Communication and Enforcement of Scientific Outcomes among Vulnerable Communities: An Environmental Justice's Perspective in North Charleston Neck Communities, South Carolina

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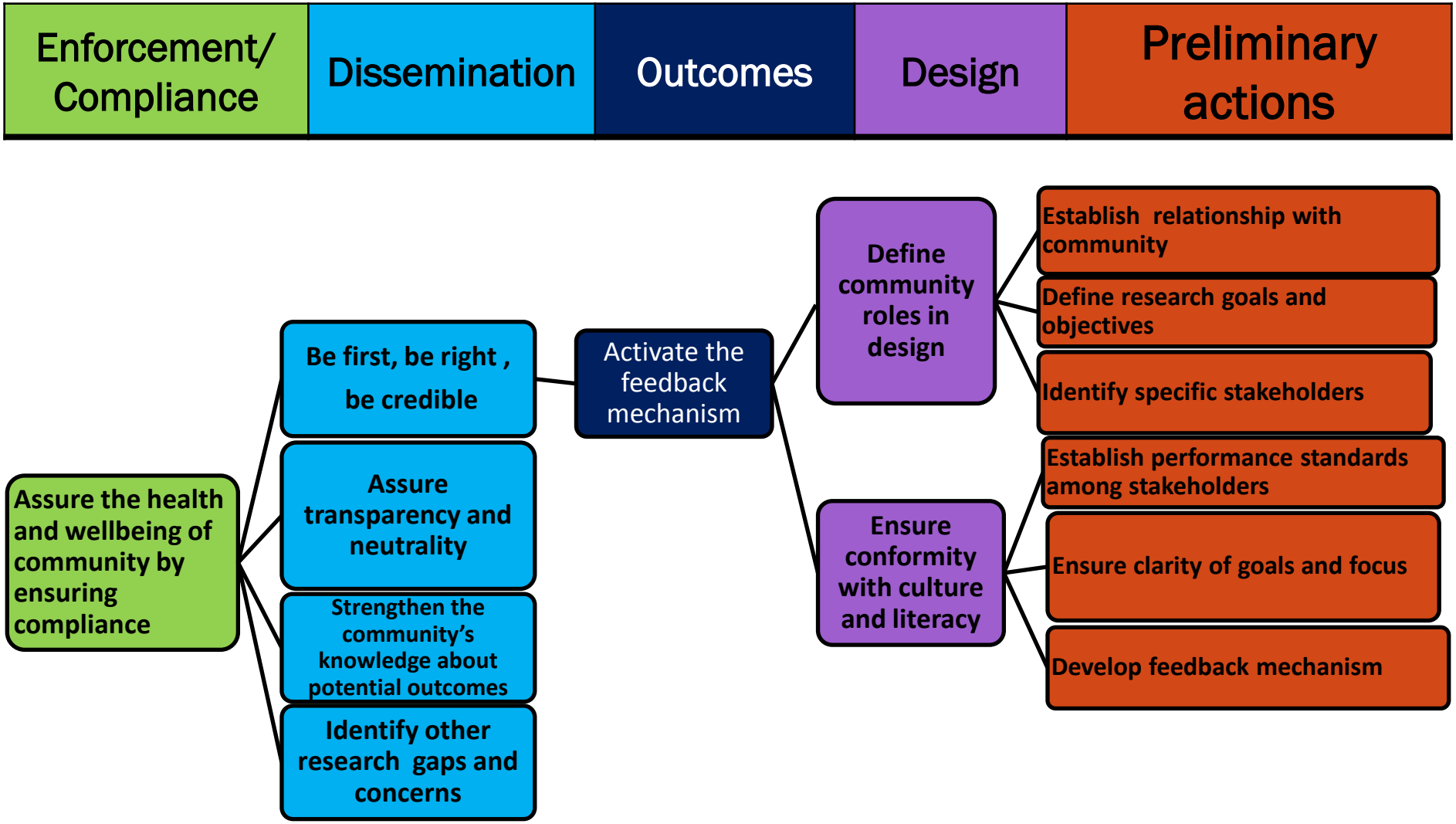
OVERVIEW

