Database:
    www.pesticideinfo.org/Index.html
- Beyond Pesticides:
  www.beyondpesticides.org/
  - Esp. Gateway on Pesticides Hazards:
    www.beyondpesticides.org/gateway/index.htm
- CA Dept. Pesticide Regulation:
  www.cdpr.ca.gov/

COMMENTS/QUESTIONS

For More Information Contact:

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(*Lots of Useful Links*)