The National Environmental Justice Advisory Council's Report on Environmental Justice and Cumulative Risks and Impacts

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A Bias for Action

"I am sick and tired of being sick and tired."

This poignant plea for assistance has been voiced at every single meeting of the National Environmental Justice Advisory Council (NEJAC) and echoed by numerous environmentally overburdened people of color, low-income, and tribal communities throughout the nation. This plea reflects profound disappointment in such communities with the status of their health, frustration with the public health community's failure to assist in improving health, anger over the unresponsiveness of many businesses complacent with the adequacy of their regulatory obligations and unresponsive to the health problems their neighbors face, and bewilderment at the government's failure to understand and correct these shortcomings. Communities richly understand the degree to which they are burdened, yet find the government unwilling to seek their counsel and to provide the resources needed for communities to exercise their full voice in regulatory decisions that impact their lives. For many communities facing stresses from factors beyond their control, living with a myriad of polluting facilities, this affront is compounded by the impacts of racial and economic discrimination.

Multiple, Aggregate, and Cumulative Risks and Impacts in the Mississippi River Industrial Corridor

Demographics	Pollution Sources	Existing Health Problems & Conditions	Unique Exposure Pathways	Social/Cultural Conditions	Community Capacity & Infrastructure/ Social Capital
• African American: 63% • Caucasian: 35% • Asian: 3%	• Petrochemical facilities • Refineries • Wastewater treatment facilities not meeting permit limits and bypassing raw sewage due to under capacity • Drinking water taken from Mississippi River • Toxic organics, pesticides, and heavy metals in drinking water • Atrazine from Midwest agricultural fields present year round in raw and finished water • Pesticides, herbicides, and fertilizers applied to sugar cane crops • Aerial and tractor application drifts on to adjacent residential areas and school yards • Burning sugar cane during fall harvest season results in particulate matter and pesticides being dispersed into the air for 1/3 of the year	• Asthma • Respiratory distress • Skin rashes • High rate of a large variety of cancers • Lack of access to health care • Lack of trained environmental health physicians	Air: • Industrial facilities: semi-volatile and volatile organics, dioxins, pesticides and herbicides, toxic heavy metals, and smoke from sugar cane burning Water: • Drinking water contaminated • Surface water contaminated with industrial and agricultural chemicals and partially-treated waste water • Contaminated crops • Contaminated terrestrial game species • Seafood contaminated with pesticides, industrial chemicals, mercury from chlor-alkali facilities by way of air deposition.	• Very poor/ minority communities • Live off land and gardens contaminated with air deposited chemicals • Hunting and fishing of contaminated organisms • Generations have lived off the land and not profited by industrial development in the area.	• Good infrastructure in areas of low-income communities of color with respect to roads and rail; the industry needs these items. • Poor infrastructure within the communities: poor road conditions, improper drainage, waste water collection and treatment system inadequate. • Very little to no social capital: education system very minimal; the area was impacted by white flight; primarily African Americans attend the public schools.

Multiple, Aggregate, and Cumulative Risks and Impacts in Four Corners, St. Mary's Parish, Louisiana

DEMOGRAPHICS	POLLUTION SOURCES	EXISTING HEALTH PROBLEMS AND CONDITIONS	UNIQUE EXPOSURE PATHWAYS	SOCIAL/ CULTURAL CONDITIONS	COMMUNITY CAPACITY AND INFRASTRUCTURE/ SOCIAL CAPITAL	ACTIONS TAKEN TO ADDRESS ISSUES
Total Population: 600 people living in 250 dwellings $ African American: 90% $ Cajun: 10%	$ Carbon Black Manufacturing Industrial facilities: air emissions of particulate and toxic organic chemicals $ Strategic Petroleum Reserve: storage of crude oil in a salt dome to provide back up source of crude oil in times of oil embargoes; emissions of benzene into the air, and contamination of ground water with crude oil and brine $ Coastal Drug Surveillance Blimp for the Gulf of Mexico: B light, noise, organic vapors, and fright pollution associated with Blimp operations. The Blimp has crashed into the community 3 times. $ Public drinking water source originating from a sole source groundwater aquifer-contaminated with heavy metals and bacteria $ Aerial and tractor applications of pesticides, herbicides, and fertilizers to sugar cane crops adjacent to residential dwellings $ Insecticides sprayed into the air to counteract mosquito population $ Hazardous waste sites located within the community	$ Lack of access to rural health clinics. Closest clinic is located 6 miles away with no mechanism for transportation to the clinic $ High incidence of lupus, cancer, hyper-tension, and diabetes $ Children with ADD $ Genetic defects	**Air** $ Agricultural pesticides, herbicides, and fertilizers applied by spray planes and tractors $ Industrial air emissions $ Smoke from burning of sugar cane fields **Water** $ Contaminated drinking water $ Surface water contaminated with nutrients, fertilizers and pesticides $ Contaminated crops, fish and game species $ High incidence of mosquito born diseases $ Hurricane damage to housing structures, water, and waste water infrastructure, resulting in contamination of community members	$ Large percentage of population in poor health $ Community living in extreme poverty $ Aging population due to young working-age population moving away from the community, older members remaining $ Population isolated from jobs, services and social infrastructure $ Substandard housing-no insulation, lack of structural integrity, poor wiring, leaking plumbing, septic tanks not functioning, raw sewage flowing under homes and into ditches, and out houses and outdoor plumbing. Greater than 90% of roofs leak due to hurricane damage. $ Lack of insurance coverage of homes due to high cost of insurance and lack of companies willing to insure homes in the area. $ Large portion of population on welfare and food stamps. $ Restrictions placed on Medicare and Medicaid benefits reduce already limited access to health care $ High unemployment rate: 25 to 30% of people of employment age unable to find substantial employment $ Devastation of male population due to drugs: in jail or killed $ Women are the most employed members of the community $ Diminished quality of life	$ Lack of jobs $ Large drug problem $ High crime rate due to drug situation $ Lack of schools in the community, closest school 6 miles away with limited bus service and lack of sidewalks for foot access. Homeowners lack adequate number of vehicles to transport students to school. $ Lack of business servicing the community. Businesses limited to one small store, one Laundromat and one car wash. $ Community members hunt deer and rabbits and fish in local streams and ponds to provide food to their families. The fish and game are contaminated by toxic chemicals. $ Vegetable gardens are impacted by chemicals sprayed on the agricultural crops. $ Very limited social capital, poor educational system, and low level of income.	$ Self Help Housing Initiative: 250 homes brought up to standard; 60 to 70 homes gutted and rebuilt $ Bank partners and support of Self Help Association resulted in $10 million in guaranteed loans over 10 years for community home improvements. No defaults on any of the loans $ Community Development Center: constructed, equipped and provided skills training and capacity building workshops for community members $ Lockett Mini Mall: Assisted in economic development in the community which resulted in a mini mall containing 7 businesses that provide services to the community $ Caribbean Winds Subdivision: Developed a subdivision for construction of affordable housing $ Improved quality of drinking water and waste water collection and treatment systems $ Conducted Health Fairs in the community $ Provided environmental workshops focused on community-specific environmental issues $ Conducted Leadership Development workshops designed specifically for the community $ Developed a Skills Transfer Center to teach community members home improvement techniques $ Scholarship Program to assist community members attend college. The program resulted in two teachers (who teach community members), two medical doctors, and a social worker $ Increased Community involvement: Community members serve on: School Board, Water Board , Sewer Board, Recreational Boards. Initiated a charter school $ Community members take pride in their community. There is an increased sense of unity: $ Flourishing businesses $ Improved esthetics in community $ Fewer teenage girls pregnant $ Recognition of progress of community involvement by national media, encouraged community members to want to do additional work in their community to further improve the conditions in their community $ Community based initiatives initiated and performed primarily by the female members of the community

