City-level SCP Initiatives towards SDG: Urban Resource Flows and Governance of Infrastructure Transitions

Read by: Prof. (Anthony) SF Chiu

University Fellow, De La Salle University, Manila

Member, International Resource Panel

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INTERNATIONAL POLICY NEEDS A SCIENCE BASE

The international resource panel was created in 2007 as a science-policy interface in responding to economic growth, escalating use of natural resources and deteriorating environment and climate change.

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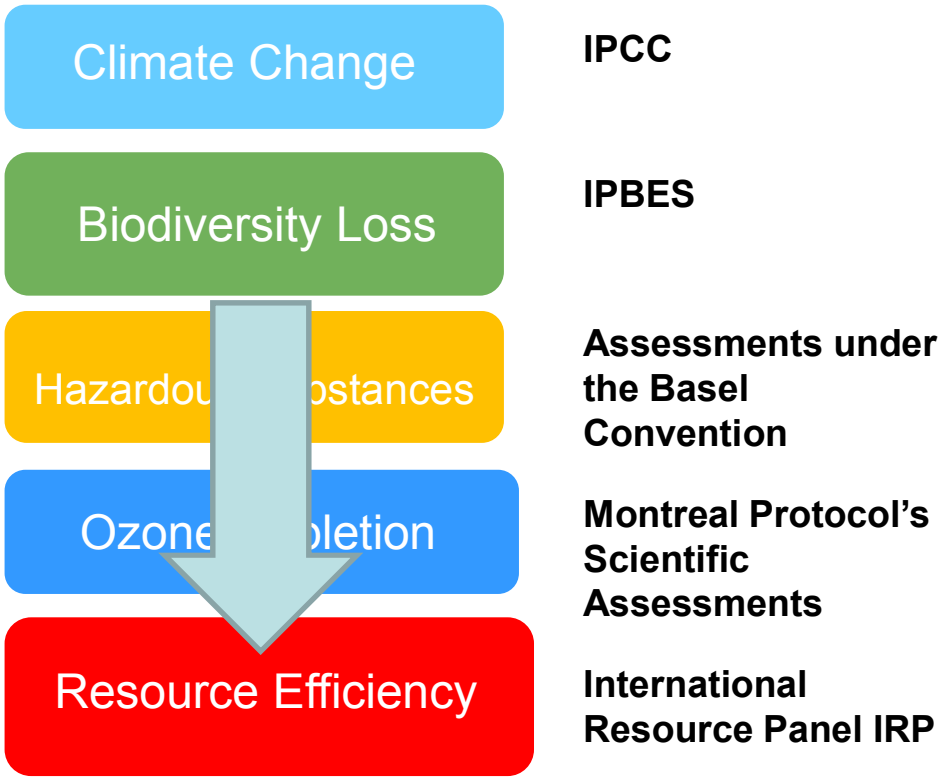

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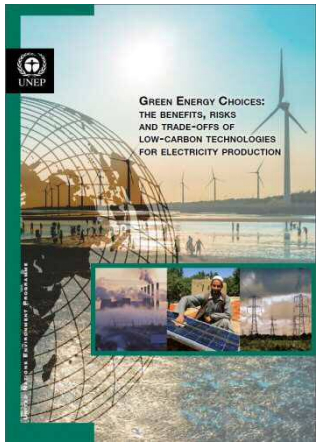
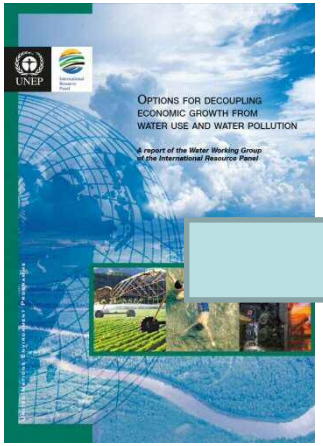
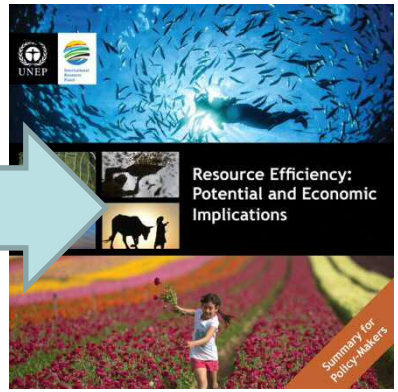
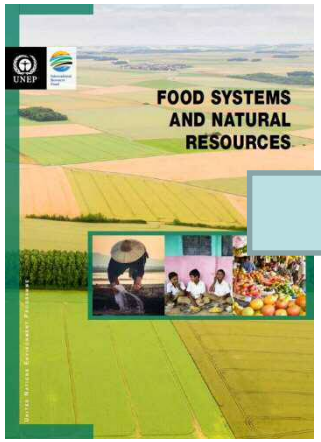
SDGs DIRECTLY DEPENDENT ON NATURAL RESOURCES

