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ACADEMIC ARM OF THE UNITED NATIONS

UNU-WIDER Conference: Climate Change and Development Policy
28-29 September 2012, Helsinki, Finland

Climate Co-Benefits in Urban Areas: Aligning Climate, Environmental and Development Policies

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Outline

- Climate change in cities
- Co-benefits
- Research / Cases
- Analysis
- Conclusion



The World Today

- Human population growing (2011~ 7 bi, 1911~1.75 bi)
- More than half-of the world population live in cities
- The trend will continue in the next decades

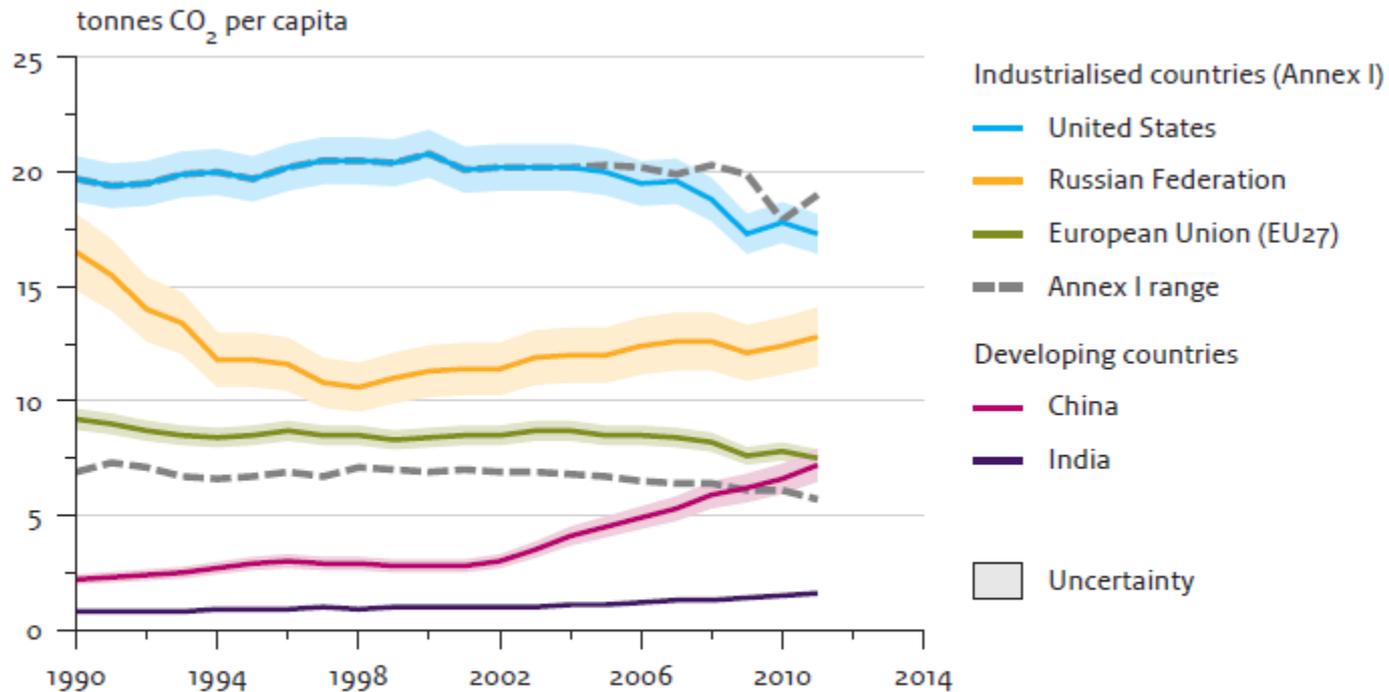


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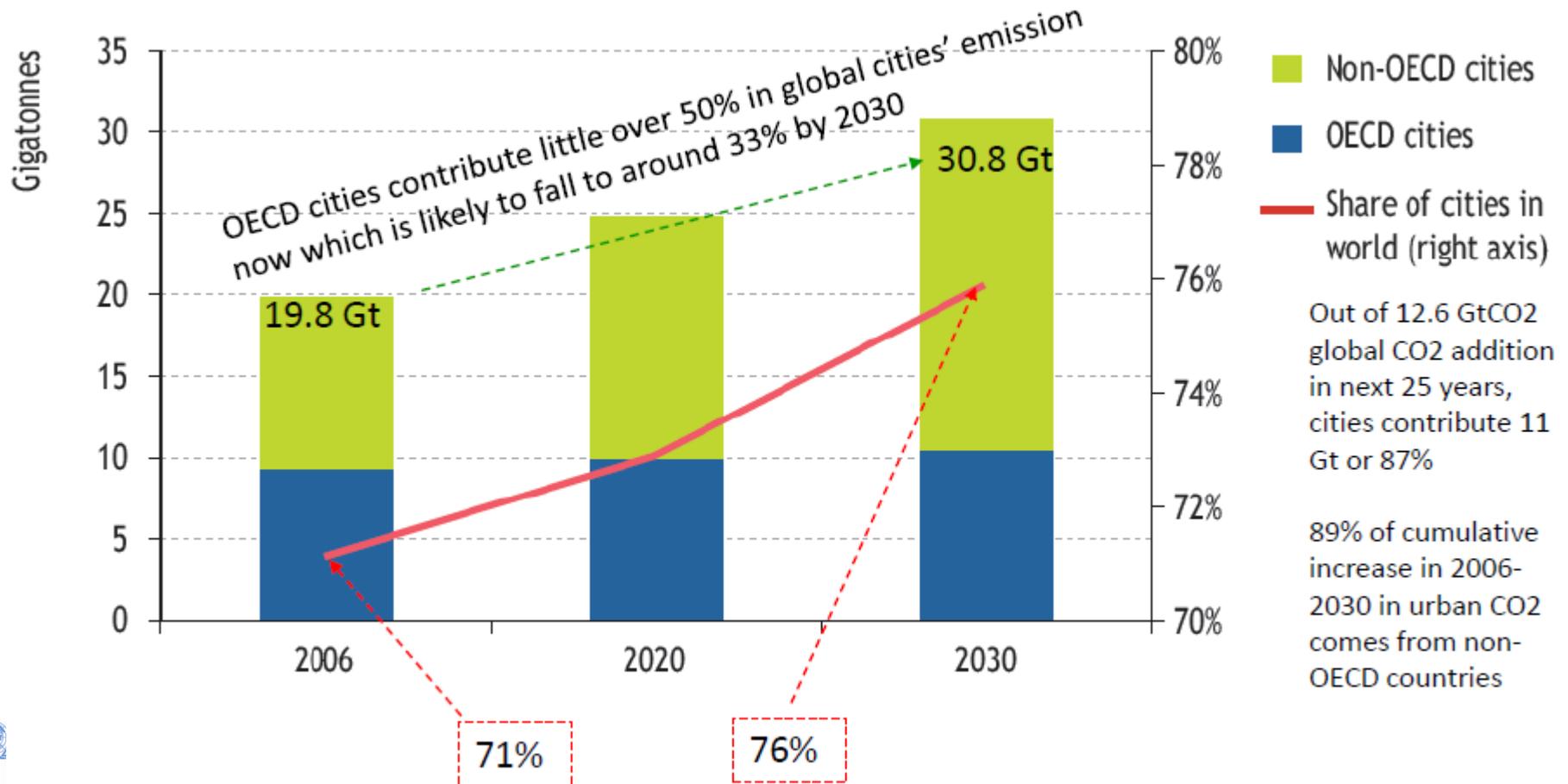
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Per Capita CO₂ Emissions

