Five Decades After Silent Spring – Now It's Your Problem

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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"

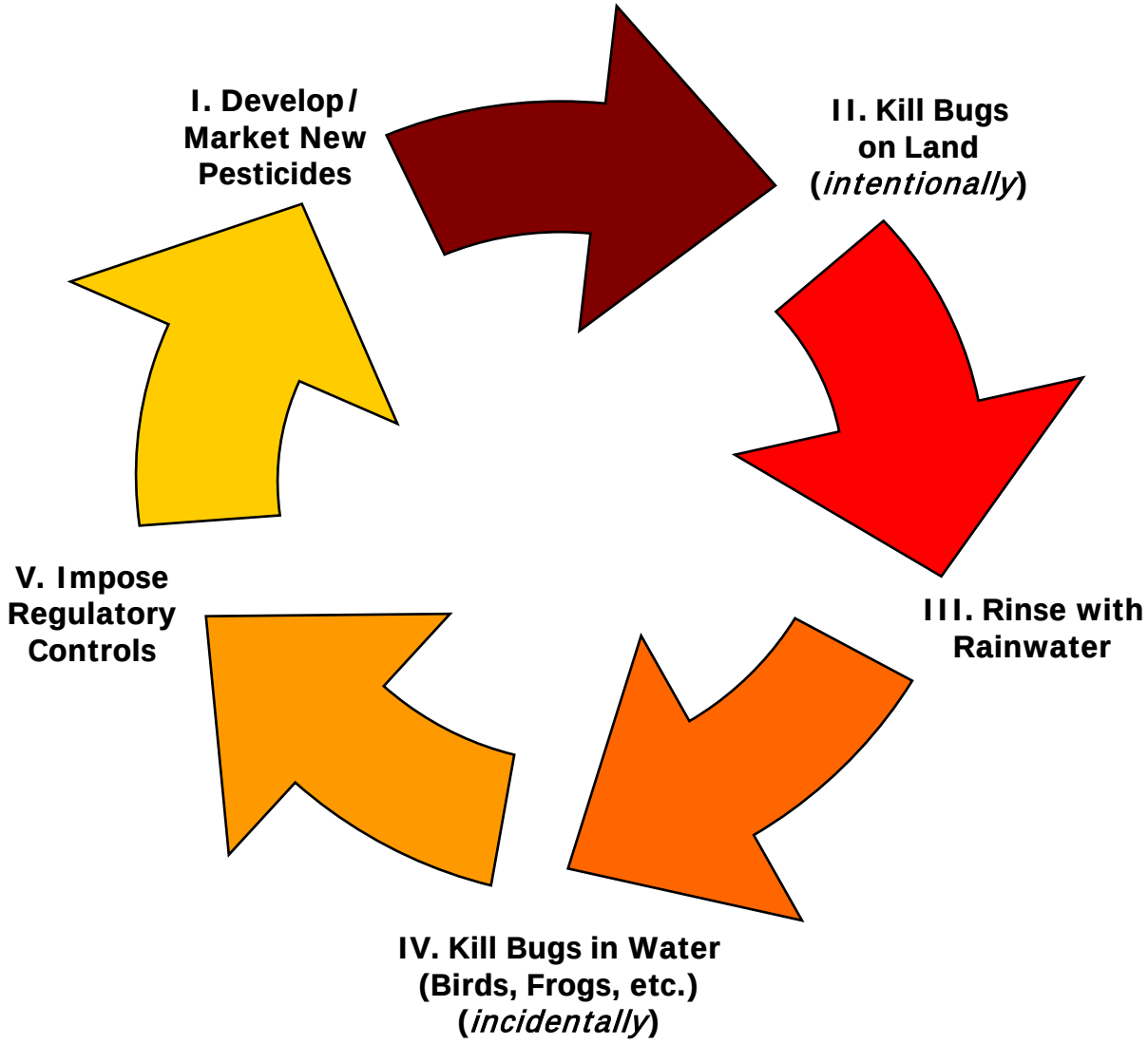
- People don't like bugs
- Chemical companies make pesticides and sell them to…
- People, who use pesticides to kill bugs

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



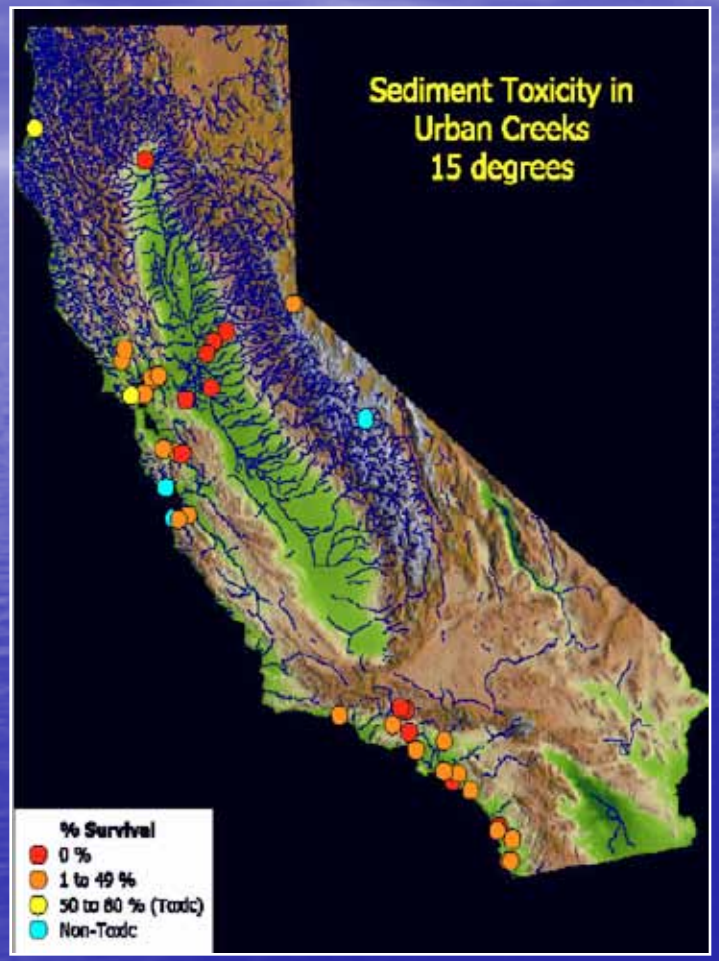
PESTICIDE INDUSTRY RESPONSE - RECENT CASE

