

# WORK GROUP

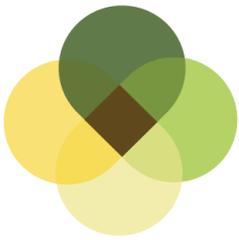
## Cumulative Impacts: Building a Scientific Foundation



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OEHHA

Cumulative Impacts &  
Precautionary Approaches Project

September 2, 2010



# Report Outline

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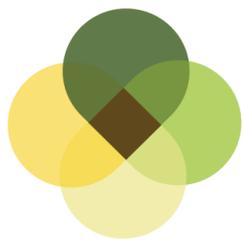
Chapter 1. Scientific Evidence for Disproportionate Cumulative Impacts

Chapter 2. Definitions and Terms

Chapter 3. A Scientific Screening Methodology for Analyzing Cumulative Impacts in Communities

Chapter 4. Cumulative Impacts in Environmental Decision-Making

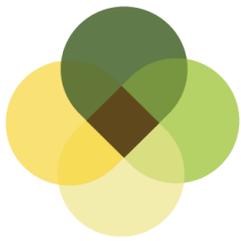
Chapter 5. Proposed Actions and Next Steps to Address Cumulative Impacts



# Chapter 1: Scientific Evidence for Disproportionate Cumulative Impacts

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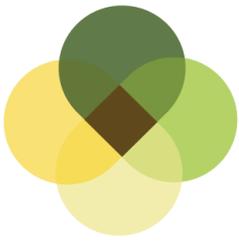
- Topics that form the scientific background for understanding cumulative impacts:
  1. Pollution and Public Health Effects
  2. Exposure Disparities and Environmental Conditions
  3. Sensitivity Due to Biological and Physiological Differences
  4. Sensitivity Due to Socially Derived Factors
  5. Health Disparities in Low Socioeconomic and Minority Populations



# Conclusions from Chapter 1

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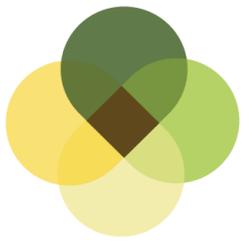
- ❑ Disparities in exposures and environmental conditions and are prevalent among different:
  - Racial and ethnic groups
  - Socioeconomic strata
- ❑ Scientific evidence suggests a role for pollutant-mediated diseases, particularly for low-income and minority populations.
- ❑ Certain populations may experience greater health effects from environmental pollutants due to population characteristics.



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# Chapter 1 Discussion

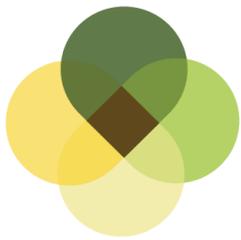
Scientific Evidence for  
Disproportionate  
Cumulative Impacts



## Chapter 2: Definitions and Terms

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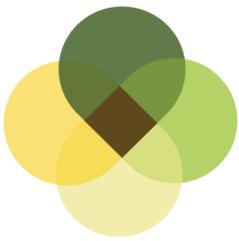
*"Cumulative impacts means **exposures, public health or environmental effects** from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts will take into account **sensitive populations and socio-economic factors**, where applicable, and to the extent data are available."*



# Burden of Pollution

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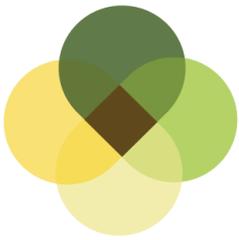
- **“Exposures”**: Contact with pollution can occur through inhalation, ingestion, and skin absorption.
  - *e.g.*, air pollutants
- **“Public health effects”**: Disease and other health conditions influenced by exposure to pollutants.
  - *e.g.*, asthma, lung cancer
- **“Environmental effects”**: Adverse environmental conditions caused by pollutants.
  - *e.g.*, hazardous waste and clean up sites



# Population Characteristics

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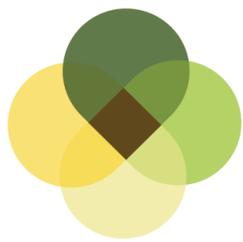
- **“Sensitive populations”**: Populations with biological traits that may magnify the effects of pollutant exposures.
  - *e.g.*, children, elderly
- **“Socioeconomic factors”**: Community characteristics that result in increased vulnerability to pollutants.
  - *e.g.*, income level, educational attainment