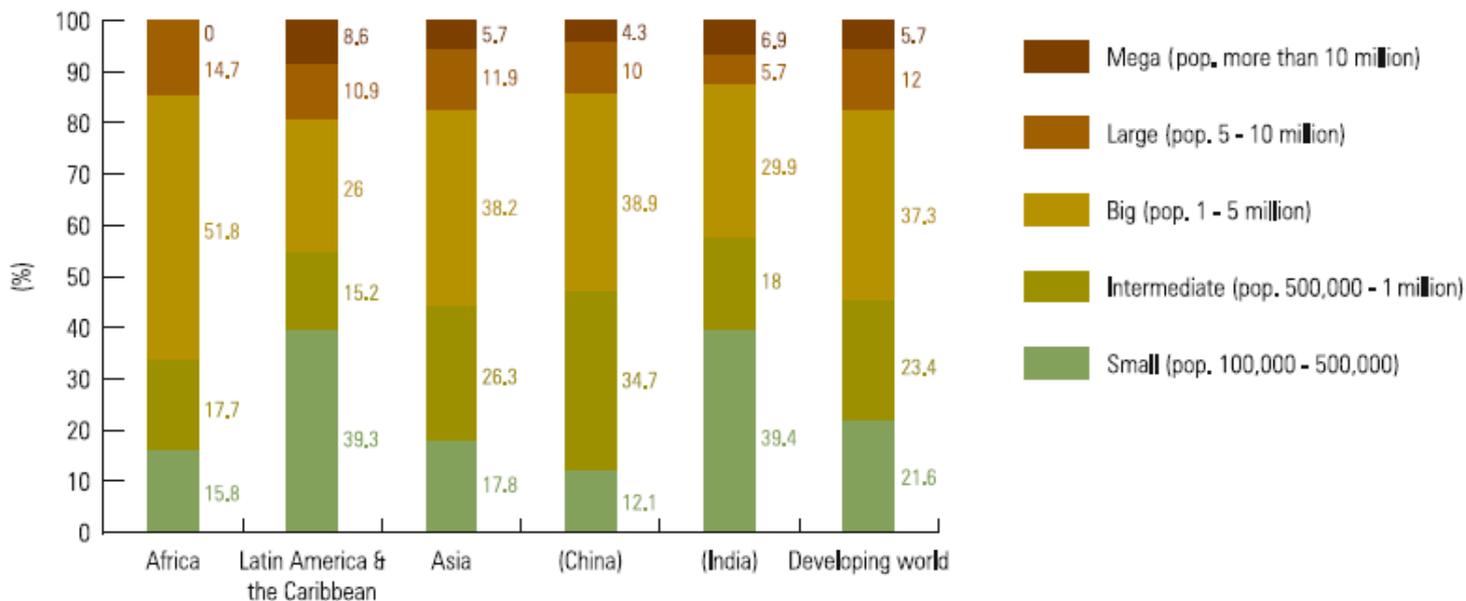


Source: EDGAR 4.2 (1970-2008); UNPD, 2010

CO₂ Emissions (Ref Scenario)



Distribution in LDCs, 2000



Source: UN-HABITAT Global Urban Observatory, 2008.

Note: UN-HABITAT Global Urban Observatory, 2008. Data from UN-Statistics Division, Demographic Yearbook (various years), UN Population Division, World Urbanization Prospects 2005.

Analysis based on a sample of 1,408 cities. Data for Asia includes China and India.

Data only includes cities with populations of 100,000 + inhabitants.



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Climate Change and Cities

- **Mitigation and Adaptation**
 - Sectoral issues (energy, transportation)
 - Physical issues (buildings)
 - Land use issues (urban form, heat islands)
 - Regional issues (effects on economy of the region)
 - Green Agenda issues (consumption)

Complexity increase



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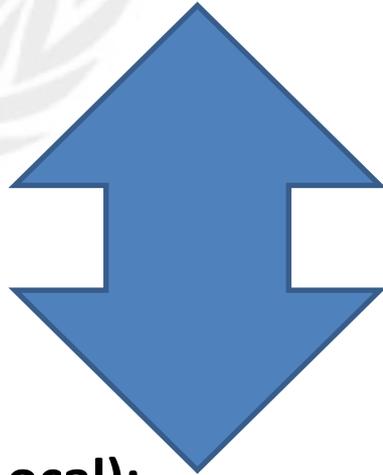
Urban Challenges

- Rapid urban growth in LDCs (population+economy)
- Need economic opportunities for local population, jobs, income + housing, transport, infrastructure...
- Local /Regional environmental problems (e.g., air pollution)
- Global issues (e.g., climate change, biodiversity). Mitigation/adaptation
- Important role of S&T&I processes to sustain a clean/green growth
- Trade-off x multiple opportunities
- Co-benefits: Tackling local and global problems at the same time

Linking Global and Local

PROBLEMS (Global):

- Cities and climate change: cities are affected by and coping with climate change



SOLUTIONS (Local):

- Local governance: local governance structures emerge and change, and how they affect the environment and development
- Old problems, new agendas for implementation: global environmental policy implementation more effective at the local level by integrating with other policies



Urban Environmental Co-Benefits

- Urban environmental co-benefits are the contribution of one city to the reduction of local environmental pollution (LEP) and global environmental degradation at the same time, leading to an improvement of local socio-economic conditions.