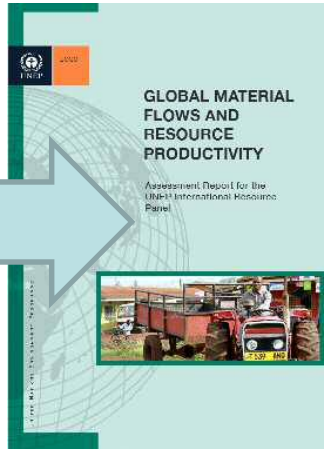
IN THE RECENT MONTHS …

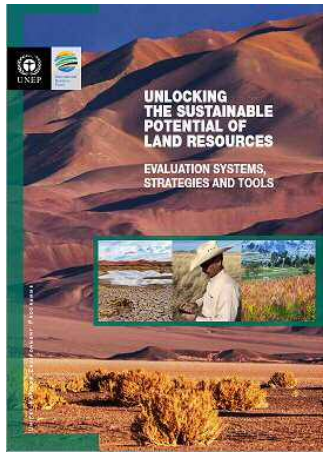












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Domestic Extraction in Different World Regions

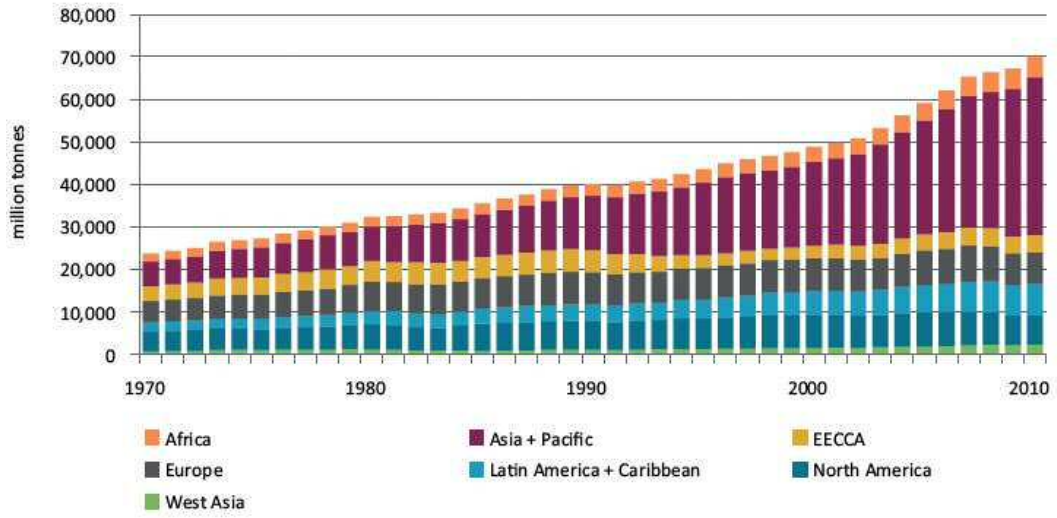

Figure 19 shows the shares of seven world regions in global domestic extraction of materials.

Figure 19 Domestic extraction (DE) by seven subregions, 1970–2010, million tonnes

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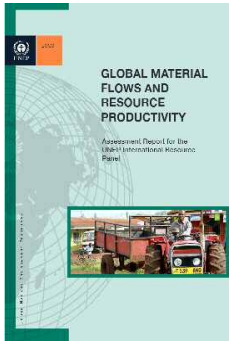
GLOBAL MATERIAL FLOWS AND RESOURCE PRODUCTIVITY (1970-2010)

- *Consumption has been stronger driver of growth in material use that population growth*
- *Since 2000 material efficiency has declined - global economy needs more materials per unit of GDP. Production has shifted from material efficient countries to countries that have lower material efficiency*
- *The richest countries consume on average 10 times more materials as the poorest*
- *The level of well-being achieved in wealthy industrial countries cannot be generalised globally based on the same system of production and consumption*



Drivers of Material Use- Population and Consumption

In **Figure 43** we see that the accelerating urbanization and industrialization of the Asia-Pacific region's developing economies greatly increased A there, and also drove major increases in MI as the economic centre of gravity shifted further towards less resource efficient economies.