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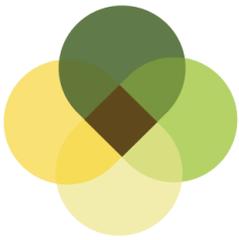
# Chapter 2 Discussion

## Definitions and Terms



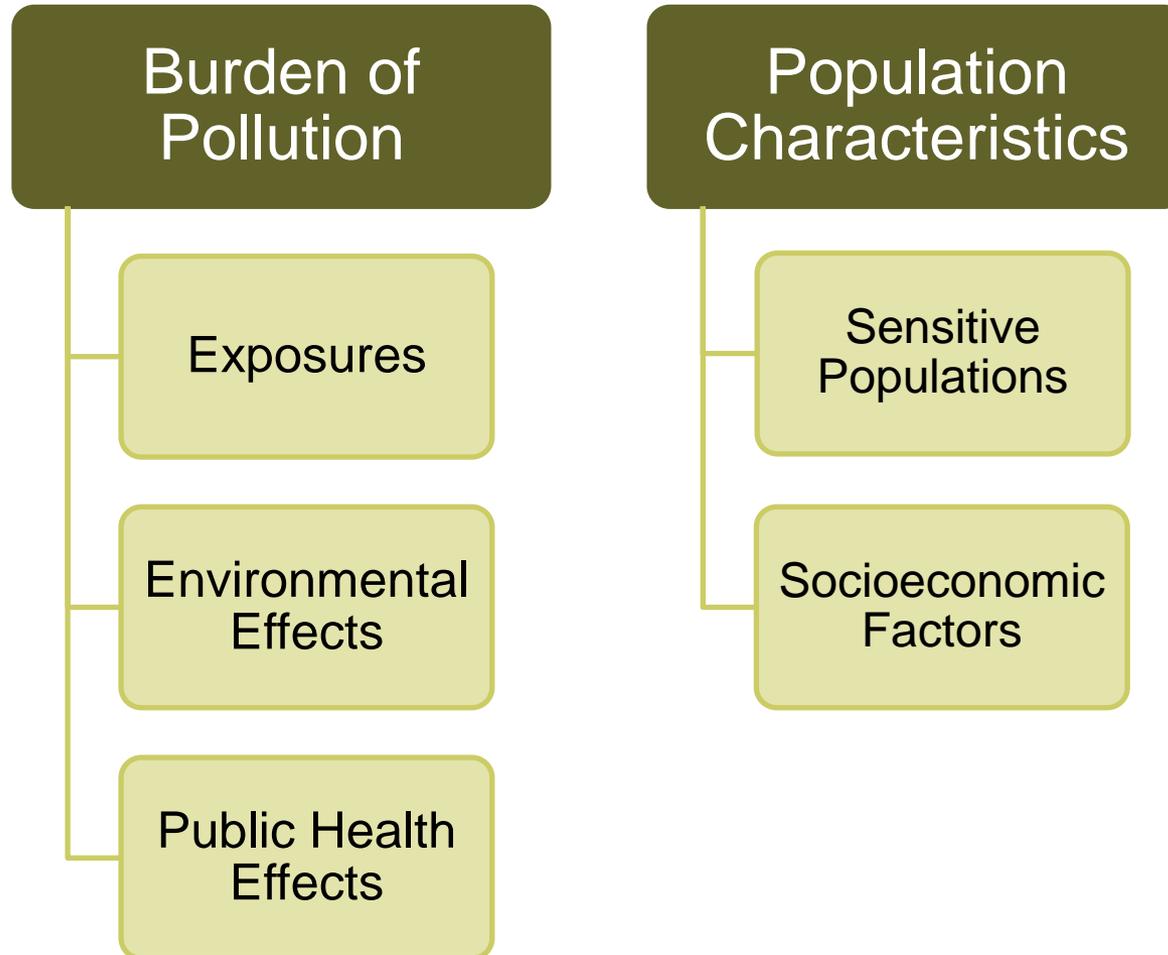
# Chapter 3: A Scientific Screening Methodology for Analyzing Cumulative Impacts in Communities