- Background
- Significance
- Objectives
- Design
- Findings
- Potential impacts
- Communication of outcomes
- Barriers to effective dissemination
- Model for enforcement of outcomes and community participation

MODEL FOR ENFORCEMENT OF OUTCOMES AND COMMUNITY PARTICIPATION



BACKGROUND

- The Charleston Metropolitan Statistical Area (MSA) is one of the largest industrialized port cities in the nation
- Median household income ($52,302) and many residents live in poverty (14%)
- Children account for 19% and the elderly 12%. Unmarried women (33%) and family households (11%) earned income below the poverty line
- In North Charleston, Median household income ($36,461)
- Children (39%) and female headed households (43%) live below the poverty line
- Residents are differentially burdened by port activities, diesel truck traffic, an incinerator, Superfund sites, leaking underground storage tanks, TRI facilities and other environmental hazards

SIGNIFICANCE

- The port of Charleston, one of the busiest US ports, currently operates five terminals (North Charleston, Wando Welch, Veterans, Columbus Street and Union Pier)
- SC Ports Authority has commenced on terminal expansions, harbor deepening and constructions to accommodate bigger container vessels from the proposed Panama Canal expansion
- Such expansion is expected to increase traffic within local vulnerable North Charleston neck communities by at least 7,000 diesel truck trips per day(>70% increase) from the present average rate of 10,000 trucks per day

OBJECTIVES

- To determine the spatial variability of PM concentrations in residential areas of the Charleston Neck impacted by environmental injustice
- To collect sufficient information and representative measurements of PM in the Charleston Neck communities prior to the new port development
- To compare the newly collected saturation data with the temporal trends in air pollution within the region over several decades from the late 1960s