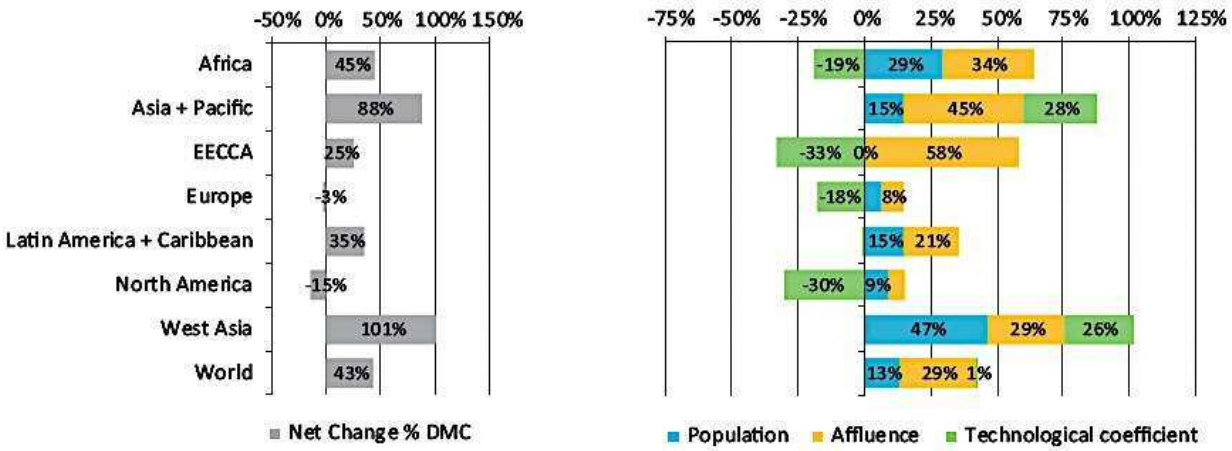


Figure 43 Drivers of net change in domestic material consumption between 2000 and 2010 for World regions: population, affluence, and material intensity

OVERALL DECLINE IN MATERIAL EFFICIENCY

- *Global economy now needs more materials per unit of GDP than it did at the turn of the century*
- *This has been caused by large shift of economic activity from more material-efficient economies such as Japan, the Republic of Korea and Europe to the much less material-efficient economies of China, India and Southeast Asia*

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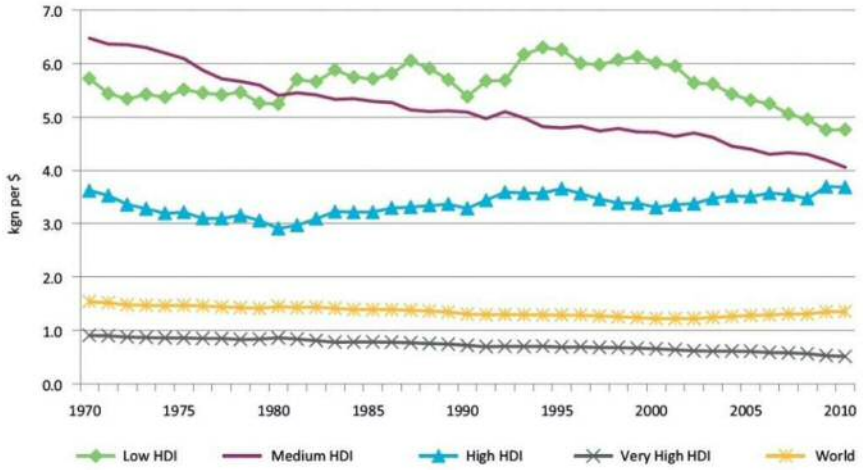


Figure 7. Material intensity by development status and global material intensity, 1970-2010

THE LEVEL OF WELL-BEING ACHIEVED IN WEALTHY INDUSTRIAL COUNTRIES CANNOT BE GENERALIZED GLOBALLY BASED ON THE SAME SYSTEM OF PRODUCTION AND CONSUMPTION