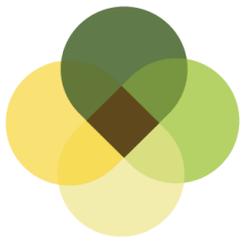
- Based on Work Group discussions, scientific research, and Agency needs.
- Identifies differences in cumulative impacts across different geographic areas that is:
  - Based on the cumulative impacts definition
  - Science-based
  - Simple and understandable
  - Multimedia
  - Incorporates population characteristics



# Components of Cumulative Impact

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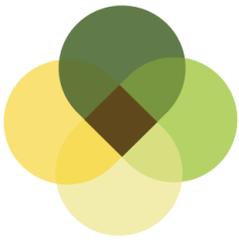




# Potential Indicators for Assessing Cumulative Impacts

Exposures	Environmental Effects	Public Health Effects	Sensitive Populations	Socio-economic Factors
<ul style="list-style-type: none"> <li>•PM 2.5 concentrations</li> <li>•Ozone concentrations</li> <li>•Toxic releases from industrial facilities</li> <li>•Traffic (vehicles per day)</li> </ul>	<ul style="list-style-type: none"> <li>•Hazardous waste &amp; clean-up sites</li> <li>•Leaking underground fuel tanks</li> </ul>	<ul style="list-style-type: none"> <li>•Low birth weight rate</li> <li>•Heart disease mortality rate</li> <li>•Cancer mortality rate</li> <li>•Asthma hospitalization rate</li> </ul>	<ul style="list-style-type: none"> <li>•Percent under age 5</li> <li>•Percent over age 65</li> </ul>	<ul style="list-style-type: none"> <li>•Percent non-white residents</li> <li>•Median household income</li> <li>•Percent residents below 2x national poverty level</li> </ul>

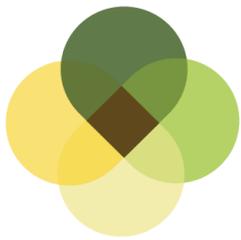
See Table 2 (p.33) of Report



# Scores for each Component

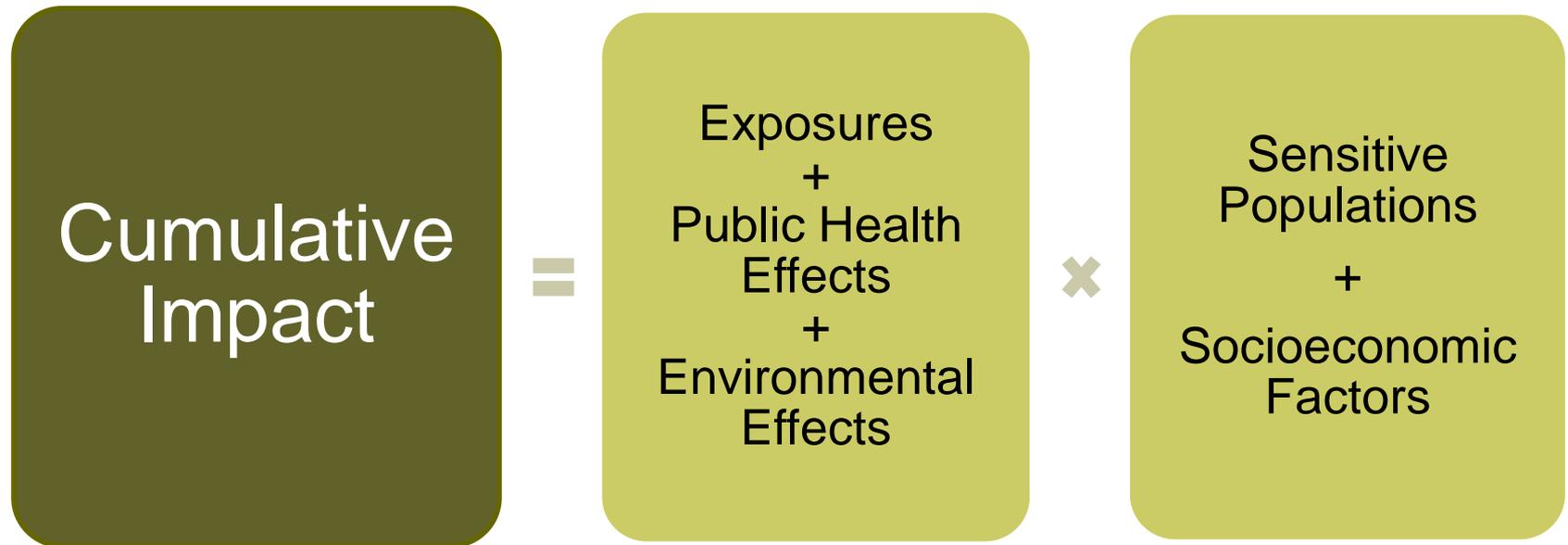
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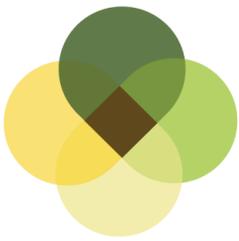
Component	Range of Possible Scores
Exposures	1-10
Environmental Effects	1-5
Public Health Effects	1-5
Sensitive Populations	1-3
Socioeconomic Factors	1-3
<b>Cumulative impact</b>	<b>6-120</b>



