

Assessing Impacts, Risks & Consequences of Pest Management

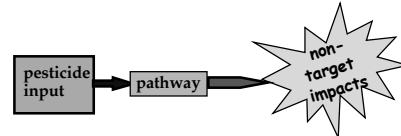
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Advisory Committee, Quarterly Meeting, April 1, 2003



Objectives

- Why assess pesticide impacts?
- Why regulatory process is not sufficient for assessment
- Putting pesticide risk into perspective
- My approach & assumptions about IPM



What is Risk?

risk = f (hazard, exposure)

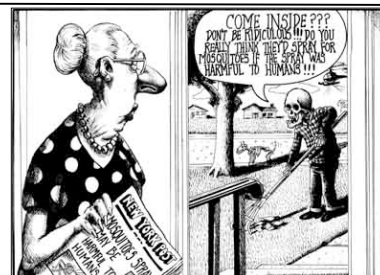
risk = perception ?

RISK PERCEPTION
who cares,
what they are doing about it

Risk perception = f (who cares,
what they are doing about it)



Pesticides: 'lightning rod' for public's fears about the environment, pollution, everything that is 'out of control'



NY Post—Oct.17, 1999



Who cares?

- **Scientists**
- **Health & environmental advocates**
- **Government regulators**
- **Communities** balancing tensions between maintaining livelihoods, sustaining health, protecting natural resources
- **Property managers** following regs, working within communities



Why the regulatory process does not sufficiently protect from pesticide risks

- History & purpose of pesticide regulations
- Political tension: economic & health risks
- Greater scientific understanding of risks
- Bureaucratic lag time



Historical Purpose of Pesticide Regulations

- **Insecticide Act (1910)**
protect growers, regulate claims of efficacy
USDA
- **FIFRA (1947)**
Federal Insecticide, Fungicide, Rodenticide Act
expanded oversight to additional types of products
USDA



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Historical Purpose of Pesticide Regulations

FIFRA (1972)

- Focus of regulations shifted to risk reduction
- Pesticide registrants supply support data
- Restricted pesticide category
Need for trained applicators
- Regulation under purview of new US EPA
- Charged with setting levels of public & environmental exposure to pesticides



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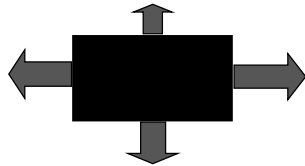
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Historical Purpose of Pesticide Regulations

FIFRA (1972)

“taking into account the economic, social & environmental costs & benefits of pesticide use.”



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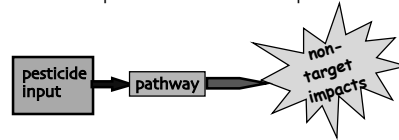
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Historical Purpose of Pesticide Regulations

FIFRA (1988)

- Review & re-registration of pre-1984 pesticides—REDs (re-registration eligibility decisions) were to have been completed by 1997
- Increase emphasis on reduced risk pesticides



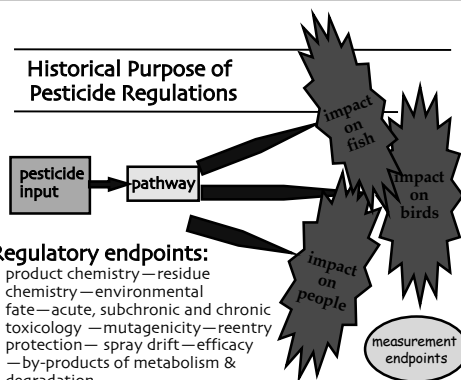
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Historical Purpose of Pesticide Regulations

Regulatory endpoints:
product chemistry—residue
chemistry—environmental
fate—acute, subchronic and chronic
toxicology—mutagenicity—reentry
protection—spray drift—efficacy
—by-products of metabolism & degradation

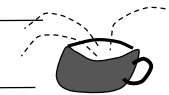


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Historical Purpose of Pesticide Regulations



Food Quality Protection Act (FQPA) (1996)

- New concepts for assessing pesticide risk
- Pesticides with = “mode of action” in 1 “risk cup”
Total use not permitted to spill over
- Expedited registration of reduced risk pesticides
- Compatibility with IPM principles
- Conservative standards to protect children
- Health effects other than carcinogenicity
e.g., reproductive and endocrine effects




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**Limitations to Regulatory Process:
Bureaucratic Lag Time**




- FQPA (1996) mandated development of a screening program to identify pesticides with possible estrogenic or other endocrine effects
 - In place within 2 years, *i.e.*, Aug 1998
 - Implemented within 3 years, *i.e.*, Aug 1999
 - Progress report to Congress within 4 years, *i.e.*, Aug 2000

What happened?