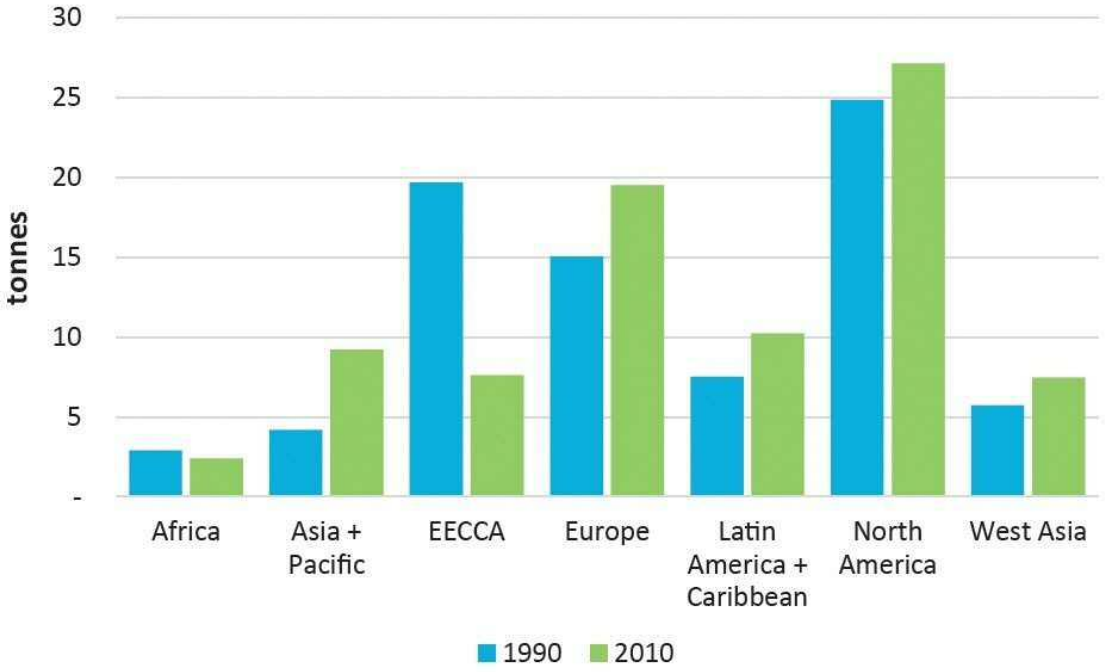
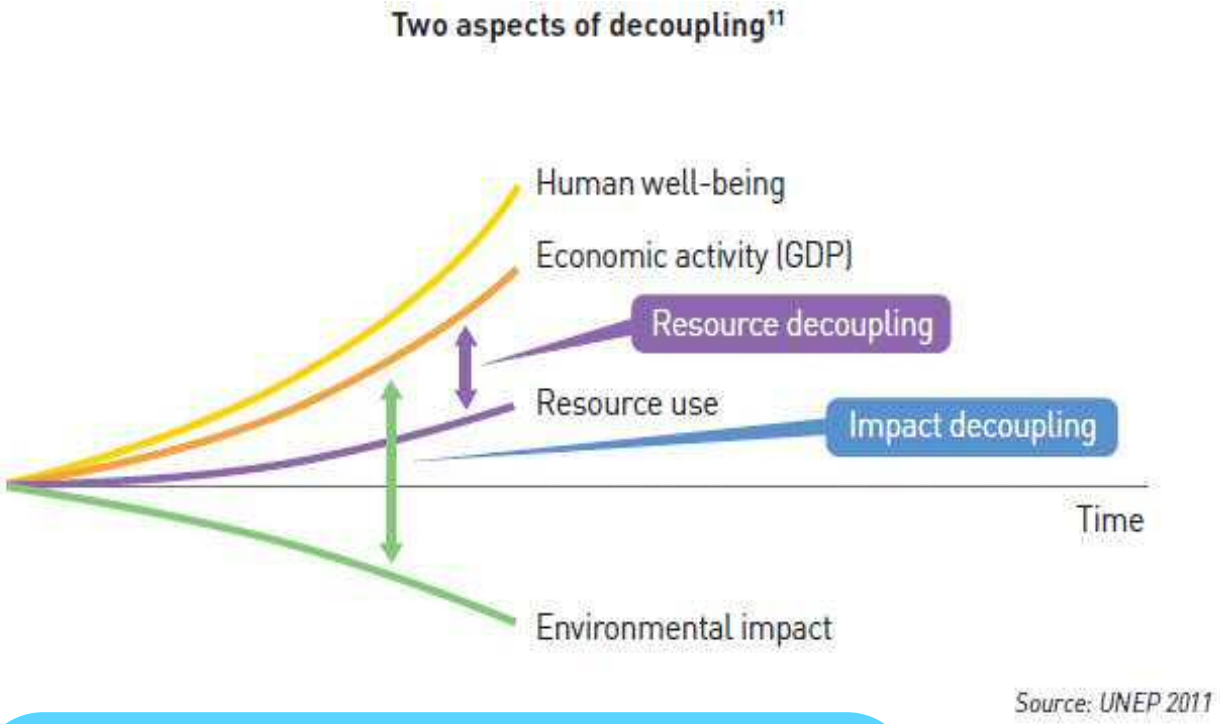