# Relationship

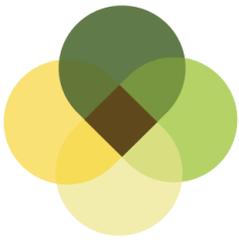
- *Cumulative impacts* need to take into account exposure and health impacts as well as sensitive populations and socioeconomic factors.





# Community Ranking Based on Cumulative Impact Scores

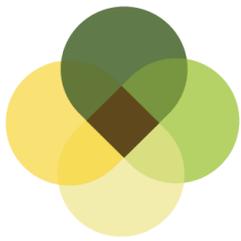
	Community																												
Component	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A A	B B	
Exposures	7	5	8	7	6	4	7	6	8	3	6	6	5	4	6	4	7	7	4	3	3	5	4	4	5	4	5	3	
Public Health Effects	5	5	5	3	4	5	3	5	3	4	3	4	3	3	1	3	3	2	3	2	2	4	3	2	2	1	1	2	
Environmental Effects	3	4	3	3	3	4	4	2	1	5	2	1	5	1	5	2	1	1	3	4	2	2	3	1	1	1	2	1	
Contributors to Burden	15	14	16	13	13	13	14	13	12	12	11	11	13	8	12	9	11	10	10	9	7	11	10	7	8	6	8	6	
Sensitive Populations	3	3	2	3	3	3	2	2	2	2	2	3	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	1	
Socioeconomic Factors	3	3	3	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2	2	3	1	1	2	1	2	1	2
Contributors to Sensitivity	6	6	5	6	6	6	5	5	5	5	5	5	4	6	4	5	4	4	4	4	4	5	3	3	4	3	4	3	3
Composite Score	90	84	80	78	78	78	70	65	60	60	55	55	52	48	48	45	44	40	40	36	35	33	30	28	24	24	24	18	



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# Chapter 3 Discussion

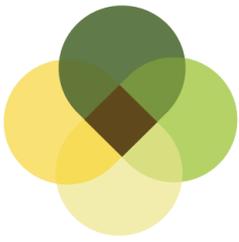
A Scientific Screening Methodology  
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# Chapter 4: Cumulative Impacts in Environmental Decision-Making

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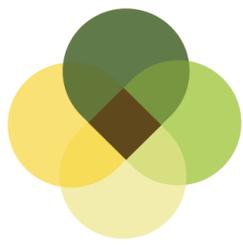
- Decision Making Activities at Cal/EPA:
  - Permitting
  - Site Clean-Ups
  - Enforcement
  - Environmental Monitoring
  - Risk Assessment & Standard-Setting
  - Financial Assistance
  - Education & Outreach



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# Chapter 4 Discussion

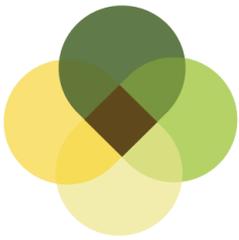
## Cumulative Impacts in Environmental-Decision Making



# Chapter 5: Proposed Actions and Next Steps to Address Cumulative Impacts

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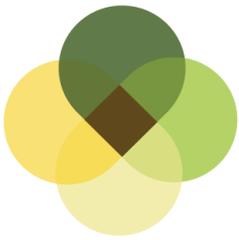
- Cumulative impact guidelines
- Methodology for a more comprehensive analysis
- Data



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# Chapter 5 Discussion

Proposed Actions and Next Steps to  
Address Cumulative Impacts



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# PUBLIC COMMENT

