Regulating Chemicals in the Environment

Principles of Environmental Toxicology
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Learning Objectives

- Understand the drivers and processes in environmental law development.
- Understand a structural summary of how the US Federal legal system works.
- Understand a structural summary of how laws, regulations and policies are made.
- Understand the fundamentals of administrative law.

Learning Objectives

- List the major US environmental laws.
- Explore the key environmental laws interfacing with issues of concern in environmental toxicology.
- Use a case study to understand the historical development of air quality regulation in California.

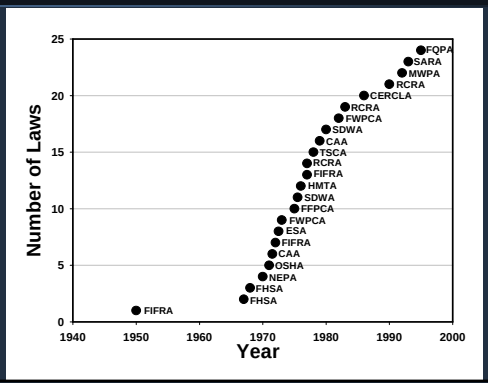
US Law and the Environment

- Statutory development paralleled the environmental movement.
- Primary origins in the human food chain and food/drinking water safety.
- "Out of site - out of mind" disposal of wastes no longer acceptable.
- "Upstream polluters - downstream users" creates fundamental rights issues.
- New scientific knowledge and public awareness of impacts on the environment.

US Law and the Environment

- What drives the creation of environmental law?
- Fundamental rights/freedoms under the constitution.
- Federalism issues.
  - State control *vs.* federal control.
- Political power and power shifts.
- Evolutionary developments and quantum leaps.
- Development of science and societal desires.
- Status quo dissatisfaction.

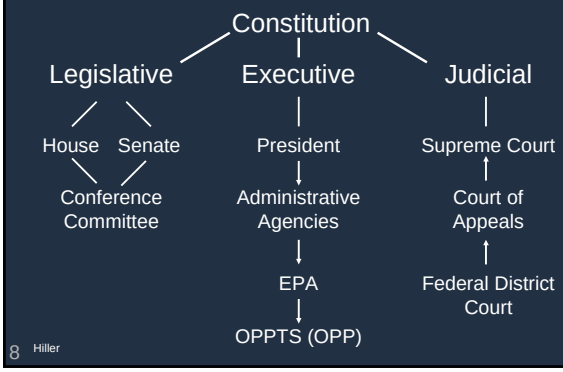
US Environmental Laws



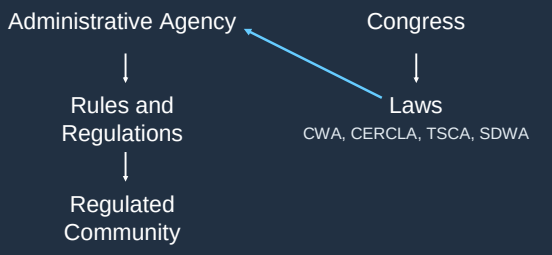
Legal System Fundamentals

- The basis of environmental law creation, administration and compliance.

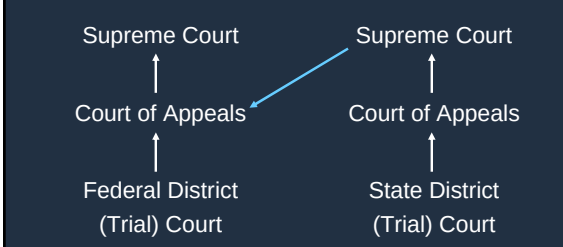
Legal System Fundamentals



Law and Regulation



Judicial Branch



Introduction to Administrative Law

Role of Agency

Rule Making	Adjudication
Issuance of regulations.	Apply regulations and standards to particular cases. Permits.
Quasi-Legislative	*Quasi-Judicial*

Introduction to Administrative Law

Types of Agency Action

Informal Rule Making	Formal Adjudication
Public notice. ↓ Opportunity to comment. *(This is important.)*	Trial type procedures. Discovery, cross exam, full record.

Introduction to Administrative Law

Court Deference to Agency Action

- Agency as fact finder and expert.
- Court review of agency authority.
  - Scope of agency authority.
  - Procedural compliance.
  - "Adequate" evidence.

Introduction to Administrative Law

Court Review of Agency Action

- Informal rule making and adjudication.
  - Arbitrary and capricious?
- Formal proceeding.
  - Substantial evidence?

In Some Cases
Trial de novo.

Common Law *vs.* Statutory Law

Common Law	Statutory Law
Derives its authority from judgments and decrees of courts, not legislative enactments.	Legislative enactments.
Torts - Injuries or harms done to people / a private civil wrong or injury.	Federal rules and state laws; Rules and regulations of federal and State agencies.
Court provides a remedy: *damages.*	Legislatures proscribe conduct and provide civil and criminal remedies.