Figure 6. Per-capita material footprint (MF) by seven world regions, 1990 and 2010, tonnes

If current systems of production and provision for major services will not be changed, nine billion people would require about 180 billion tonnes of materials annually by 2050, almost three times today's amounts

Cities and natural resource use

- **80% of global GDP** produced on just 2% of the land surface.
- **60-80 % of global energy** consumption
- **75 % of carbon emissions**
- **More than 75 %** of the world's natural resources
- Cities mainly depend on the import of **finite material resources** from outside their boundaries.



A Sustainable economic development will depend on **DECOUPLING** growth from escalating resource use and ensuring equitable distribution of the resulting benefits

Understanding urban metabolism as the key

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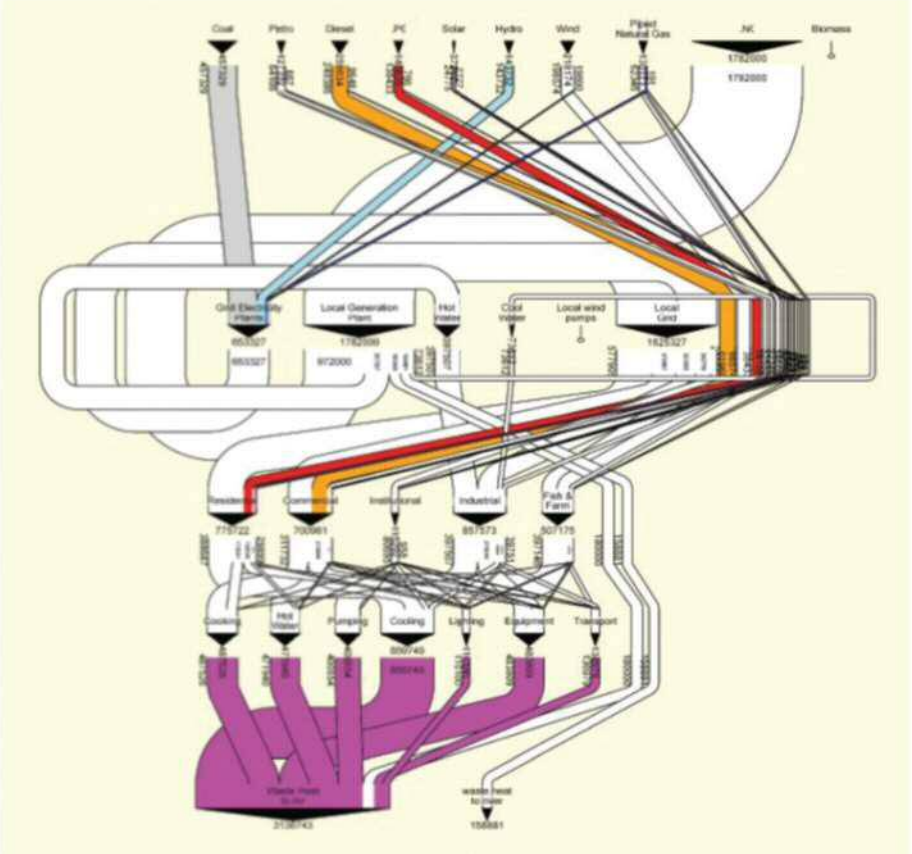
- Cities are complex networks of interlocked infrastructures that represent a web of interaction.
- The unique configuration of cities can give rise to very different levels of domestic material consumption (DMC)
- The **reconfiguration of urban infrastructures** requires a better understanding of urban metabolism

