Data and complexities of resource flow analysis in the Gauteng City-Region

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Urban metabolism in policy & practice: A global Discussion
9 May 2019
The Gauteng City-Region (GCR)

Context

A *actually existing urban reality*, with dynamics (spatial, economic, social, environmental, etc. that need to be understood)

- Cluster of cities, towns and urban nodes - including cities of Johannesburg and Pretoria - make up the economic heartland of South Africa.
- Holds roughly a quarter of the South African population and a third of the national economy

A ‘political project’ to govern the GCR better through improved intergovernmental co-ordination

- Find the right institutional expressions of the idea of a city-region
- Given the city-region’s challenges and opportunities, shape the right government agenda
GCRO helps to build the knowledge base that government, business, labour, civil society and residents all need to shape appropriate strategies that will advance a competitive, integrated, sustainable and inclusive Gauteng City-Region.
Increasingly clear that cities cannot to continue to grow and develop in a way that assumes unlimited resources and that environmental costs can be externalised.

- Green Assets and Infrastructure
- Dimensions of a green economy
- Metabolic flows and infrastructure transitions
- Just sustainability transitions

These projects aim to build the arguments necessary for government to shift decision-making around urban development in the Gauteng City-Region.
The project:

- examines the prospects for reducing resource consumption and waste flows through the transformation of infrastructure networks in GCR
- tracks water, energy, biomass, waste and where possible other material flows, together with the infrastructure that conducts these flows
- provide an overall picture of total resource consumption and waste outputs, in order to help clarify what would be entailed in an infrastructure transition to increase resource efficiency and sustainability in the GCR.
The project set out to conduct an economy wide material flow analysis (EW-MFA) following the Eurostat (2001) guidelines.

Between 2011/12 and 2013/14 data was collected for the following flows:

- Waste
- Energy
- Water
- Food
- Other materials (e.g. cement)

Data collection was conducted by commissioned experts and GCRO staff.
Results from data collection

Vaal River System abstraction (megalitres per year) vs GDP (R millions constant 2010 prices)
Results from data collection
Energy demand by sector (in PJ) for City of Tshwane Metro Municipality 2004

- Transport, 36.5 PJ
- Household, 19.3 PJ
- Industry & construction, 34.5 PJ
- Commercial, 9.1 PJ
- Agriculture, 1.0 PJ
- Local government, 1.0 PJ
- Mining & quarrying, 0.0 PJ
Results from data collection

Liquid fuel consumption (tons per year) vs GDP (R millions constant 2010 prices)
Results from data collection

Domestic sales of cement (tons per year) vs GDP (R millions constant 2010 prices)
Despite some success, there were serious challenges – greater than what were anticipated

- **Data availability**: e.g. Cement & concrete was monitored closely with publically accessible data until 2008. Data was basis for collusion so data collection was shut down

- **Boundary issues**: the functional city-region is very different from the administrative boundaries, and different data custodians collect and store data very differently
Waste data seems plausible at an aggregated scale, but issues arise with closer inspection.

Fluctuations over time resulting from data availability issues - some municipal data is not available in some years.

Municipal solid waste (tons per year) vs GDP (R millions constant 2010 prices)
2006 waste results not believable
  • Tshwane & Johannesburg

Possible reasons from qualitative analysis
  • Issues at weighbridges
  • Disincentive to dispose of waste properly because of costs → bribes & broken weighbridges

Total waste flow data rendered meaningless

Waste generated 2006 (t/annum) for the Gauteng Metro and District Municipalities

<table>
<thead>
<tr>
<th>District</th>
<th>Waste (t/annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tshwane</td>
<td>2,435,500</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>1,492,000</td>
</tr>
<tr>
<td>Ekurhuleni</td>
<td>1,368,000</td>
</tr>
<tr>
<td>Sedibeng</td>
<td>373,071</td>
</tr>
<tr>
<td>West Rand</td>
<td>60,949</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,729,520</strong></td>
</tr>
</tbody>
</table>
Increasingly important to pair metabolic flow analysis (e.g. EW-MFA) with a range of other data and investigations:

- Bottom up data collection at household and neighbourhood levels
- Political ecology type analyses to explore where structural disincentives exist within data collection & sustainability transitions

The focus must remain on how these analyses can support a transition to sustainable urban development and in identifying where blockages exist – within physical flows and governance structures
Thank You