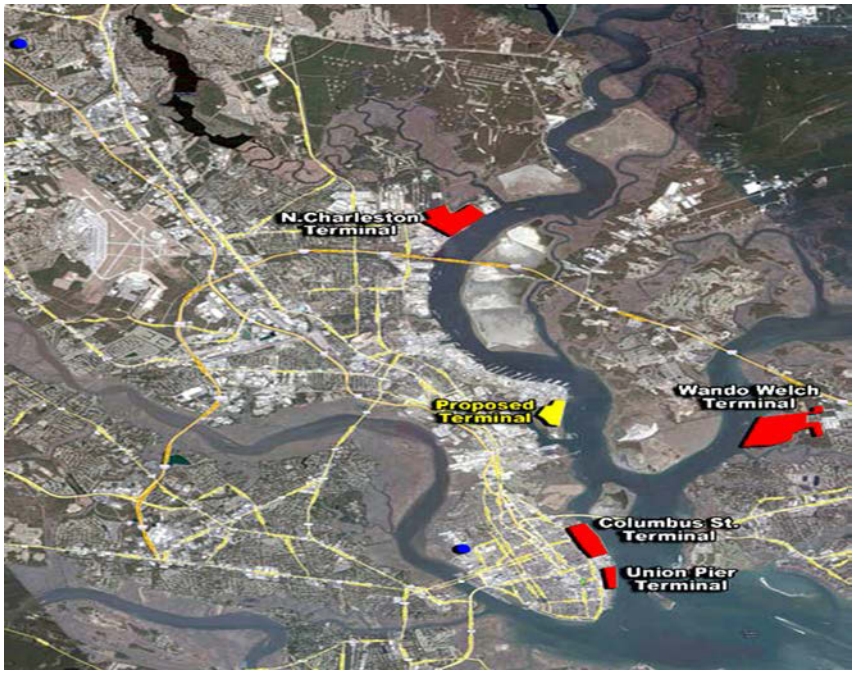
DESIGN

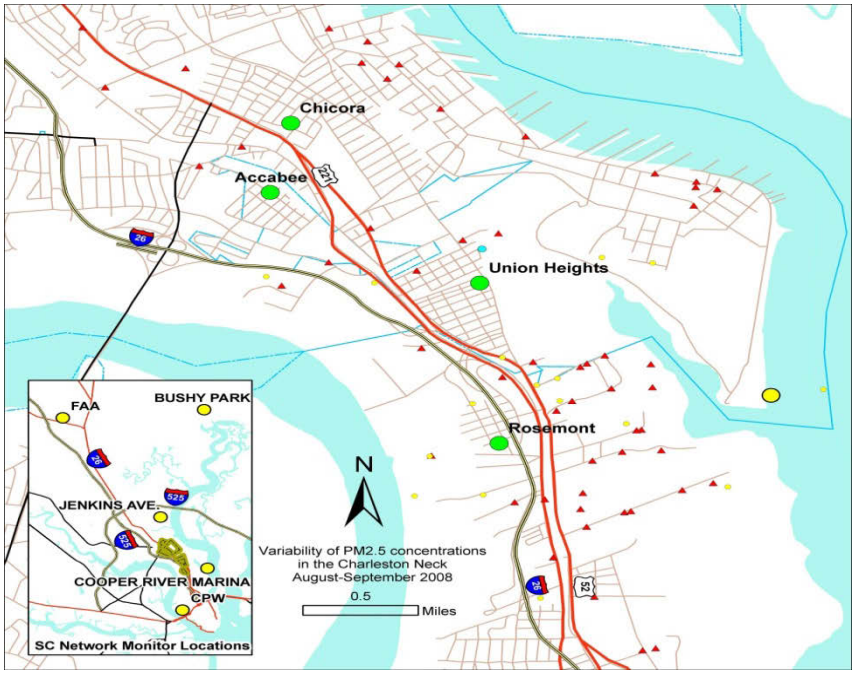
- Study area: Accabee, Chicora/Cherokee, Howard and Union Heights
- Saturation study was performed to determine spatial variability of PM in local Charleston Neck communities
- Temporal trends in particulate air pollution within the region were determined across several decades
- With the BGI Sampler, PM samples were collected for 24 hours comparable to the Federal Reference Method protocol
- Gravimetric analysis of the PM filter samples were conducted following EPA protocol

DESIGN

- Charleston, South Carolina peninsula indicating areas of port activity and South Carolina Ambient Monitoring Network sites

- **Air Quality Monitoring Saturation Study Area; North Charleston, South Carolina; 2008**
- **Legend: Large Yellow dots- Current SC DHEC air monitoring stations**
- **Large Green dots- Planned project monitoring sites**
- **Small Red Triangles- Air emission sites registered with SC DHEC**
- **Small Yellow Dots- discontinued ambient monitoring sites**
- **Small Blue Dot- Howard Heights saturation/FRM site**





