Urban form, mobility and greenhouse gas emission in African cities: the case of Yaoundé

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Outline (4 Steps)

1) Cameroon facing climate change due to transport
2) Urban Transport in Yaoundé: *Business as Usual* vs *Sustainability*
3) Impact Assessment in terms of GHG emissions
4) Key priorities for GHG mitigation in Yaoundé
Cameroon facing climate change due to transport

- Transport is the main source of GHG emission in Cameroon
- Vehicle fleet is rapidly increasing, largely constituted of old and small private cars
- Because of urban sprawl, main cities like Yaoundé face traffic jam (congestion) and increasing GHG emission
Transport as the main source of GHG emissions in Cameroon

<table>
<thead>
<tr>
<th>GHG Emissions - Energy Sub-Sector Sources</th>
<th>Unit</th>
<th>Available years</th>
<th>Latest Value</th>
<th>Per Capita</th>
<th>Absolute change from Earliest to Latest Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity/Heat</td>
<td>MtCO₂</td>
<td>1990-2012</td>
<td>1.75</td>
<td>0.08tCO₂</td>
<td>5.733333%</td>
</tr>
<tr>
<td>Manufacturing/Construction</td>
<td>MtCO₂</td>
<td>1990-2012</td>
<td>0.39</td>
<td>0.02tCO₂</td>
<td>72.27%</td>
</tr>
<tr>
<td>Transportation</td>
<td>MtCO₂</td>
<td>1990-2012</td>
<td>2.89</td>
<td>0.13tCO₂</td>
<td>66.09%</td>
</tr>
<tr>
<td>Other fuel combustion</td>
<td>MtCO₂e</td>
<td>1990-2012</td>
<td>3.10</td>
<td>0.14tCO₂e</td>
<td>13.89%</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>MtCO₂e</td>
<td>1990-2012</td>
<td>1.61</td>
<td>0.07tCO₂e</td>
<td>5.82243%</td>
</tr>
</tbody>
</table>
Evolution of Vehicle fleet in Cameroon and by energy in Yaoundé

Immatriculation of vehicles in Cameroon

Number of vehicles by type of energy in Yaoundé
Transport demand, traffic and urban sprawl in Yaoundé: an illustration

Simulated car traffic for 2030 for the city of Yaoundé

Traffic for 2010

Traffic Estimations for 2030

Source: 2010 Urban Displacement Plan; Yaoundé Urban Council
Transport demand, traffic and urban sprawl in Yaoundé: an illustration

<table>
<thead>
<tr>
<th>Year</th>
<th>Surface Area in Hectares (ha)</th>
<th>Rate of Progression relative to the last period (in %)</th>
<th>Average annual progression rate relative to the last period (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>1740</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1980</td>
<td>5300</td>
<td>205</td>
<td>8.2%</td>
</tr>
<tr>
<td>2002</td>
<td>15,919</td>
<td>200</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

*Source: Plan de Développement Urbain (PDU 2010)*
Urban Transport preferences in Yaoundé: *Business as Usual* vs *Sustainability*

**Inadequate institutional framework**

- Different actors in the urban transport governance assuming the same missions:
  - National level
  - Regional level
  - Local level
Urban Transport preferences in Yaoundé: *Business as Usual* vs *Sustainability*

*Policy focus on improving connectivity*

- Road construction and rehabilitation
- Traffic management
- No parking strategy
- The question of private motorized vehicles
Urban Transport preferences in Yaoundé: Business as Usual vs Sustainability

The City don’t have any Mass Transit System or Project

Passengers Modal Share in Yaoundé

About 85%  
2,9%  
10%
Urban Transport preferences in Yaoundé: *Business as Usual* vs *Sustainability*

*Lack of pro-poor or other vulnerable groups policy and strategy*

- Mobility varies between the urban center (CBD) and the different local Councils with access to the former appearing to be differentiated in mobility.
  - Poor households are located at the periphery;
  - Far from the center where they work;
  - These poor households don’t have their own cars;
  - The quality of the roads they use are poor;
  - These poor households have the longest travel time;
  - The share of income spent on mobility is high...
Impact Assessment in terms of GHG emissions

• The study shows that:
  • Accessing collective transportation in highly (dense) populated zones is significant in reducing CO₂ emissions;
  • Both the population density and density of establishments (variable capturing density) have a significant effect in reducing CO₂ emissions.
Urban form and mobility

<table>
<thead>
<tr>
<th>Types of Zone</th>
<th>Number</th>
<th>Origin</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Density</td>
<td>67</td>
<td>0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Medium Density</td>
<td>107</td>
<td>8.4%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Low Density</td>
<td>180</td>
<td>91%</td>
<td>92.2%</td>
</tr>
<tr>
<td>Total</td>
<td>354</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Proportion of displacements in Yaoundé: Origin/Destination
Mobility and CO2 Emission

• Looking at the different modes of transportation,
  • Private car owners have 1.66 more chances of emitting more CO\(_2\) than individuals using a bus/minibus for movements;
  • Using a taxi (cab) for movements have respectively have 1.85 more chances of emitting more CO\(_2\) than using a bus/minibus for movements;
  • The effect of average income appears to be modest. An increase in revenue only marginally increases CO\(_2\) emissions by 0.073
Key priorities for GHG mitigation in Yaoundé

- Working on a urban SUMP in Yaoundé
  - New institutional framework (Urban transport Law...);
- Mass transit system;
- Walkability on the center district;
- Integrated land use and transport plan for demand management;
- Urban transport funding mechanism;
- Vehicle standard (age, emissions, mileage).
The research paper was prepared with the collaboration of:

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- Epo Ngah Boniface, Lecturer at the University of Yaoundé II.
Thank you for your attention