Example Conduct

Contamination of Water Leading to Physical Injury / Contamination

Common Law → **Torts**

Statutory Law → **Civil Action** / **Criminal Action**

Torts	Civil Action	Criminal Action
Nuisance Negligence- Strict liability Medical bills Punitive damages	CWA, CERCLA, SDWA, CAA Restore property Civil penalties	CWA, CERCLA, SDWA, CAA Fines Imprisonment

Environmental Performance Standards

Technology Standards	**Ambient Standards**
• Define acceptable levels of discharge. • Emission/effluent limitation.	• Specifies minimum conditions. • Impose quality requirement on receiving air/water. • "Harm"-based.

Major US Environmental Laws

- The Clean Air Act (CAA)
  - 42 U.S.C. s/s 7401 et seq. (1970)
- The Clean Water Act (CWA)
  - 33 U.S.C. s/s 121 et seq. (1977)
- CERCLA, Superfund
  - 42 U.S.C. s/s 9601 et seq. (1980)
- The Emergency Planning & Community Right-To-Know Act (EPCRA)
  - 42 U.S.C. 11011 et seq. (1986)
- The Endangered Species Act (ESA)
  - 7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973)

Major US Environmental Laws

- The Fed. Insecticide, Fungicide and Rodenticide Act (FIFRA)
  - 7 U.S.C. s/s 135 et seq. (1972)
- The Freedom of Information Act (FIA)
  - U.S.C. s/s 552 (1966)
- The National Environmental Policy Act (NEPA)
  - 42 U.S.C. s/s 4321 et seq. (1969)
- The Occupational Safety and Health Act (OSHA)
  - 29 U.S.C. 651 et seq. (1970)
- The Oil Pollution Act of 1990

 33 U.S.C. 2702 to 2761

Major US Environmental Laws

- The Pollution Prevention Act
  - 42 U.S.C. 13101 and 13102, s/s et seq. (1990)
- The Resource Conservation and Recovery Act (RCRA)
  - 42 U.S.C. s/s 6901 et seq. (1976)
- The Safe Drinking Water Act (SDWA)
  - 42 U.S.C. s/s 300f et seq. (1974)
- The Superfund Amendments and Reauthorization Act (SARA)
  - 42 U.S.C. 9601 et seq. (1986)
- The Toxic Substances Control Act (TSCA)
  - 15 U.S.C. s/s 2601 et seq. (1976)

National Environmental Policy Act

- Purpose: To ensure that all federally administered or assisted programs are conducted so as to take the environmental impact of their activity into consideration
- Scope: Includes federal activity as well as private activity requiring federal licensing.

NEPA - EIS

- NEPA - Environmental Impact Statement, EIS
- All proposed legislation, major federal actions significantly affecting the environment must have accompanying EIS
  - The environmental impact statement:
    - Any adverse environmental effects which cannot be avoided.
    - Alternatives to the proposed action.
    - The relationship between the local, short term use of man's environment and the maintenance and enhancement of long term productivity.
    - Irreversible and irretrievable commitment of resources.

Clean Water Act (CWA)

- Originally the FWPCA, 1972.
- Amended in "77 (CWA) & '87.
- Goal: "fish-able and swim-able waters" by 1983.
- Elimination of discharge of pollution into navigable waters by 1985.
- NPDES permit program.

CWA

- CWA - maintaining and restoring the nation's waters.
- Key issues:
  - Controlling toxic discharges.
  - Wetland regulation.
  - Non-point sources.
  - Restoring "low-flow" streams.

CWA

- Ambient water quality standards.
- National, technology based effluent limitations for major point sources.
  - Deadlines for compliance.
- Provisions for citizen suits.
- Policy for non-point and gw pollution.
- Municipal waste treatment grants.
- Point Sources.
- BPT, BCT, BAT.
  - Practical, conventional, available.

Safe Drinking Water Act (SDWA)

- Primary standards for health protection.
  - MCLs, maximum contaminant levels.
- Secondary state regulations for aesthetics
- Controls underground injection of contaminants.
- Primacy can be delegated to states.

FIFRA

- Federal Insecticide, Fungicide, and Rodenticide Act-FIFRA.
  - 1996 Food Quality Protection Act.
- Pesticides - economic poisons.
- Requires registration of uses.
- Details testing and risk assessment procedures.

Toxic Substances Control Act

- TSCA 1976, Covers toxic substances not covered by CAA, CWA, FIFRA.
- Health and environmental data requirement for chemicals and mixtures.
  - To be produced by manufacturers
- Authority to regulate chemicals with unreasonable risk (PCBs).
  - Sensitivity to the creation of unnecessary economic barriers
- EPA can impose restrictions on use, manufacturing, labels.