  ⇨”M**aterial Flow Analysis” (MFA)**



Different conception of Urban infrastructure

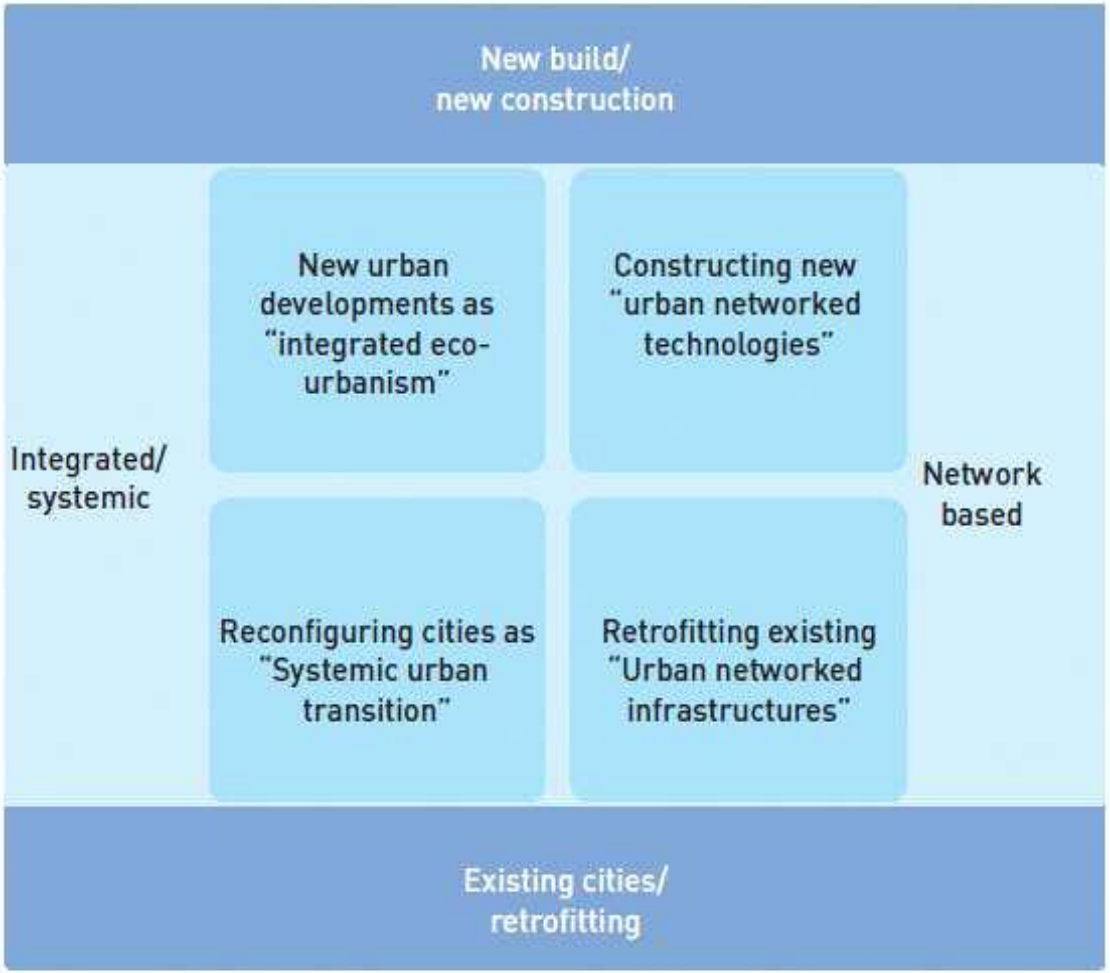
- Urban infrastructure are "**socio-technical systems**" that determine the nature of flow and interaction
- Urban restructuring therefore needs to go beyond the focus on physical construction and take into account the **human dimensions**
- **The transition to sustainable** urban infrastructure has positive impact on
  - -Employment opportunities
  - -Health, Education, Leisure
  - -Environment
  - -Overall quality of life

Models of sustainable urban transition

Four models of urban transition:

- "**Integrated eco-urbanism**" → e.g. an eco-island, new town, cluster development;
- "**urban networked technologies**" →focus on one particular technology such as water or energy;
- "**systemic urban transitions**" → retrofits of existing urban infrastructures using an integrated network approach;
- "**urban network infrastructures**" → focus on a particular technology, such as rapid bus transit systems, water efficiency infrastructures