Multiple, Aggregate, and Cumulative Risks and Impacts Among the Vietnamese Fisherman Community in Louisiana

DEMOGRAPHICS	POLLUTION SOURCES	EXISTING HEALTH PROBLEMS AND CONDITIONS	UNIQUE EXPOSURE PATHWAYS	SOCIAL/CULTURAL CONDITIONS	COMMUNITY CAPACITY AND INFRASTRUCTURE/ SOCIAL CAPITAL
Vietnamese: 100 % $ Read and write English/Non-English speaking: 95% $ English Speaking: 5%	$ Commercial hazardous waste incinerator, imported hazardous waste from across the US and foreign countries $ Large number of hazardous and waste dump sites in the residential areas $ Surface water drinking water source contaminated with organic toxins and heavy metals from upstream industrial and agricultural sources $ Agricultural fields sprayed with pesticides, herbicides and fertilizers. $ Application by airplanes and tractors. $ Burning of agricultural fields and marsh ecosystem $ Improper sewage and sanitary infrastructure in community B Raw sewage flowing in ditches	$ Lack of proper nutrition due to long periods of time on fishing boats $ Lack of access to proper health care and lack of medical insurance $ Drug addiction $ Alcoholism $ Medical conditions consisting of cancer, respiratory diseases, skin rashes, asthma, and frequent bacterial infections	**Air** $ Air emissions of hazardous chemicals from the hazardous waste incinerator $ Burning of the agricultural fields and marshes releasing toxic chemicals and particulate matter into the air $ Drift of pesticides and herbicides from agricultural spraying **Water** $ Contaminated drinking water sources $ Contaminated food resources-garden crops, terrestrial animals, aquatic species	$ Vietnamese fishing community must compete with white fishermen from Louisiana and Texas. The Vietnamese are discriminated against by the seafood processors. $ Large investment in boats; unable to make payments due to dumping of foreign imports of seafood. Banks are repossessing boats $ If the community members cannot fish, there is no way to make a living and remain together as a society $ Live in clusters and small towns with their life centered around their churches with the priests serving in community leadership roles $ Community members are hard workers and willing to work under substandard conditions $ Low economic conditions and hard life takes its toll on the fishers and their families even in good times $ Fishing trips require the men to be away from their families for 2 to 3 weeks at a time $ Lack of environmental/biological diversity awareness $ Lack of technical assistance to identify and apply for assistance resources	$ Substandard housing $ Many generations living in single dwellings $ Children perform well in school and provide assistance to adults. Deep respect on the part of the younger generations for the elders. $ Lack of social capital $ Lack of economic capital $ Lack of medical insurance $ Lack of adequate processing plants for harvested seafood $ Lack of financial resources to capitalize investments $ Lack of infrastructure to ensure ability to sell harvested seafood $ Severely impacted by the dumping of foreign seafood on U.S. markets

Multiple, Aggregate, and Cumulative Risks and Impacts in Kelly AFB, San Antonio, Texas

DEMOGRAPHICS	POLLUTION SOURCES	EXISTING HEALTH PROBLEMS AND CONDITIONS	UNIQUE EXPOSURE PATHWAYS	SOCIAL/CULTURAL CONDITIONS	COMMUNITY CAPACITY AND INFRASTRUCTURE/ SOCIAL CAPITAL