- In response to EPA phase-out of diazinon, chlorpyrifos:
- Replaced OPs with different active ingredients approved by USEPA (pyrethroids), continued selling products to urban customers
- Will likely lead to new 303(d) listings, TMDLs

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 TMDLs adopted 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

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

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

Urban Use and Toxicity

- Permethrin and cypermethrin most widely used in California urban area
- 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

- Pesticides Subcommittee is tracking pyrethroids re-evaluation process
- CASQA participates as an interested party
- CASQA retained Armand Ruby Consulting to investigate and compile available monitoring information documenting presence and effects of pyrethroids in urban surface waters in CA.

Monitoring Data Compilation - Overview

- identify pyrethroids monitoring data in urban surface waters and sediments
- identify references and/or data sources, including agency and jurisdiction
- compile summary information, such as monitoring sites, frequency, and constituents, together with references and/or source information, in a chart or table that is readily expandable in the future
- communicate the results to stakeholders

Pyrethroids Monitoring - Results

I. Expanding diversity of research on presence and effects of pyrethroids
II. Since 2000: shift in pesticides research from agricultural to urban areas
III. Pyrethroids are present in both water and sediment– and toxic effects have been documented in both matrices
IV. Evidence of presence and effects of pyrethroids in urban watercourses widely distributed geographically throughout CA
V. Effects of pyrethroids on aquatic organisms are widespread throughout aquatic biosphere
VI. Shift from toxicity to Ceriodaphnia due to OP pesticides, to toxicity to amphipods (Hyalella) due to pyrethroids.
VII. Analytical detection limits not sufficiently low to detect pyrethroids at environmentally-relevant concentrations understate the extent of the problem

I. There is an expanding diversity of research focusing on presence and effects of pyrethroids

- Over 100 studies evaluated for this project
- Many studies ongoing – preliminary results included where available
- Urban focus – but notations made for
  - "Ag Studies"
  - "Methods-Research"
  - "Reviews-Regs-Resources"
  - "Study Plans"
  - "Other Pesticides"

II. Earlier (pre-2000) pesticides research focused principally on agriculture, but that has changed in recent years

- Several dozen reports/studies summarized for this project from California urban areas
- Much additional work is ongoing or planned

III. Pyrethroids are present in both water and sediment in urban areas

- Recent improvements in field collection and laboratory analytical protocols produce improved detection of pyrethroids, particularly in water.
- Toxic effects have been extensively documented in both matrices

IV. Pyrethroids are found statewide

- Evidence of presence and effects of pyrethroids *in urban watercourses* is widely distributed geographically throughout the state of California.
- Studies are summarized from:
  - North coast
  - Lake Tahoe region
  - San Francisco Bay area
  - Central Valley
  - Central Coast
  - Both coastal and inland areas of southern California

V. Effects of pyrethroids on aquatic organisms are widespread

- Studies show effects throughout the aquatic biosphere
- Documented in studies involving:
  - Water column toxicity testing
  - Sediment toxicity testing
  - Bioassessments (benthic macroinvertebrates)
  - Tissue analysis

VI. Shift in aquatic (water column) toxicity

- Observed since the phase-out of urban uses of diazinon in 2004
- Formerly, urban runoff and surface waters exhibited frequent toxicity to Ceriodaphnia, due to OP pesticides (diazinon and chlorpyrifos)
- Increasingly, the same waters are exhibiting toxicity to amphipods (Hyalella), due to pyrethroids

(based on TIEs and chemical data)

VII. It's worse than it appears

- Some studies use analytical detection limits not sufficiently low to detect pyrethroids at environmentally-relevant concentrations.
- Some samples reported as "non-detect" may in fact contain pyrethroids at potentially harmful concentrations
- This has the effect of understating the extent of the problem

[Some commercial labs are currently capable of providing appropriate analytical detection limits on a routine basis]

REGULATORY BREAKDOWN

- USEPA/FIFRA (Pesticide Registration)
  – Ineffective in preventing water quality impacts (OPP and OW disconnect)
- CA Department of Pesticide Regulation (DPR)
  – Gets involved after approval/use
- TMDLs (Clean Water Act) – Post-impact
- Need complete revision of regulatory system – assess/prevent ecological impacts before product approval

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..."

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

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(*Lots of Useful Links*)