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Co-benefits and Development

**GHG reduction
benefits**

**LEP reduction
benefits**

**Economic
benefits**

**Energy security
benefits**

**Health and
Safety**

AGGREGATED CO-BENEFITS

**Co-benefits (climate
policy+env policy)**



**Development
(short term +long term)**

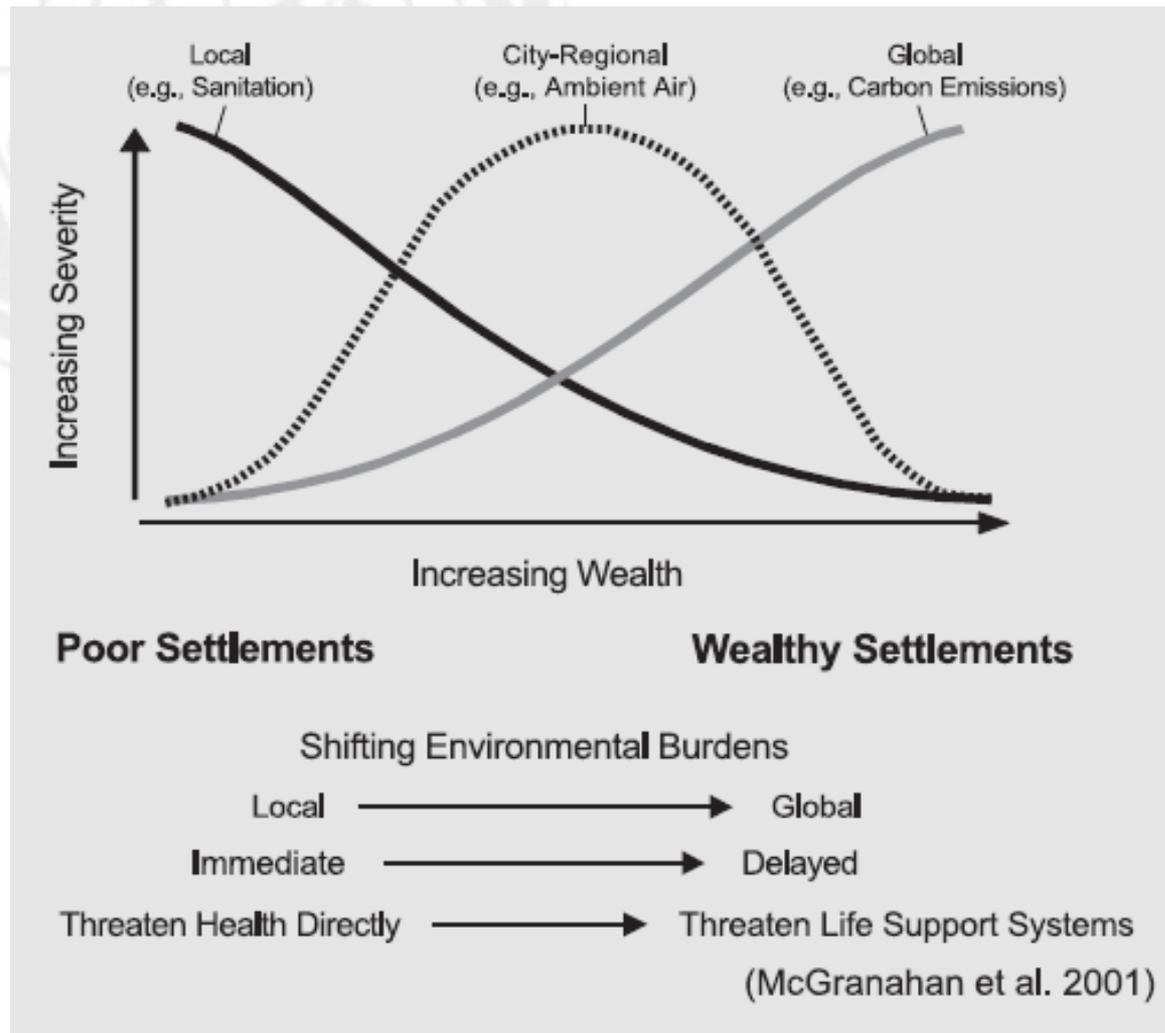


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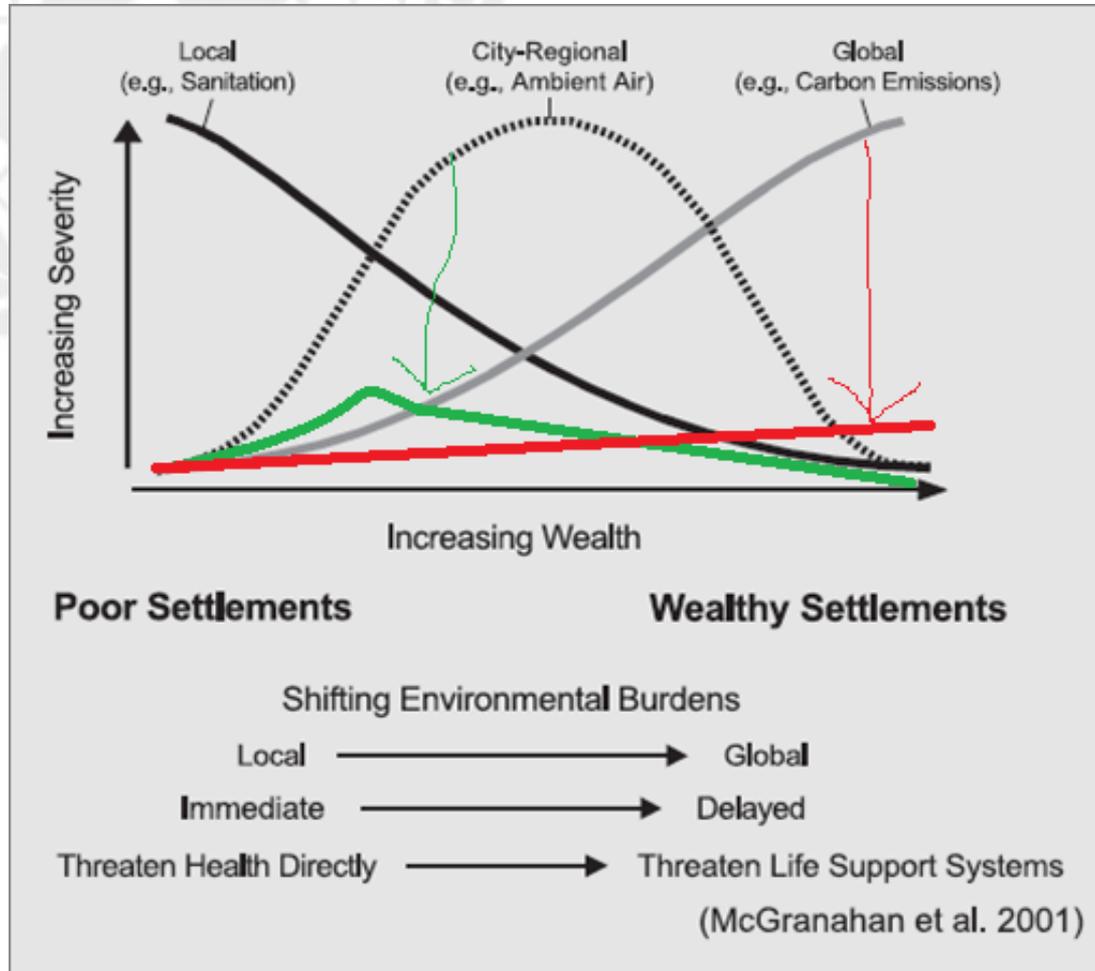
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Economic Development and Environmental Issues