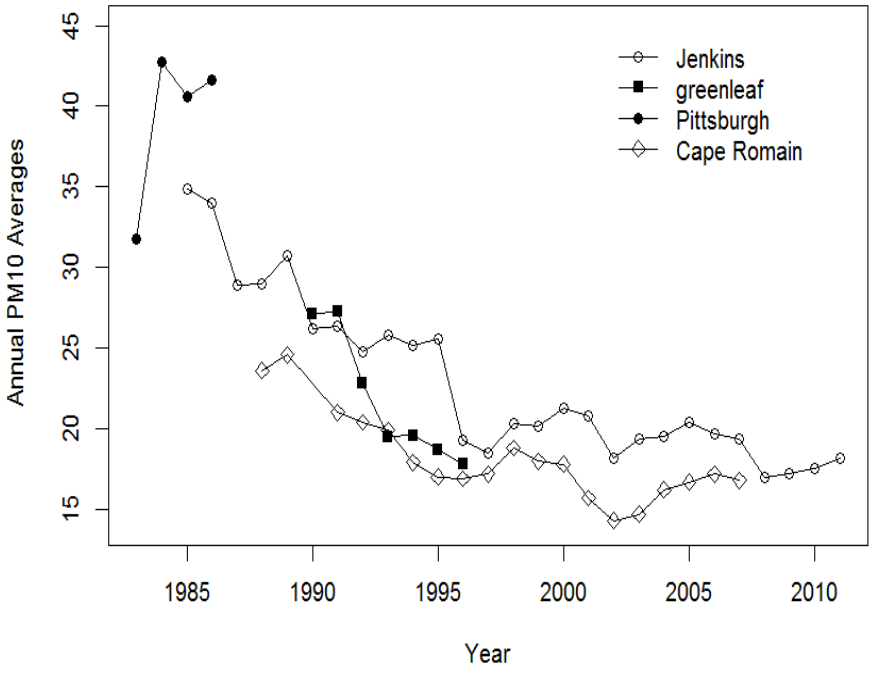
FINDINGS

- The range of the PM_{10} annual average across the region from 1982 to 2006 was 17.0µg/m^3 to 55.0µg/m^3
- On only two occasions were the records of PM_{10} averaged above the 50.0µg/m^3 national standard
- In the case of $PM_{2.5}$, the annual average for 1999-2006 ranged from 11.0µg/m^3 to 13.5µg/m^3 and no annual average exceeded the 15.0 µg/m^3 $PM_{2.5}$ annual standard

FINDINGS

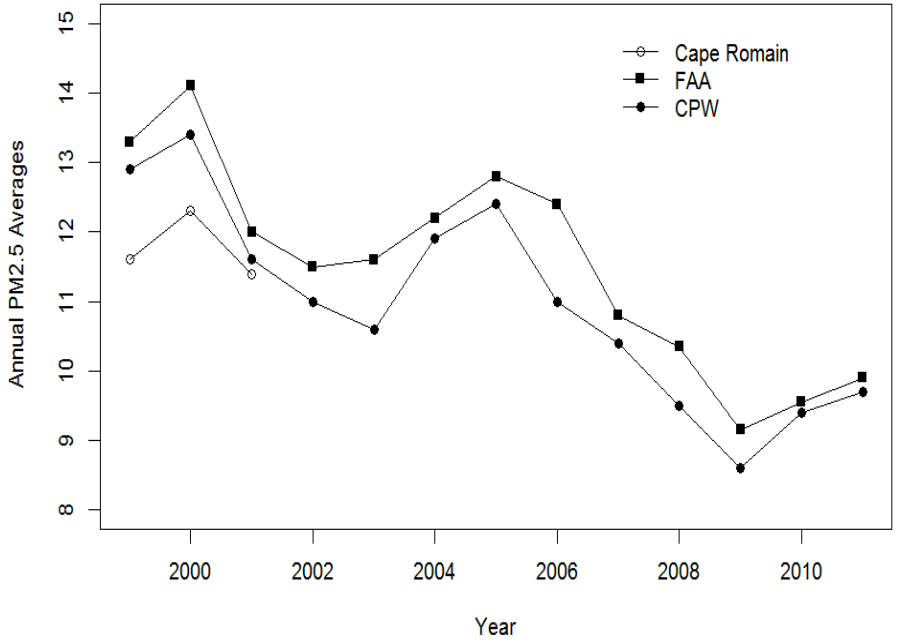
Trend in Annual PM_{10} Averages in Charleston across Ambient Monitoring Stations (1980-2012)

Range of annual averages was 17-55ug/m^3(1982-2006)



Trend in Annual $PM_{2.5}$ Averages in Charleston across Ambient Monitoring Stations (1998-2012)

Range of annual averages was 11 -13.5ug/m^3 (1999 -2006)