$ Hispanic/Mexican-Americans: 94%
$ Mexican-Americans living within 1 mile radius of Kelly AFB: 100%
	$ Contaminates from Kelly AFB-spills, releases associated with facility operations, and leaking waste lines, storage tanks, waste pits, and landfills. Contaminants include solvents, fuels, organic chemicals, chlorinated solvents such as *Tetrachloroethene(PCE), Trichloroethene(TCE), DCE, and Vinyl Chloride, Benzene, Chlorobenzene, Arsenic, Chromium, Thallium*, and radiological contaminants such as *Radium 226*.
	$ Contaminated groundwater plume 4 miles off site covering 12 squ. miles of residential neighborhood east of Kelly AFB. The plume of polychlorinated organic chemicals underlies 20,000 homes many of which have or had ground water wells located in the contaminated aquifer. The contaminated shallow alluvial aquifer served base housing, operations, industrial processes as well as once was a major source of drinking water in the residential areas around Kelly AFB. The deeper Edwards aquifer also is contaminated by chemicals from Kelly AFB.
	$ Surface water streams are contaminated by contaminated groundwater seeps. The sediment, water and aquatic organisms in the streams are contaminated.
	$ The soil is contaminated with lead, heavy metals, and volatile organic chemicals.
	$ Soil gases are contaminated with chemicals that have migrated from Kelly AFB and are released in to the air of the community.
	$ Other sources of contamination:
	B auto repair shops
	B dry cleaners
	B paint shops
	B railroads
		$ Leukemia
		$ Lupus
		$ Cancer
		$ Over 130 cases of ALS in Kelly AFB workers
		$ Miscarriages
		$ Central nervous system disorders
		$ Immune system disorders
		$ Liver problems
		$ High rate of asthma
		$ High rate of birth defects
		$ Bone and muscle problems
		$ Headaches
		$ Fatigue
		$ Dizziness
		$ Learning disorders
		$ Skin disorders and rashes
		$ Respiratory illnesses
		$ Nose bleeds
		$ Children and adults suffer from multiple health problems
			Air
			$ Fuel emissions from tank farms Chemicals from industrial area flight lines Fugitive emissions from Kelly AFB operations
			$ Jettisoning of fuel by aircraft landing at Kelly AFB
			$ Jet fuel exhaust from air planes
			$ Jet fuel spills
			$ Ground Contaminants off gassing into the air
			$ Volatile organic chemicals contaminating soils venting into the air from the soil
			
			Water
			$ Chlorinated organic chemicals in the ground water plume
			$ extending four miles off the base
			$ Contaminated groundwater seeping into surface water
			$ bodies Off base residential community exposed to direct contact
			$ and inhalation of VOCs during showering, and other used of contaminated water.
			$ Migration of VOCs from ground water into buildings and homes
			
			Noise
			$ Engine runup maintenance operations
			$ Plane take off and landing paths directly over community
			$ Fruits and garden produce contaminated in residential yards
			$ Chemical paint stripping operations caused negative health effects on workers at Kelly AFB
				$ Population is family-oriented and consists of a stable population
				$ 40% of households are linguistically isolated
				$ 55% of households have children under the age of 18
				$ 54% of the families are one-parent families
				$ 36% of families are not in the labor force
				$ 26 to 39% of the families are living below the poverty level. There is a lack of access to health care and medical professionals trained to treat chemical related illnesses and conditions
				$ Lack of meaningful and accessible employment
				$ Information frequently not translated into Spanish, not readily available and not presented in formats understandable to all community members
				$ Educational system not designed to meet the needs of the Hispanic population and learning disabled children
				$ Property values depressed due to close proximity to contaminants
					$ Community needs assistance in obtaining health solutions to illnesses associated with contaminants (workers and community residents)
					$ Need for health clinics, chemical specific health screening and medical professionals educated on health impacts associated with chemicals contaminants associated with Kelly AFB
					$ Community attempting to get cleanup inside and outside of Kelly AFB
					$ Process to insure voices of community are heard and community involvement made a part of the decision making processes
					$ Revitalization and community development inside and outside Kelly AFB that is appropriate for local community needs and with community input and involvement
					$ Better paying jobs and jobs designed to fit the community needs
					$ Technical job training programs
					$ Improve transportation system to better service the community
					$ Improve methods of communication to educate and inform all segments of the population

Multiple, Aggregate, and Cumulative Risks and Impacts at Tar Creek Superfund Site, Oklahoma