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**Limitations to Regulatory Process:
Bureaucratic Lag Time**

What happened?


- 1996: Endocrine disruption designated high priority research area
- 1997: Endocrine Disruption Research RfPs
- April 1, 2003: End of public comment period on EPA's planned method for selecting the 1st group of chemicals to be screened in EPA's Endocrine Disruptor Screening Program (EDSP) (Source: Federal Register, Feb 23, 2003)

Bureaucratic delay & complex science




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**Limitations to Regulatory Process:
Greater scientific understanding of risks**




Pesticide toxicity test results are generally based on individual applications of single active ingredients.




However...

Environmental impacts of mixtures may be different than individual toxins

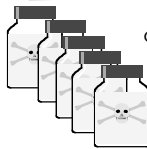


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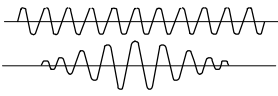



**Limitations to Regulatory Process:
Greater scientific understanding of risks**




Cumulative impacts from repeated or extended exposures can be different than impacts expected from a single exposure.

Toxicity tests assume constant chemical concentrations, but exposure levels typically fluctuate, & impacts can differ accordingly

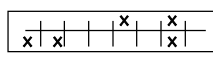

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**Limitations to Regulatory Process:
Greater scientific understanding of risks & data manipulation**

- Are data from field, lab, or simulated model? from agricultural, forest or peri-urban environment?
- What do data tell us? is measured effect lethal dose? change in behavior? is the effect reversible?
- How were organisms exposed to the toxin? at field dose? higher? lower? single exposure?
- How are data gaps filled? ignored? estimated? averaged? extrapolated?


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**Limitations to Regulatory Process:
Greater scientific understanding of risks**


**Regulatory endpoint:
Acute toxicity to adult honey bees**



Insecticides lethal to worker honey bees in the field may have < negative long-term impact on hive survival than insecticides with sub-lethal effects.


The 'less-toxic' insecticides can be brought back to the hive & kill brood, or alter nectar-collecting behavior.

Which pose greater risk to feral bees & other types of beneficials?



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**Limitations to Regulatory Process:
Greater scientific awareness of risks**

- Impacts at higher levels of biological organization ecological impacts weigh equally with direct health effects
- Impacts at smaller (e.g., cellular) levels of biological organization
- Scalar effects: special attention to high volume chemicals
- Long-term, low-level exposures to chemical soup of pesticides, industrial chemicals, medications —with varying effects at different stages of development



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**Limitations to Regulatory Process:
Greater scientific understanding of risks & Developments in science of risk assessment**

- Ecological risk assessment framework iterative, objectives guide process, communication integral
- Statistical methods
- Low confidence ratings for older tests of pesticide effects and fate
- Probabilistic risk assessment
- **UNCERTAINTY**—data gaps, complex science, future impacts, off-site effects, suitability of model
- **VARIABILITY**—vulnerable &/or highly exposed groups, situation-specific conditions



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**Limitations to Regulatory Process:
Federal regulatory agency perspective**

US EPA—the federal regulatory agency— offers additional incentives to reduce risk

- BPPD: Biopesticides & Pollution Prevention Division
- PESP: Pesticide Environmental Stewardship Program
- Expedited processing of Reduced Risk pesticides
- Microbial, Biochemical & Biochemical-like
- Commitment to adoption of Integrated Pest Management (IPM)



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**Limitations to Regulatory Process:
Accident, ignorance, malfeasance**