POTENTIAL IMPACTS

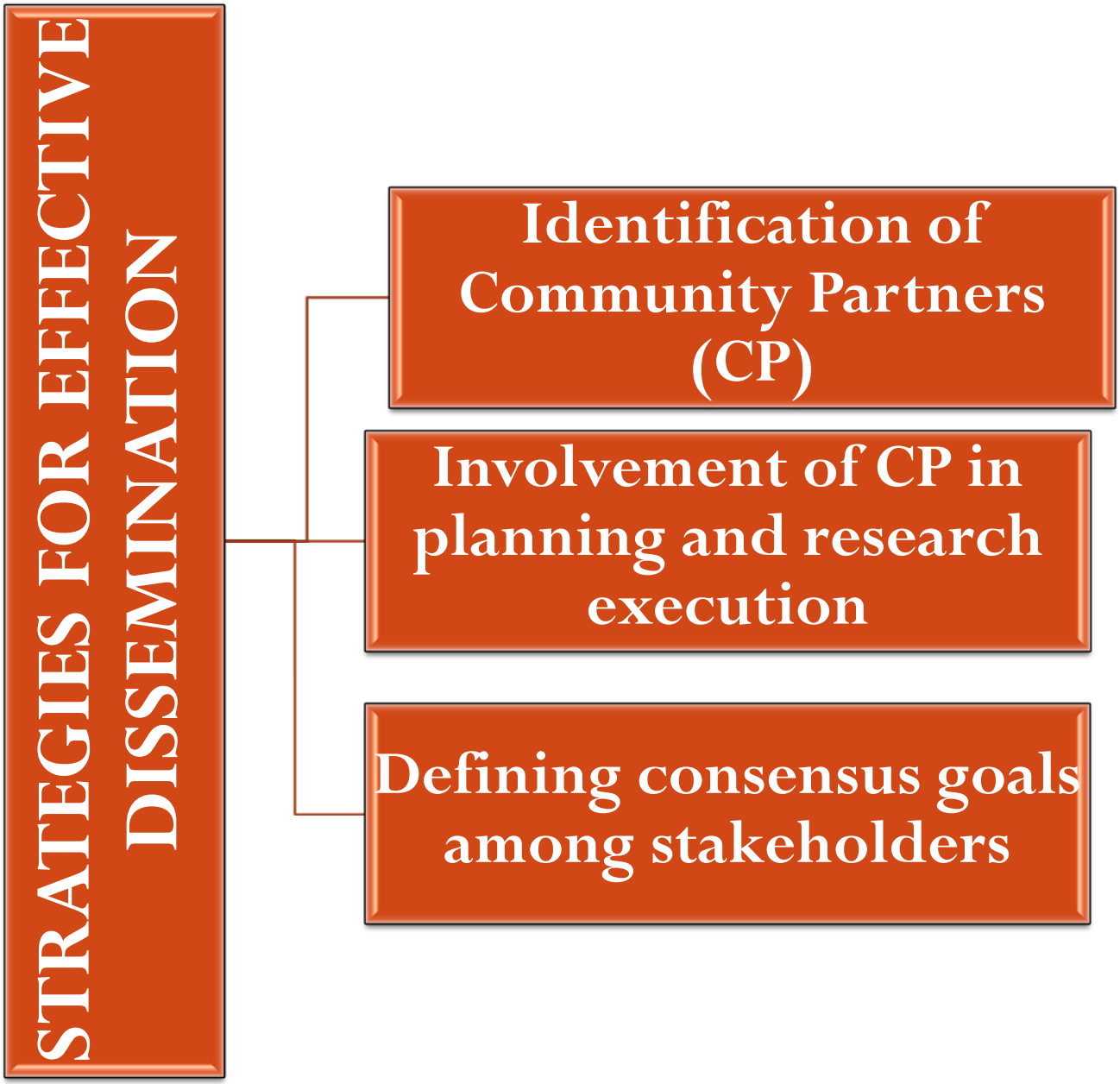
- Air pollution from local sources (public health significance)
- Previous studies showed port activities will increase atmospheric levels of particulate matter (especially $PM_{2.5}$) and other air pollutants within the North Charleston Neck communities
- EIS (2005) predicted daily $PM_{2.5}$ average of 47ug/m^3 due to port expansion
- Each 10ug/m^3 elevation in PM was associated with approximately a 4%, 6% and 8% increased risk of all-cause, cardiovascular, and lung cancer mortality
- High level of PM concentration can potentially elevate cardiovascular risks among the 600,000 residents in metropolitan Charleston