DEMOGRAPHICS	POLLUTION SOURCES	EXISTING HEALTH PROBLEMS AND CONDITIONS	UNIQUE EXPOSURE PATHWAYS	SOCIAL/CULTURAL CONDITIONS	COMMUNITY CAPACITY AND INFRASTRUCTURE/ SOCIAL CAPITAL
$ Native American 25% • Hispanic 7% • Anglo 66% • African-American 1% • Other 1% • Mean Annual Income $16,000	$ Largest lead and zinc mine in the United States. 40 sq. mi. are affected by acid mine drainage which has contaminated surface and ground water $ Soil in residential and school yards are contaminated with heavy metals $ Toxic heavy metals contaminate dust which blows throughout the area $ Radon gas is released from mine tailings $ Stockpiles of large mountains of mine tailings are dispersed by the strong Oklahoma winds $ Flotation Ponds contain residual contaminated fine particles of mine waste $ B. F. Goodrich chemical plant releases large quantities of benzene $ Boat manufacturers release styrene into the air and water $ Mushroom cultivation releases hydrogen sulfide, molds and mushroom spores $ Pesticides, herbicides and fertilizers used on agricultural crops of wheat, soybeans, hay and maize are released into the environment. $ Public water supplies are contaminated by acid mine waste	$ Lung Cancer $ Hypertension $ Silicosis $ Muscle damage $ Skin Cancer $ Pulmonary emphysema $ Liver Cancer $ Thyroid conditions $ Prostate Cancer $ Nausea $ Testicular Cancer $ Vomiting $ Parkinson-s Disease $ Seizures $ ADHD $ Mental Retardation $ Leukemia $ Alzheimer's $ Strokes $ Learning difficulties $ Heart Disease $ 48%of the population has diabetes $ Elevated blood lead levels in adults as well as children	**AIR** $ Toxic heavy metals contaminated mine tailings dust has been and is being blown and spread through out the area. Contaminants are located in soil in yards, schools, parks, pasture and croplands, marshland wetlands, and inside of homes, buildings and schools. The mine tailings are contaminated with arsenic, cadmium, manganese, zinc, lead, mercury, iron, chromium, and silica $ Emissions from industrial facilities release benzene and styrene into the air $ Emissions from mushroom cultivation releases hydrogen sulfide $ Crushed mine waste consisting of sharp edged particles damage respiratory tissue when inhaled **SOIL** $ Contaminated mine waste has been used as fill material under and around houses and buildings $ Mine tailings have been dispersed throughout the area and contaminated soils and sediments **WATER** $ Surface and ground water are contaminated by acid mine drainage. The contaminants have impacted municipal drinking water sources and surface water drainage systems $ Waste water discharges into Tar Creek result in 13 tons of heavy metals being discharged on a daily basis **FOOD** $ Fish advisories warn of heavy metal contaminated fish Contaminated fish species serve as subsistence food sources and are used in tribal ceremonies $ Native pecan and walnut crops along the Tar Creek flood plain are contaminated by mine tailing heavy metals $ Garden crops are contaminated by toxic heavy metals from mine tailings $ Wild onions and other native species are used in ceremonial activities and are contaminated with cadmium $ Black berries are gathered and deer are hunted by the Native American community members, both are contaminated by mine waste heavy metals	$ Very poor Native American and other minority populations $ Subsistence fishers, gatherers and hunters $ Organisms and vegetation contaminated by heavy metals from mine waste $ Community members hunt and consume deer contaminated by mine waste $ Cattle are grazed in areas contaminated by mine tailings. Contaminated meat and milk are consumed by the community $ Cultural ceremonies depend on contaminated plants and animal species which add to the body burden of community members $ Inadequate social and financial resources to address the wide spread health related issues and environmental impacts associated with contamination from the Tar Creek site	$ Portions of towns are built over mined areas. Cave-ins make community members live in fear and have severe impacts on infrastructure $ A number of communities want to be bought out and relocated to escape the impacts of the mine contaminants $ The most vocal communities wanting to be relocated are those with multiple exposures to the contaminants $ Lack of adequate access to health care and medical professionals equipped to deal with medical conditions associated with environmental contaminants $ Lack of adequate testing of community members to determine the extent of human body contamination and potential to transmit contaminants to the fetus and nursing babies $ Inadequate evaluation of the extent of contamination in the wide variety of impacted environmental media. Information is critical to initiate protective measurers as well as develop strategies to control and contain contaminants