Resource Conservation and Recovery Act

- RCRA - managing and disposing of "new" solid and hazardous waste.
  - 1976 amendments to Solid Waste Disposal Act as amended by Hazardous and Solid Waste Amd. 1984 (HSWA). Includes: HW, municipal, hospital, UST.
- Key issues:
  - The "land ban".
  - Incineration/combustion disposal.
  - Waste minimization.
  - Prevent hazardous waste sites.
  - If a HW generator - cannot avoid liability.
  - "Cradle to grave" tracking.

RCRA - Hazardous Waste

- Solid; Hazardous.
  - Listed.
    - F - non specific sources.
    - K - specific sources.
    - P & U - commercial products.
  - Characteristic.
    - C – Corrosive D002
    - R – Reactive D003
    - I – Ignitable D001
    - T – Toxic (leachate) D004-043
  - Mixture
    - Listed + other = listed.
  - Derived from.

RCRA

- Exclusions:
  - Household waste.
  - Agricultural waste of fertilizer.
  - Recycled materials.
  - Point sources regulated under CWA.
  - Small quantity generators.
  - 100-1000 kg/mo, <180 days holding, expertise on site.
  - <SQG, conditionally exempt.
- Includes: regulation of underground storage tanks
- Solid waste regulated under Subtitle D, municipal landfills.
- Hazardous waste regulated under Subtitle C.

CERCLA

- The Comprehensive Environmental Response, Compensation, and Liability Act - cleaning up hazardous waste sites.
- Key issues
  - Costs, delays, "Superfund site" stigma.
  - Remedy selection.
  - Allocating liability.

CERCLA

- Comprehensive Environmental Response, Compensation and Liability Act
- CERCLA, 1980
- SARA, 1986, 90, (94?)
- "Superfund"

CERCLA History and Objectives

- Impetus was the risk to public health from hazardous waste sites.
- Existing law did not address abandoned sites.
- Designed to respond to the past disposal of hazardous waste complementary to RCRA which governs on-going hazardous waste handling and disposal.

National Priorities List (NPL)

- Determine priorities of "releases or threatened releases" in nation.
- Part of the National Contingency Plan (NCP) and must be updated annually.
- Criteria based on risks to public health, welfare, or the environment.
  - Extent of population at risk.
  - Hazard potential of the HS.
  - Contamination of DW.
  - Threat to ambient air.
  - Hazard ranking system.

CERCLA - Scope

- 40 million persons (40% US population) live within 4 miles of a site listed on the NPL (1990 estimate).

CERCLA - Scope

- 44,000 sites assessed; 11,000 active or on the NPL.
- There are 1560 proposed final or deleted NPL sites.
- 7,409 removal actions at 5,262 sites.

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CERCLA - Scope

- Since FY 1992, responsible parties continue to perform over 70% of new remedial work at NPL sites (FY 1999).
  - Settlements reached with private parties with an estimated value of over $16 billion (FY 1999).
  - 430 de minimis settlements with more than 21,000 small waste contributors (FY 1999).
- EPA, States, Tribes have assessed over 44,000 sites.

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Hazardous Waste Regulation

- RCRA
  - New waste generated.
  - Regulates:
    - Generators.
    - Ultimate treatment, storage and disposal (TSD) sites.
    - Transporters.
- CERCLA (Superfund)
  - Focuses on remedying past-frequently "abandoned" waste sites.
  - Seeks to impose liability on past generators and disposers.

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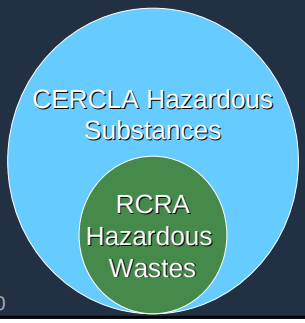
Classification

- Comparison of CERCLA Substances to RCRA Wastes.



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Clean Air Act (CAA)

- Air Quality Act 1967, CAA-'70, '73, '77, '82,'90.
- Prevention and control of air pollution is a primary responsibility of state and local government.
  - Federal $$ assistance and leadership.
- Creates a list of air pollutants and national ambient air quality standards.

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CAA

- CAA - maintaining and restoring the nation's air resources.
- Key issues:
  - Noncompliance of most metropolitan areas.
  - Air toxics.
  - Costs and market incentives.

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CAA

- Primary/secondary standards for CO_2, SO_2, NO_x, O_3, (HC), Particulates and Pb.
- Requires a State Implementation Plan (SIP).
  - Vehicles, stacks, non-attainment.
- Vehicle emission standards.
- 90% reduction of emissions, 2003.
- Elimination of O_3 depleting chemicals, 2000.