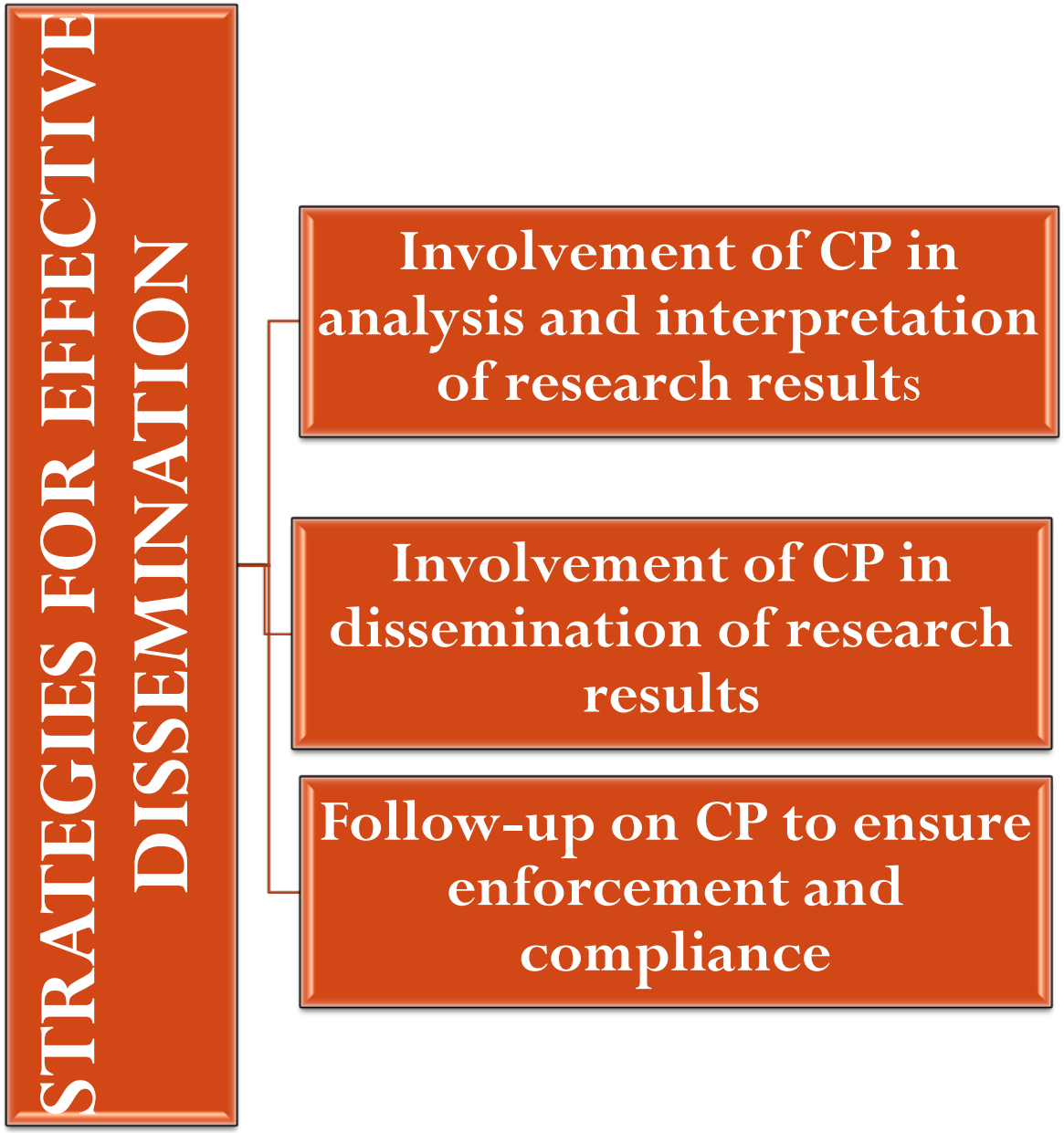
COMMUNICATION OF OUTCOMES

- Overburdened minority communities and low-income populations will be mostly affected
- Comprehensive monitoring of the ambient air quality of the region is required periodically
- Additional research and data gathering through community based participatory research
- Future studies should include spatial variability of NOx, SO_4, PM and VOC