Defining the Issue

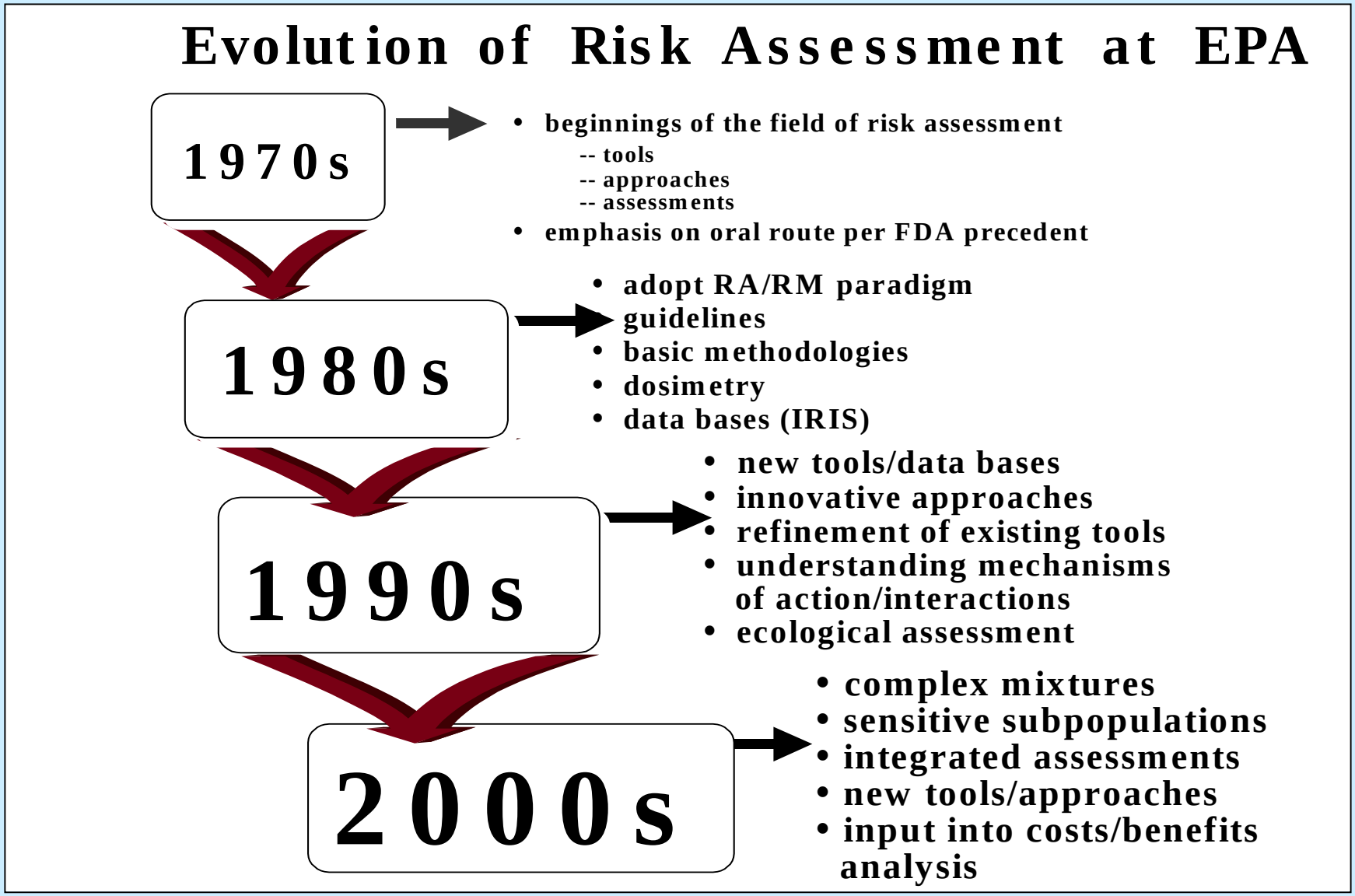
Multiple Stressors

- Need common definition of cumulative risks and impacts
- Critical for process dependent in long run on coherence, consistency and transparency
- Most risk assessors see definition as quantitative (or in some cases qualitative) result of completed assessment
- Most members of public see term to mean multiple stressors coexisting concurrently and geographically
- Bias for action very difficult without having of common starting for dialogue, which has to be multiple stressors

Multiple Media

- Agency activities based upon individual legislation, leading to programmatic and regulatory fragmentation
- Problem especially egregious for disadvantaged, under-served, and environmentally overburdened communities
- Comprehensive, unified, multi-media approaches and efforts are critical to addressing cumulative risks and impacts

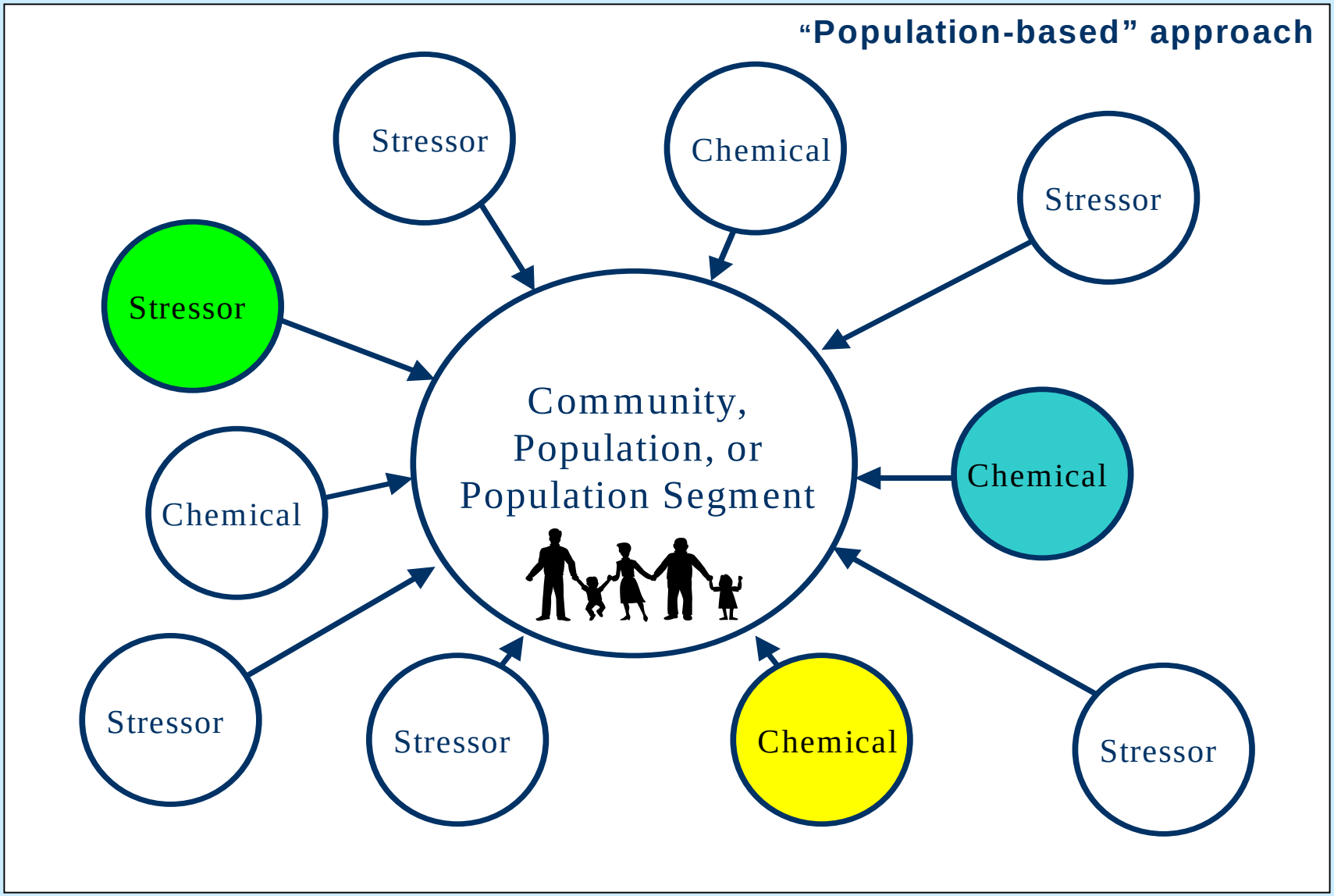
EPA Framework for Cumulative Risk Assessment