Possible changes



Objectives

- Combine the sectoral approach with thematic interdisciplinary institutional analyses using a case-study based methodology to identify where, how and why policies related to co-benefits have succeeded in order to develop evaluation tools to analyze and measure effectiveness of co-benefits.



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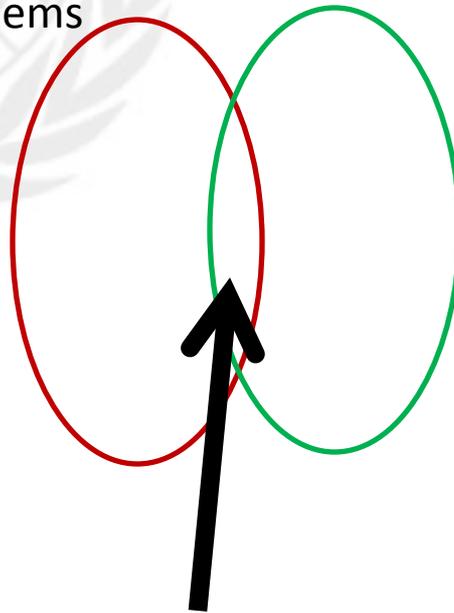
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(Existing) Technological Opportunities

Solutions to local socio-environmental problems

Solutions to global environmental problems



Co-benefit opportunity (technical feasibility)

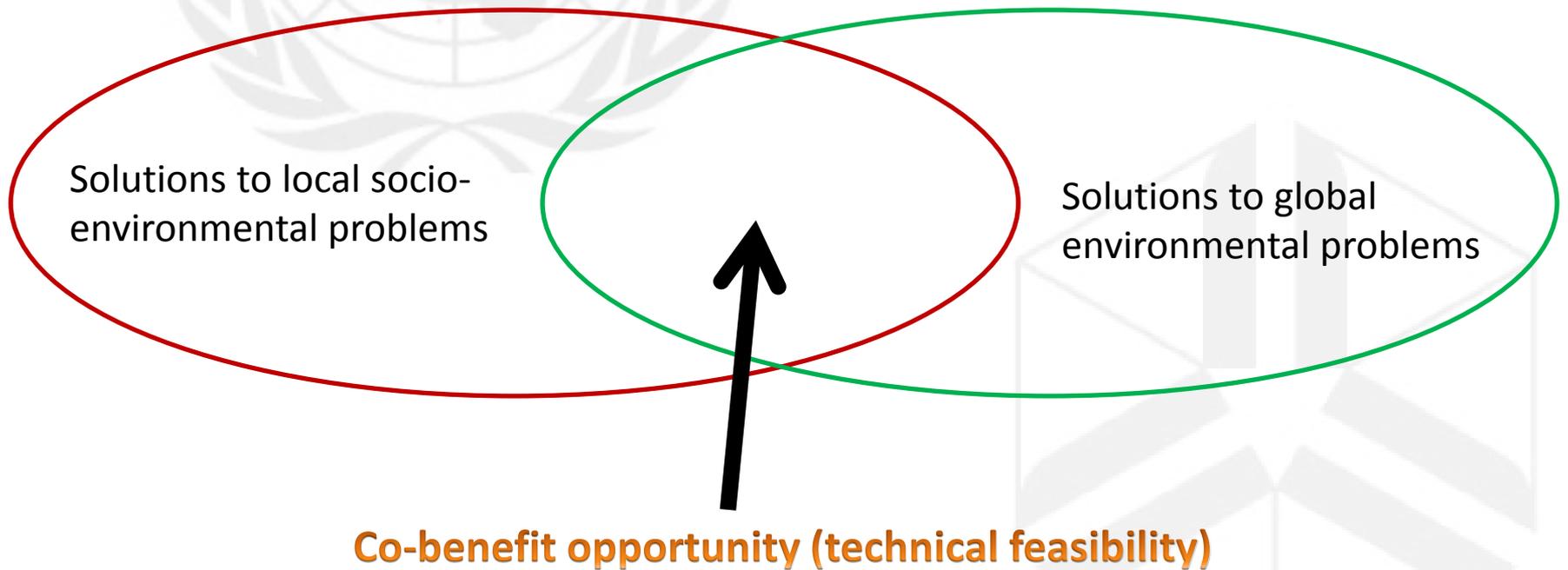


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Technological Development (more R&D, supply-side)