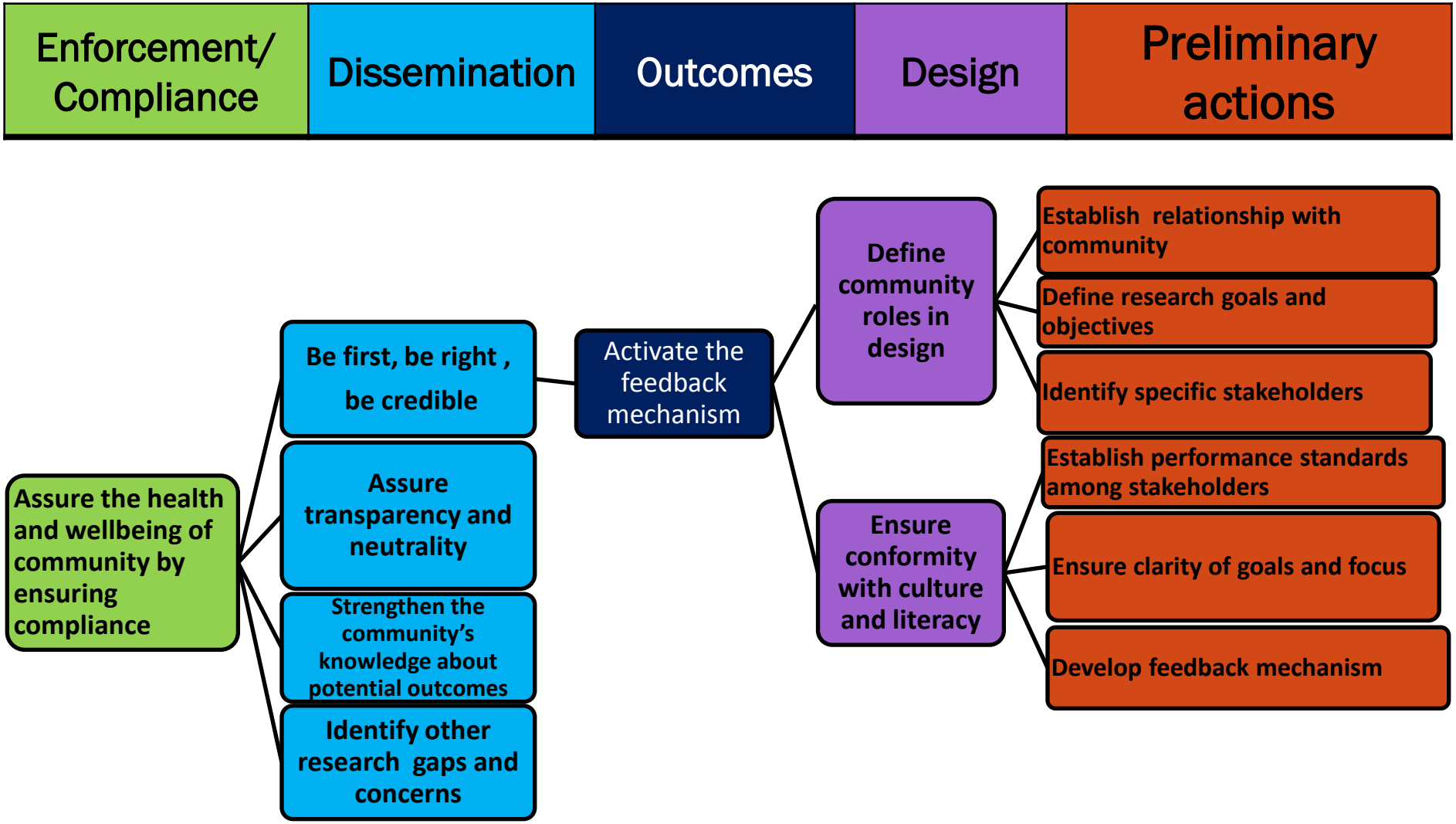
BARRIERS TO EFFECTIVE DISSEMINATION

- Helicopter Scientist Phenomenon "*In the academia, dissemination is defined myopically as publication in peer-reviewed scientific journals and there are no plans to disseminate feedback to the study communities*"
- Diverse needs and objectives of stakeholders (economic vs environmental, politics vs policy)
- Cultural and literacy differences between the stakeholders (residents and researchers)
- Deadlines and limitation of resources


STRATEGIES FOR EFFECTIVE DISSEMINATION
Identification of Community Partners (CP)
Involvement of CP in planning and research execution
Defining consensus goals among stakeholders


STRATEGIES FOR EFFECTIVE DISSEMINATION
Involvement of CP in analysis and interpretation of research results
Involvement of CP in dissemination of research results
Follow-up on CP to ensure enforcement and compliance

MODEL FOR ENFORCEMENT OF OUTCOMES AND COMMUNITY PARTICIPATION



ACKNOWLEDGEMENT

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