EPA Framework for Cumulative Risk Assessment

- Takes broad view of risk
- Utilizes population-based & place-based analysis
- Promotes comprehensive & integrated assessment of risk
- Involves multiple stressors (chemical & non-chemical)
- Posited expanded definition of vulnerability to include biological & social factors
- Places premium on community involvement & partnerships
- Emphasizes planning, scoping & problem formulation
- Links risk assessment to risk management in context of community health goals

EPA Framework for Cumulative Risk Assessment



NEJAC's Core Response to EPA Charge:

Adopt a Community-Based Collaborative Problem Solving Model to address Cumulative Risks and Impacts

- **Best way to operationalize concepts of EPA *Framework for Cumulative Risk* in "real life" context of environmental justice issues**
- **Fastest & surest way to secure tangible & sustainable risk reduction**
- **Reflects a bias for action**

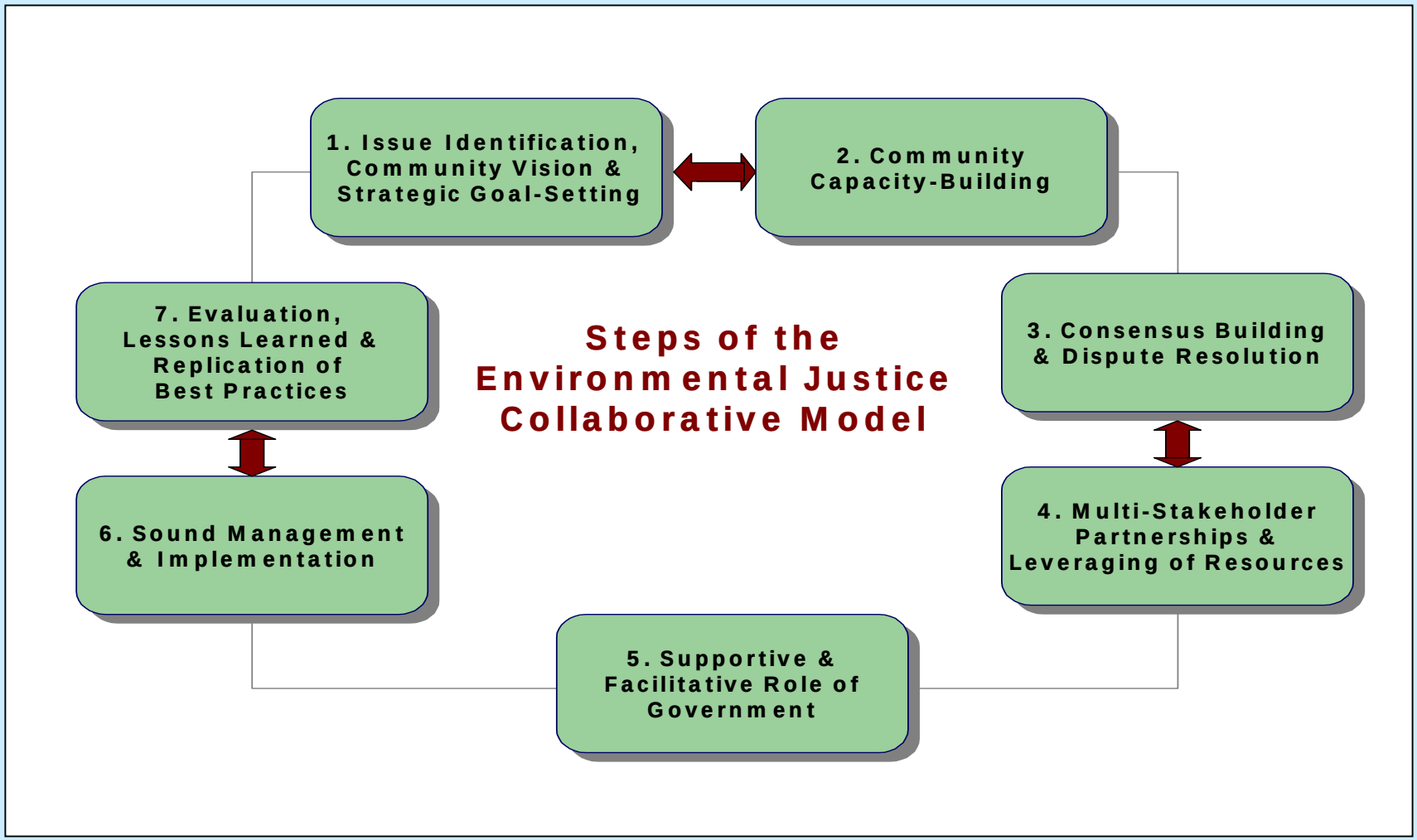
NEJAC's Core Response to EPA Charge:

Adopt a Community-Based Collaborative Problem Solving Model to address Cumulative Risks and Impacts

- **Address multiple stressors**
- **Create transparent process that instills confidence, trust, & social capital**
- **Institutionalize a bias for action**
- **Develop coherent & consistent framework**
- **Address issues of vulnerability**
- **Utilize screening, targeting and prioritization methods/tools**
- **Bring about significant risk reduction**
- **Employ regulatory authorities to bring recalcitrant parties to the table**

NEJAC's Core Response to EPA Charge:

Adopt a Community-Based Collaborative Problem Solving Model to address Cumulative Risks and Impacts



Key Concept: Community-Based Participatory Research

- Promotes active collaboration and participation at every stage of research
- Foster co-learning
- Ensures projects are community-driven
- Disseminates results in useful terms
- Ensures research and intervention strategies are culturally appropriate
- Defines community as a unit of identity

Key Concept: Qualitative Analysis

Primary Methods of Qualitative Analysis:

- **Questionnaires, interviews, and panels**
- **Checklists**
- **Matrices**
- **Networks and system diagrams**
- **Modeling**
- **Trends analysis**
- **Overlay mapping and GIS**

White House Council of Environmental Quality, "Considering Cumulative Effects Under the National Environmental Policy Act"

Key Concept: Vulnerability

The concept of **vulnerability** goes to the heart of the meaning of environmental justice. Vulnerability recognizes that disadvantaged, underserved, and overburdened communities come to the table with pre-existing deficits of both a physical and social nature that make the effects of environmental pollution more, and in some cases unacceptably, burdensome. As such, the concept of vulnerability fundamentally differentiates disadvantaged, underserved, and overburdened communities from healthy and sustainable communities. Moreover, it provides the added dimension of considering the nature of the receptor population when defining disproportionate risks or impacts.

Key Concept: Vulnerability

- Susceptibility/Sensitivity
- Differential Exposure
- Differential Preparedness
- Differential Ability to Recover

Key Concept: Vulnerability

Social Factors and Vulnerability:

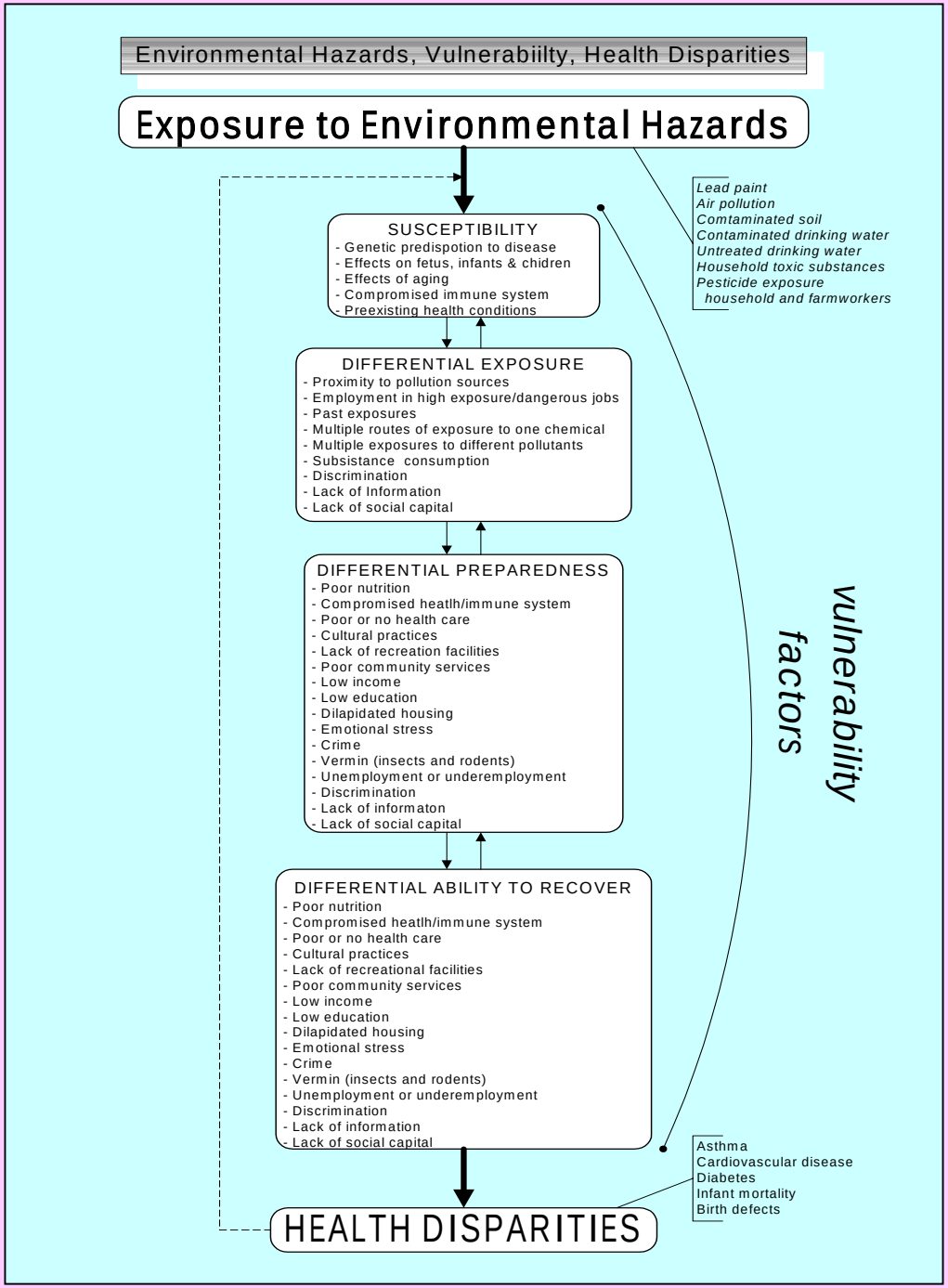
Social, economic, and cultural factors can play a role with respect to differential exposure. An intriguing example of a lessened ability to prevent environmental insult and resulting exposure is found in the research of Professor Manuel Pastor, Jr. and his colleagues. They found a strong correlation between periods of greatest community demographic change and the introduction of noxious land uses. It is surmised that this is a period when the community's social capital, in terms of stable leaders, networks, and institutions, is perhaps lowest. Pastor's colleagues coined a term to describe this phenomenon, i.e., "ethnic churning."