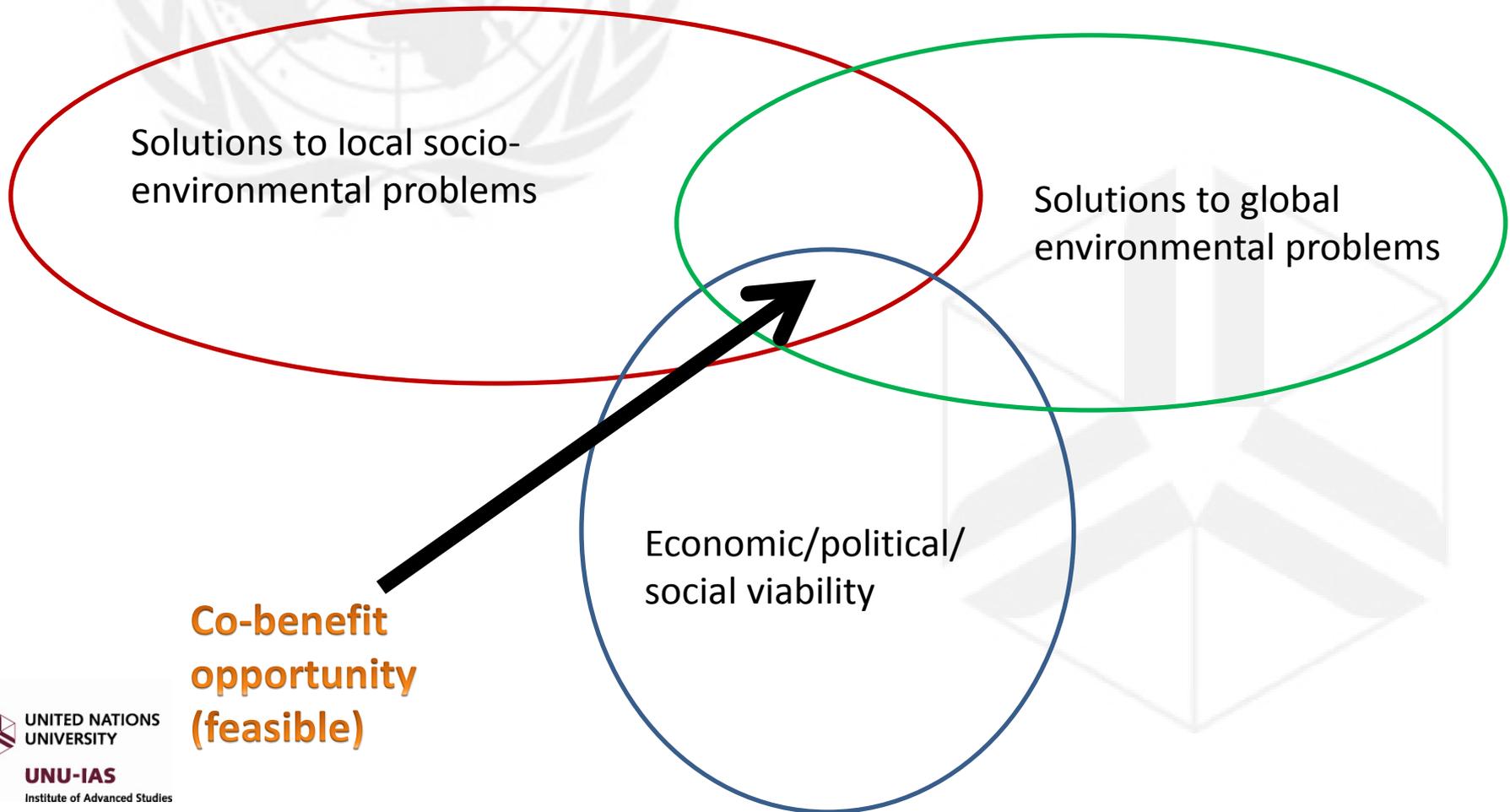


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Limits



Solutions to local socio-environmental problems

Solutions to global environmental problems

Economic/political/ social viability

**Co-benefit
opportunity
(feasible)**



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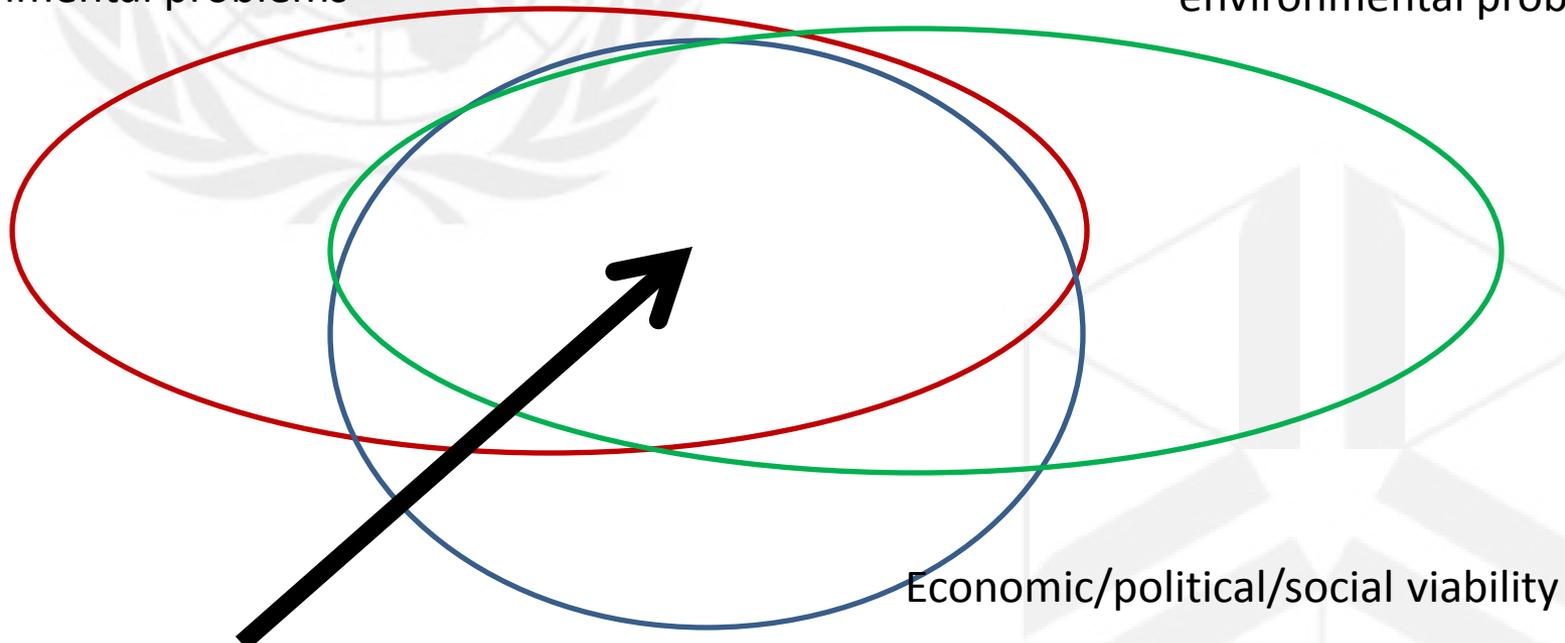
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Innovation and diffusion (Institutional Development?)