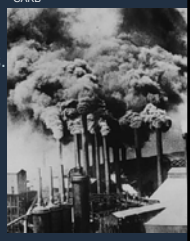
Case Study: CA Air Quality

- History of air pollution.
- Air pollution events: human cost and concern.
- Legislative response.
- Ozone link established.
- Regulatory events.
- Changing culture and attitudes.
- Current costs/effects.
- Ambient air quality standards.

Air Pollution/Control is Not New

- Natural (non-human).
  - Volcanoes, lightning made fires.
  - Emissions from vegetation and animals.
- Non-Natural (human).
  - Fires used for cooking, heating and agriculture.
  - Fuel switch to Coal (19th Century).
  - Industrial emissions.
  - Motor vehicles.
- First Control
  - England's Edward the First - 1273.
  - Smoke nuisance - 19th Century.
  - Smoke Control Ordinances - 1881.

CARB



Historical Air Pollution Events

- 1930 - Meuse Valley, Belgium.
  - 60 Dead and thousands sick.
- 1943 - Los Angeles, CA.
  - Visibility 3 Blocks. Numerous complaints watery eyes, nausea, & respiratory discomfort.
- 1948 - Donora, PA.
  - 20 People & 1,000's animals dead, 6,000 ill.
- 1930 - London, England.
  - Killer Fog: 4,000 dead.

 CARB

Historical Air Pollution Events

CARB

Los Angeles 1943 Historical Event

- 1943 - Visibility 3 blocks.
  - Numerous complaints of vomiting, watery eyes, nausea, & respiratory discomfort.
- Cause: Butadiene Plant?
  - No, problem continued when shut-down.

CARB

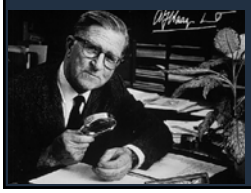
CA. Gov. Signs Air Pollution Law

CARB

Arie Haagen-Smit Discovers Ozone

- 1952: Major component of "smog" is ozone created by interaction of nitrogen oxides (combustion, cars, heaters, etc.) and hydrocarbons (evaporation from gasoline, solvents, drying of products such as paints, consumer products).
  - These two pollutants in the presence of sunlight (ultraviolet radiation) produce ground-level ozone.

CARB



Significant Legislative Events

CARB

Significant Legislative Events

- 1947: CA Air Pollution Control Act signed by Gov. E. Warren.
- 1959: Legislation established the ability for CA to develop ambient air standards and controls for motor vehicles.
- 1961: Auto emission control requirements.
- 1963: First Federal Clean Air Act.
- 1967: Gov. R. Reagan establishes Air Resources Board to coordinate CA air pollution activities.
- 1969: First CA Ambient Air Quality Standards.

CARB

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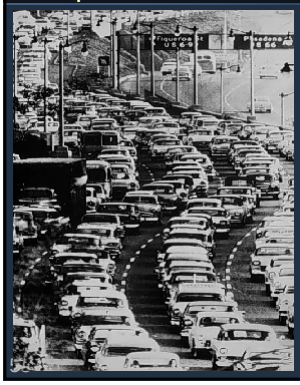
Population/Growth Overwhelm Controls



- During the 50's - 60's controls focused on obvious sources.
  - Backyard burning, incinerators, burning at dumps, factory emissions, auto technology.
- US electric trolleys replaced by buses.
- Interstate highways.

CARB

Federal/CA Clean Air Act

CARB

Federal/CA Clean Air Act

- The 70's and 80's environmental activism promotes legislation.
- 1970: Federal Clean Air Act.
- 1977: Federal Clean Air Act revision.
- 1987: California Clean Air Act.
- 1990: Federal Clean Air Act.

Current Cost/Effects: CA

- Health ($90M/yr):
  - Air pollution affects children, elderly, and all, including adults, who exercise.
  - Asthma, bronchitis, permanent lung damage: 10% lung loss in LA children by age 18 (morbidity autopsies); headaches, nausea, anemia, brain damage, reduced immunity, cancer, reproduction problems, birth defects, premature death.
- Agriculture ($700M/yr):
  - CA crop damage documented as early as 1948.
- Commercial loss ($?):
  - Ozone as an oxidizer.

CARB

Ambient Air Quality Standards

- Maximum acceptable average concentrations of an air pollutant during a specified period of time measured in parts per million (ppm).
- Ozone standards.
  - Fed: 0.08 ppm/8hr std; CA: 0.09 ppm/1hr std.
- Bad air day alerts; Smog Alerts (1 hr):
  - Health Advisory > 0.15 ppm.
  - Stage 1 > 0.20 ppm.
  - Stage 2 > 0.40 ppm.
  - Stage 3 > 0.50 ppm.