Regulatory safeguards assume exposure at regulated levels

But

- Accidents happen
- Hazardous pesticides are a security threat
- California is a crowded place

Wise not to have unsecured poisons around

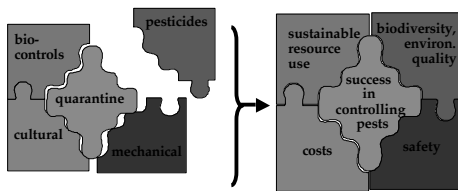


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Pesticides in perspective

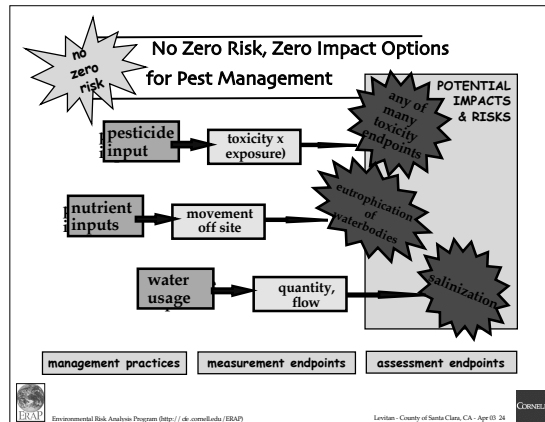


Balancing risk factors & other considerations: pesticide toxicity, water consumption, energy & resource use, soil erosion, labor time & hazards, habitat protection, pollution



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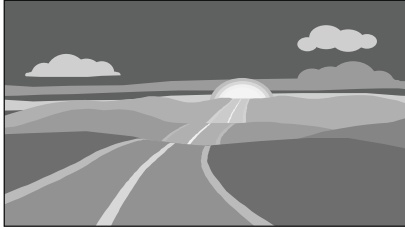


An endpoint may be more critical under certain regional or situation-specific conditions

e.g.:
Social, economic & environmental costs of water use in dry areas

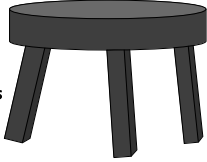
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Holistic appraisal of impacts from an array of pest management options
 — appropriate to targeted objectives—
 needed to guide pest managers down the “right path”



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**Integrated Pest Management:
 3-Legged Stool**



**Efficacy of IPM
 in controlling
 pests & diseases**


Least cost approach

**Most benign to
 human health
 & environment**

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**Integrated Pest Management:
 Ecological, Systems Approach**

How is the IPM 3-legged stool constructed?
 How sustainable is it?




**Is the wood from
 good stock?**

Was it milled well?

**Glued tight?
 Will it last?**

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**Ecological, Systems Approach
 Integrated Pest Management**



- Design & planning to avoid pest problems
- Pro-active cultural practices & materials protective against pest outbreaks
- Threshold for intervention consider raising bar to account for environmental costs as well as economic
- Counter build-up of resistance with broad array of control options

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**Ecological, Systems Approach
 Integrated Pest Management**

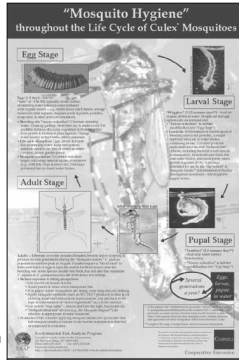


- When intervention is called for, optimize for most sustainable, most benign (least risk) improving ecological balance decreasing future pest problems
- Do not pre-judge which approach is least risk (i.e., do not presume that mechanical control is less risky than pesticide)
- Evaluate efficacy for near-term control for long-term reduction of pest problem(s)

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Prevention & control of West Nile Virus

- early season surveillance
- prevent mosquito breeding
 - eliminate breeding sites
 - disrupt mosquito life cycle
 - "reduced risk" larvicides
- personal protection
 - repellents
 - long clothing
 - screening
 - avoid places where mosquitoes are biting
- mosquito adulticides
 - consider using if disease is suspected in human population



Encourage rigorous evaluation of recommended control methods!

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Helping citizens and policy-makers interpret scientific information about environmental risks and make informed decisions that balance levels of concern with levels of risk and social impact.

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