Solutions to local socio-
environmental problems

Solutions to global
environmental problems



**Co-benefit opportunity
(feasible, promoted by public
policies, market driven etc)**



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Research Flow

- Identifying the technical and institutional opportunities for co-benefits,
- Identifying and analyzing cases where co-benefits have occurred (how and why),
- Understanding the technological and institutional processes, particularly the role of public policies and governance.



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Case Studies

- The research is based on grounded analytical research in cities in four countries: China, India, Indonesia and Brazil.
- Analyzing five broad sectors:
 - Energy (focus on non-transportation) and Industry
 - Transportation
 - Building
 - Land use
 - Liquid and Solid Waste Management

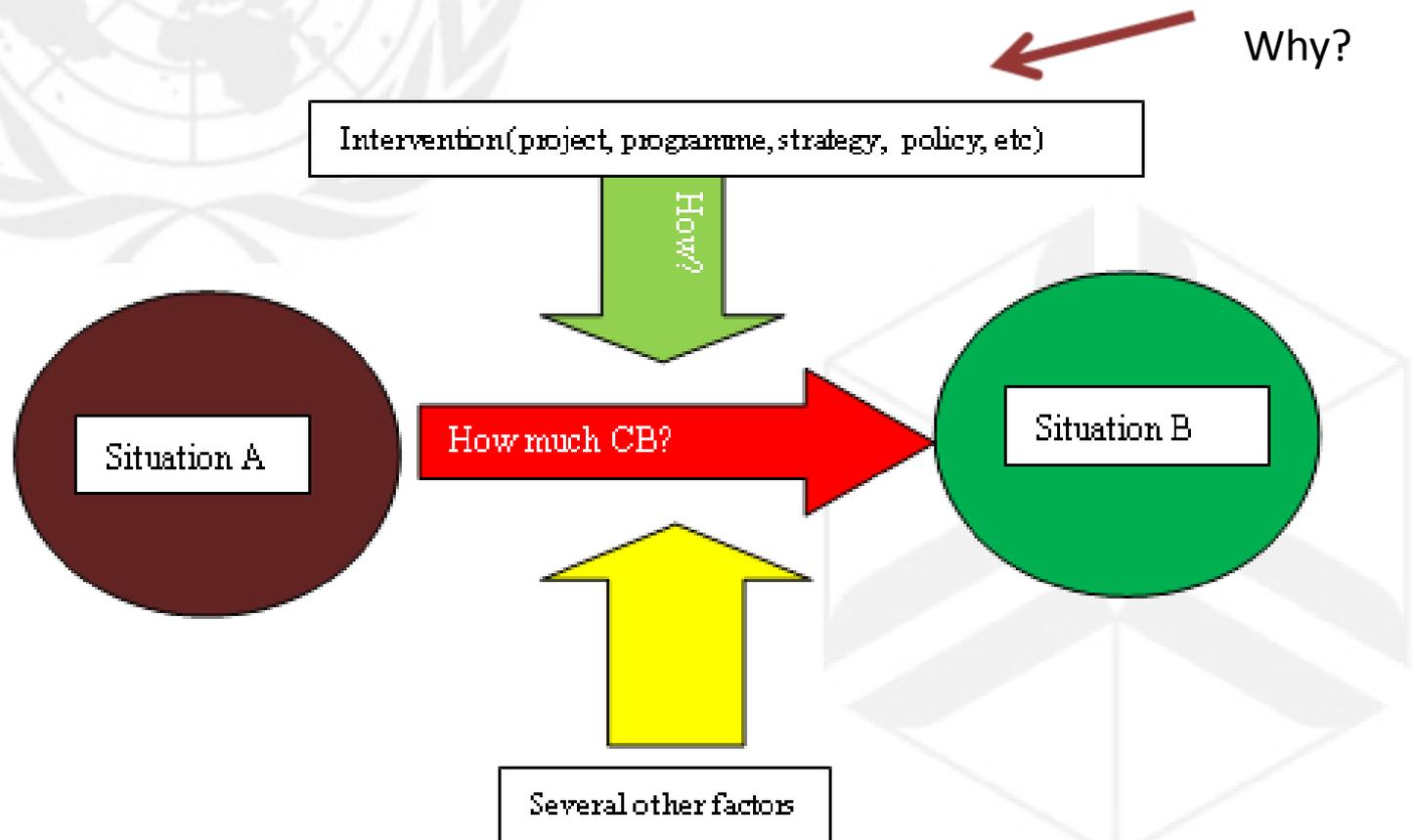


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Evaluation



SOME GENERAL LESSONS FROM THE DEVELOPMENT OF THE PROJECT

- Behind Co-Benefits: Still Limited Discussions on Co-benefits
- The Main Drivers are also outside the Environmental Arena
- Climate Change is not yet a Strong Driver
- Government is key for large scale/radical changes
- Urban governance as an underlying factor for effectiveness of co-benefits policies
- Law and Legal Institutions in relation to co-benefits
- International cooperation can play an important role
- The difficulty to assess co-benefits in a more quantitative way (MRV)



Individual Research Cases

- Case of Shenyang, China (Energy-Tiexi District)
- Case of Shanghai, China (Energy-Baoshan District)
- Case of Shanghai, China (Building)
- Case of Sao Paulo, Brazil (Transportation)
- Case of Delhi, India (Transportation-Metro.)
- Case of Delhi, India (Transportation)
- Case of Surat, India (Waste)
- Case of Yogyakarta, Indonesia (Transportation)
- Case CBSWM Yogyakarta (Waste)
- Case Planning Yogyakarta (Land-use)



Case Study Analysis 1: GHG Emissions Savings based on Mode Share: The Delhi Metro, India