Four types of rebundled green urban networks[124]



Source: Hodson & Marvin 2010

Opportunities for developing countries

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- **60 per cent** of the built environment required to meet the needs of the world's urban population by 2050 still needs to be constructed.
- Developing countries have **low 'lock-in' inertia** from existing unsustainable infrastructure
- These countries therefore have a **higher potential** for sustainable urban transition

Recommendations

- Environmental sustainability need to be **effectively mainstreamed** in urban development policy frameworks;
- **Public investments** should support infrastructure that stimulate low-carbon, resource-efficient and equitable urban development.
- Cities should set **specific targets** to use resources more efficiently and formulate plans to achieve them.
- Relevant **micro and city level innovations** need to be actively supported and networked
- Private sector need to be engaged in **translating proven innovations** into citywide projects.

Case studies

A set of **30 case studies** provide examples of innovative approaches to sustainable infrastructure, covering

- Community-based innovations
- Municipal initiatives
- Green enclaves
- Infrastructure alternatives

Waste: **Mariannhill landfill site near Durban, South Africa**

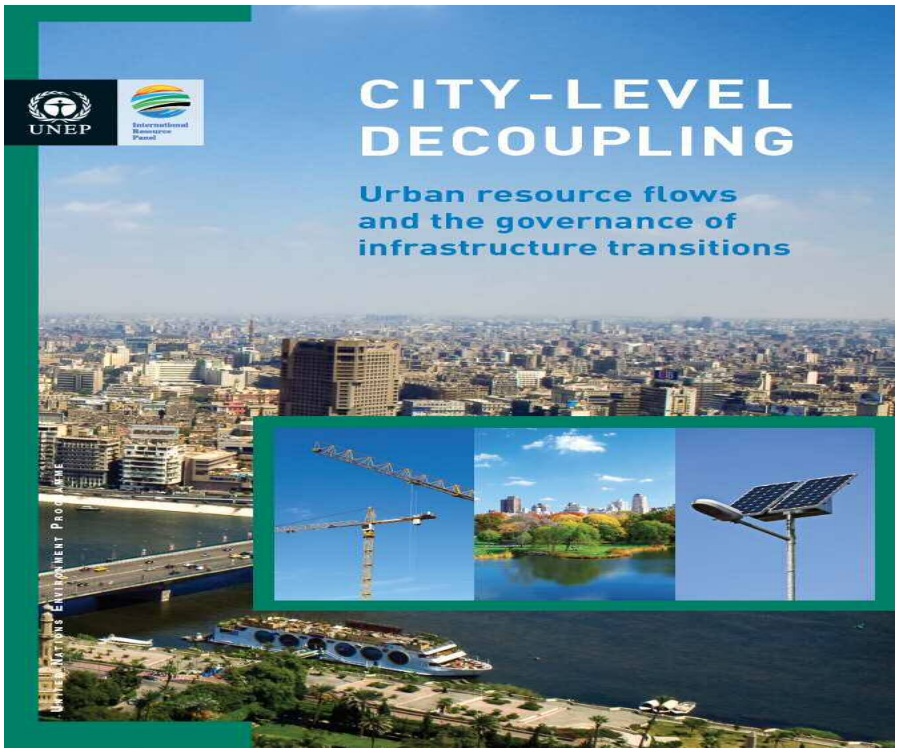
- Collection and treatment of 30 m^3 of toxic liquid waste from the site before re-using it for irrigation
- Generation of 650,000 kwh of electricity and making US$20,000 per month
- On-site tree nursery supporting indigenous plants and averting potential biodiversity loss caused by the landfill.

Green Vision for San Jose, USA, 2022

- Create 25,000 clean tech jobs
- 50% reduction in per capita energy consumption
- 100% renewable energy
- 100% recycle or reuse of waste water
- Build or retrofit 50 million ft^2 of Green buildings
- 400 miles of on-street bikeways
- 100% public vehicles run on alternative fuels

Resource Requirements of Future Urbanization

Mark Swilling (South Africa), Maarten Hajer (The Netherlands),
Blake Robinson (South Africa), Serge Salat (France),
Tim Baynes (Australia), Josephine Musango (South Africa),
Anu Ramaswami (USA), Sangwon Suh (USA),
Joe Bergeson (USA)



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