Clearly, social factors, including but not limited to income, employment status, access to insurance, discrimination in the health care system, language ability, and the existence of social capital, can play an important role in determining the ability to prevent, withstand, or recover from environmental insults. Last, isolation, whether economic, racial, linguistic, or otherwise, leads to less connections, less access to information or influence, and, thus, less ability to prevent, withstand, or recover from environmental stressors. Indices which measure such isolation, such as dissimilarity indexes, may be useful in this area.

Key Concept: Vulnerability

Vulnerability and Health Disparities:

This formal definition of vulnerability takes on new meaning when looked at within the context of a community and provides a framework for understanding how a disadvantaged community faces greater impacts from pollution than the general population. As already illustrated, linking vulnerability with the concept of health disparities can produce a very powerful analytical tool. Vulnerability and health disparities are integrally related concepts, and in some ways, **health disparities are both an outcome of and a contributor to vulnerability**. Greater vulnerability of individuals to a stressor can result in health disparities to an entire community. For example, if an entire community receives higher exposure to a single or multiple pollutants, this may result in the community having a higher incidence of disease, such as asthma or cardiovascular disease, resulting in a health disparity. If these same individuals are also more susceptible to a stressor, are in poor health to begin with and do not receive proper medical attention, the potential for health disparities and the magnitude of the disparities from the higher exposure increases. Once a community shows disparities in various diseases, the community members have a compromised state of health, the community is more vulnerable. This cycle of multiple exposures coupled with vulnerability can lead to a downward health spiral to greater disparities.


Environmental Hazards, Vulnerabiilty, Health Disparities
Exposure to Environmental Hazards
Lead paint
Air pollution
Comtaminated soil
Contaminated drinking water
Untreated drinking water
Household toxic substances
Pesticide exposure
household and farmworkers
SUSCEPTIBILITY
- Genetic predispotion to disease
- Effects on fetus, infants & chidren
- Effects of aging
- Compromised immune system
- Preexisting health conditions
DIFFERENTIAL EXPOSURE
- Proximity to pollution sources
- Employment in high exposure/dangerous jobs
- Past exposures
- Multiple routes of exposure to one chemical
- Multiple exposures to different pollutants
- Subsistance consumption
- Discrimination
- Lack of Information
- Lack of social capital
DIFFERENTIAL PREPAREDNESS
- Poor nutrition
- Compromised heatlh/immune system
- Poor or no health care
- Cultural practices
- Lack of recreation facilities
- Poor community services
- Low income
- Low education
- Dilapidated housing
- Emotional stress
- Crime
- Vermin (insects and rodents)
- Unemployment or underemployment
- Discrimination
- Lack of informaton
- Lack of social capital
DIFFERENTIAL ABILITY TO RECOVER
- Poor nutrition
- Compromised heatlh/immune system
- Poor or no health care
- Cultural practices
- Lack of recreational facilities
- Poor community services
- Low income
- Low education
- Dilapidated housing
- Emotional stress
- Crime
- Vermin (insects and rodents)
- Unemployment or underemployment
- Discrimination
- Lack of information
- Lack of social capital
vulnerability factors
Asthma
Cardiovascular disease
Diabetes
Infant mortality
Birth defects
HEALTH DISPARITIES

Overaching Themes

- **Theme #1: To institutionalize a bias for action within EPA through widespread utilization of an Environmental Justice Collaborative Problem-Solving Model.**

- **Theme #2: To fully utilize existing statutory authorities.**

Overarching Themes

- **Theme #3: To address and overcome programmatic and regulatory fragmentation within the nation's environmental protection regime.**

- **Theme #4: To fully incorporate the concept of vulnerability, especially its social and cultural aspects, into EPA's strategic plans and research agendas.**

Overarching Themes

- **Theme #5: To promote a paradigm shift to community-based approaches, particularly community-based participatory research and intervention.**

- **Theme #6: To incorporate social, economic, cultural and community health factors, particularly those involving vulnerability, in EPA decision-making.**

Overarching Themes

- **Theme #7: To develop and implement efficient screening, targeting, and prioritization methods/tools to identify communities needing immediate intervention.**

- **Theme #8: To address capacity and resource issues (human, organizational, technical and financial) within EPA and the states, within impacted communities and tribes, and among all relevant stakeholders.**