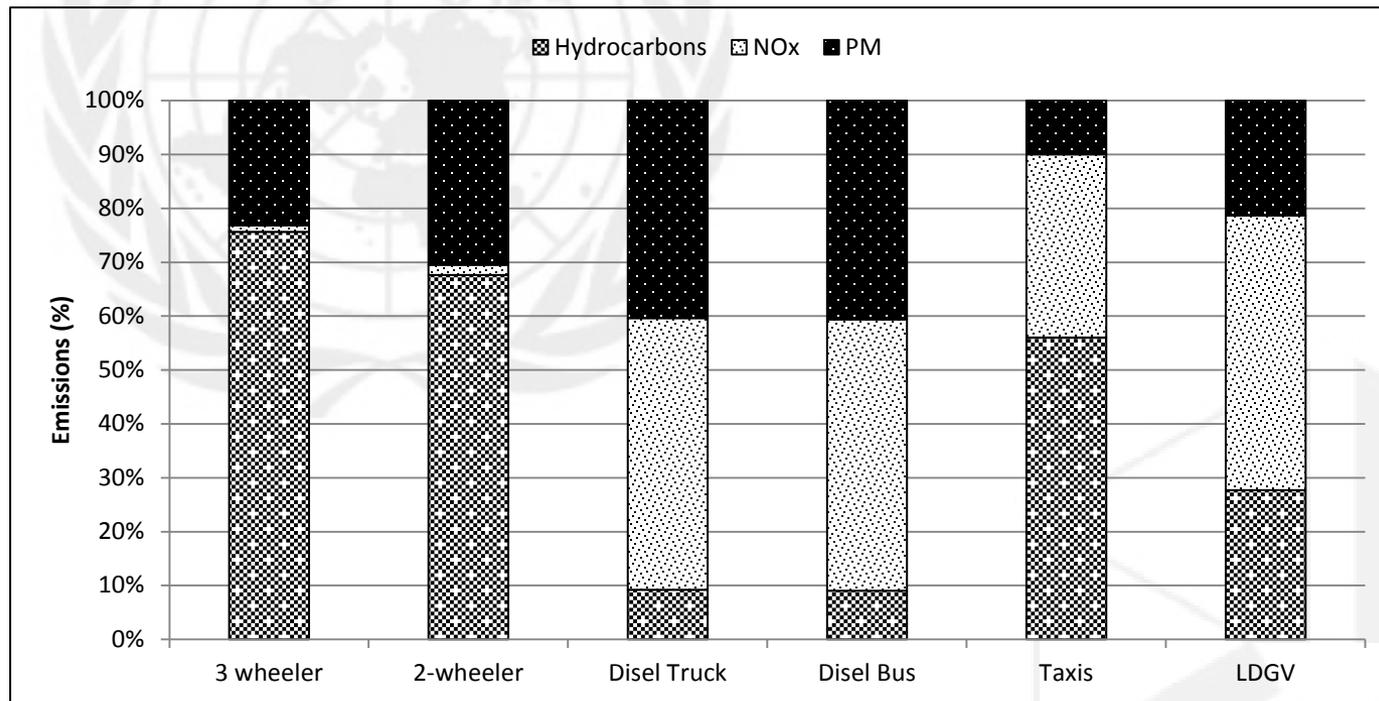


Figure 3- Contribution of vehicle category in NO_x, PM and HC emissions in Delhi in 1996
LDGV- Light Duty Gasoline Vehicle, Source: Xie, and Shah (2002)

Diesel driven vehicles were the major source of NO_x emission in Delhi, whereas least contribution was from two-wheelers and three-wheelers.

Case Study Analysis 1: GHG Emissions Savings based on Mode Share: The Delhi Metro, India

Mode shift to the Metro

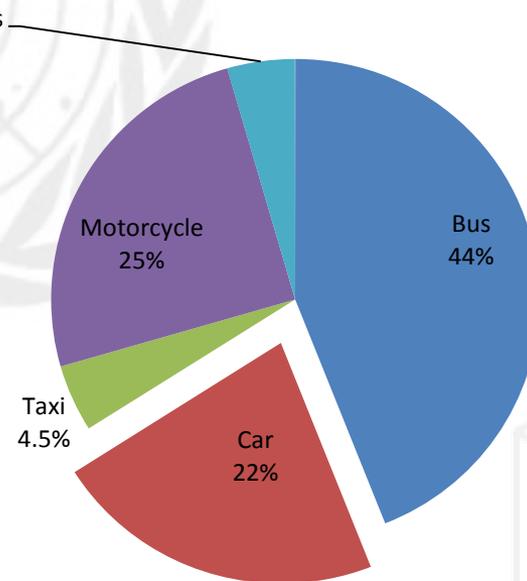


Figure -Mode shift to the metro.

Source: Interviews made with transport professionals in Delhi

Mode shift to the metro has been primarily from buses (Figure) with half as much coming from private cars and a quarter from motorcycles. The remaining 9% was split equally between three-wheelers and taxis.

Table 1 - Co-benefits from Delhi Metro for year 2011

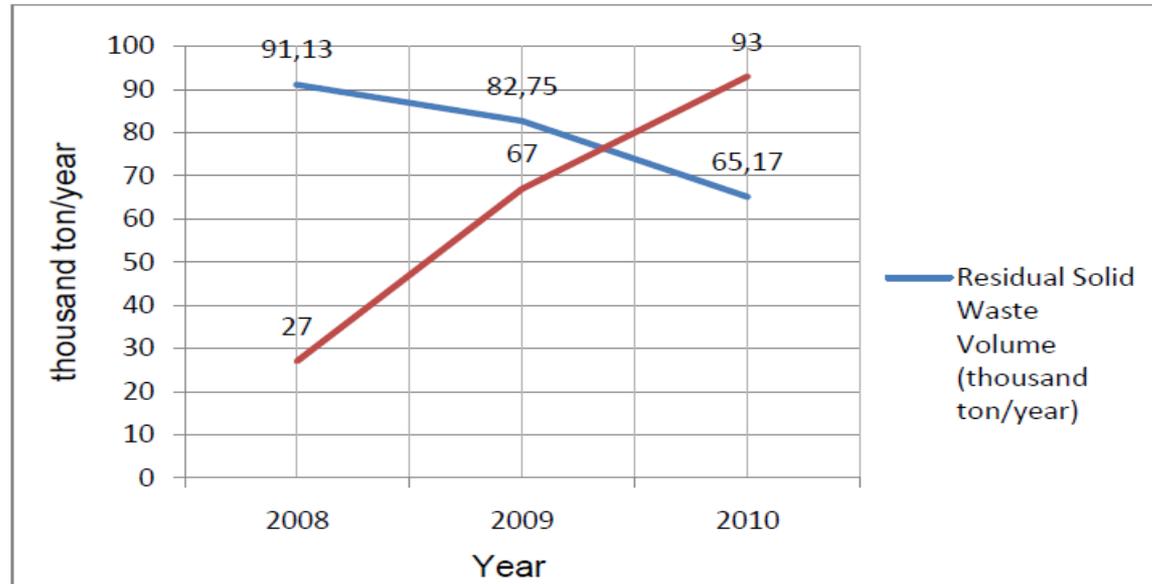
	Bus	Car	Taxi	Motorcycle	3-wheelers	Metro	Total
GHG (tCO ₂ /yr)	-44,256	-152,389	-28,994	-145,200	-10,381	357,120	-24,100
Percent Change (%)	-4.55	-6.48	-16.20	-8.67	-13.48		-0.46
Air pollutants (tons/yr)	-882	-2,491	-555	-29,635	-397	5,935	-24,897
Percent Change (%)	-4.55	-6.48	-16.20	-8.67	-13.48		-6.90

It is clear from this analysis that co-benefits can be easily achieved if the mode shift to the metro comes from cars or any other private mode rather than buses. There is however a large reduction in air pollution emissions, which is enhanced as grid electricity generation takes place far from the city and would not be counted.



Case Study Analysis 4: Solid Waste Management, Yogyakarta, Indonesia

Correlation between Amount of CBSWM Group and Volume of Disposal Solid Waste into the Landfill in Yogyakarta City, 2008 – 2010



Source : Environmental Agency of Yogyakarta City (2008 – 2010); Yogyakarta City CBSWM Association “Jari Polah” (2011).

Figure 10 - Correlation between among of CBSWM group and volume of disposal solid waste into the landfill in Yogyakarta city

The growth of CBSWM in last 7 years shows correlation to waste generation and disposal into landfill. Figure 4 shows there is a decreasing of solid waste about 28 % from 2008 until 2010.

Some key points for analysis

- Partnerships. The partnerships helped to bring complementary resources to make the projects happen. The external resources helped to boost the projects, and they varied among the projects.
- Collaboration between governments. There were positive synergies between municipal (city level) governments and other levels of government,
- Appropriate technology. All the projects had an innovation of a certain kind of technology or practice new to the locals.
- Win-win situation. Some projects, such as the case of CBSWM, there was a huge potential for win-win situations in terms of co-benefits and economic efficiency, as the composting generate jobs and reduce the amount of waste collected and sent to the landfills or incinerators.
- The role of the rule of law. In New Delhi, the decision from the Supreme court started the process of enforcement of the law and reducing pollution



Autonomy and capacity at the local level

- The degree of decentralization in a country influence cities' initiatives for co-benefits
- Decentralization has not brought enough resources to the responsibilities in the cities
- SWM responsibility belongs to local authorities but they do not have the resources or technical expertise to establish SWM systems



Coordination among government bodies and divisions

- Sectoral approaches: specialization x isolation/coordination
- Coordination among different governments with different responsibilities
- Delhi Metro Rail Corporation (DMRC): participation of the city government and national government, which control the public transportation and land-use respectively.



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Awareness of policies to realize co-benefits

- Developing countries the awareness of pushing environmental agendas forward consistently is yet to be developed.
- Climate change policies are still incipient and with mix results.
- CDM has brought some awareness, more in the private sector (MNCs)
- The court actions such as the clean-up process in Delhi are linked to win-win situations in economy, local environment and reductions in GHG emissions.



Adoption of new technologies

- Most of the cases involved simple technologies, but new to the city
- Clean technologies in many sectors are new, advanced and more expensive than existing technologies, or need large initial investment
- Lack of regulations and standards
- Integrated systems to make clean technologies to work more effectively



Financial opportunities

- Reform of public budgeting for allocation of public funding
- Changes in regulation to attract private investments leading to co-benefits
- Many of those reforms may need changes at different levels. Local
- City governments may be able to introduce some of those changes, but others may need to be approved at higher level of governments,
- Development assistance and policy could help to make the reforms necessary to make co-benefits more attractive financially.



International network of cities and local governments for information exchange

- Networks of cities and local governments could increase synergies and facilitate knowledge and information exchange among them,
- Capacity to learn and move forward the implementation of new ideas
- Takakura method in the SWM



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OPPORTUNITIES FOR PROMOTING URBAN CO-BENEFITS

- Discussions of Co-benefits has emerged in several organizations:
Opportunities in the Policy Arena
- **Short Term-** Straight forward initiatives using simple technologies
E.g., waste management, 3R.
- **Medium Term:** require larger investments and the projects can have a high institutional complexity, and consequently high risks and transaction costs
E.g., transportation, and industry and energy sector.
- **Long Term** – Areas with slow changing paths and involving a larger set of integrated initiatives and standards
E.g.,: building and land-use sectors, consumption



Conclusions and the way forward

- Climate change has become more relevant driver in some countries (China, Brazil and Indonesia in particular) Co-benefits being discussed in several agendas
- In the international landscape, it seems that the post-Kyoto regime will be more based on voluntary actions, and the National Appropriate Mitigation Actions (NAMAs)
- There will be three basic groups of co-benefits would have to fit in.
 - Firstly, there are the mitigation actions that make economic and financial sense, which will be carried out voluntarily or with minimum access to credit. Many of those actions, such as improvement in energy efficiency, have important co-benefits. However co-benefits approach can make a difference if the concept is introduced at the national policy. **National awareness**



Conclusions: The way forward

- Secondly, there are those actions that will be viable with the official or voluntary carbon trading systems, such as CDM or ETS (EU). Those systems will bring the weight in the economic rationale to facilitate the implementation of some of the projects, such as those CDM has facilitated in the landfill methane burning. Co-benefits could be introduced as a criteria to value credits? Strategy=> **Awareness through international organizations + countries to influence international processes**
- Thirdly, there will be those projects that will not make economic sense in the short or long term, because of the huge opportunity costs that have to be given up. Those will happen only with national policies or international grants/aid and innovation. However, many countries do not have the resources, both human, technical and financial, to implement those actions timely. Thus, international cooperation may play an important role in providing resources and technical ground to make those projects viable. Strategy => **International cooperation and multilateral funds**





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