Weight of the cities

source : "World urbanization prospects - The 1994 revision", ONU, 1995
Size of the cities

- According UNO, in 2015, in developing countries:
  - 23/27 cities over 10 millions inhabitants
  - 36/44 cities over 5 millions inhabitants

- With this size of the cities, mobility is very crucial.

- Example of Bangkok: from 1972 to 1992: average length of trips increase from 2,5 to 6 km.
Size of cities and GDP

- GDP increase with the size of the cities
  - Sao Paulo GDP per capita (1990): 4694 $ = 1.7 Brasil GDP per capita (2797 $)
  - Calcutta GDP per capita (1190): 953 $ = 3 India GDP per capita (299 $)

- Development increases the part of population living in the cities and, so on, mobility problems
# Transport and environment

## Green house emissions

<table>
<thead>
<tr>
<th></th>
<th>Atlanta</th>
<th>Barcelona</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (millions)</td>
<td>2.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Area (km²)</td>
<td>4,280</td>
<td>162</td>
</tr>
<tr>
<td>CO₂ Emissions (t CO₂/ha/year)</td>
<td>7.5</td>
<td>0.7</td>
</tr>
</tbody>
</table>

From the table, we can see that Atlanta has a higher population and area compared to Barcelona, leading to higher CO₂ emissions from public and private transport. The CO₂ emissions per capita of CO₂ in Atlanta are much higher than in Barcelona, indicating a possible need for more sustainable transport solutions in larger cities.
## Transport and energy

<table>
<thead>
<tr>
<th>Density</th>
<th>Walk, cycle, PT</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhabitants/ha</td>
<td>Mjoule/inhabitant</td>
<td></td>
</tr>
<tr>
<td>USA Canada</td>
<td>18.5</td>
<td>14%</td>
</tr>
<tr>
<td>European Union</td>
<td>55</td>
<td>50%</td>
</tr>
<tr>
<td>Asia (rich cities)</td>
<td>134</td>
<td>62%</td>
</tr>
<tr>
<td>Asia (other cities)</td>
<td>190</td>
<td>68%</td>
</tr>
<tr>
<td>Africa</td>
<td>102</td>
<td>67%</td>
</tr>
<tr>
<td>South America</td>
<td>90</td>
<td>64%</td>
</tr>
</tbody>
</table>

Source: IUTP
Pollution (1)

- The level of pollution in Mexico in 1991 was the same than in Paris in 1965.
- Pollution is due to industry but also, and more and more, to traffic.
- In African cities, the development of motorbikes-taxis, cheaper than car-taxis, increase hardly pollution.
## Pollution (2)

<table>
<thead>
<tr>
<th>Transport mode</th>
<th>Trips</th>
<th>Pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRT</td>
<td>0.2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Bus</td>
<td>8.4</td>
<td>1</td>
</tr>
<tr>
<td>Metro</td>
<td>13.2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Microbus</td>
<td>47.8</td>
<td>19.5</td>
</tr>
<tr>
<td>Taxi</td>
<td>14.7</td>
<td>14.7</td>
</tr>
<tr>
<td>Private car</td>
<td>20.3</td>
<td>64.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Mexico DDF
Safety

- In developing countries, the number of accidents and killed people increase very quickly with the traffic.

- Death rate:
  - Cities of South America: 150 to 300 deaths for 100,000 cars
  - Cities of developed countries: 15 for 100,000 cars.
Transport and equity

- Poor people leave generally on the outskirts of the cities. So, they have long trips to have access to employment, school, public facilities.

- In Africa, month public transport ticket represents about 25% salary. So, trips by foot (concerning mainly the poorest) increase: about 50% in Bamako or Ouagadougou.

- Public transport with affordable fee allows access to all the opportunities of the cities.
Transport and efficiency

- Sustainable development of the cities depends on:
  - Accessibility for freight and persons, in affordable time
  - Quality of life: pollution, noise, ...

- Public transport increase the efficiency of the cities: in the same space, more people can move, with less pollution and noise than by car
Sustainable mobility plans (1)

What is that?

- Global policy of transport, with push measures to develop use of public transport and bicycle, and pull measures to control the use of cars
- Very important link with land-use
Sustainable mobility plans (2)

Key element for the success of the plan: involvement of responsible of all sectors concerned by mobility:

- Road maintenance
- Traffic and parking
- Public transport, including representatives of informal transport
- Police

And also responsible for housing.
Sustainable mobility plans (3)

Involvement of stakeholders

- Mobility plan has to answer the inhabitants needs.
- The involvement of inhabitants (workers, women, ...) very useful to:
  - Define cheap and adapted measures
  - Increase public awareness of effects of the mobility choices on environment and health
Sustainable mobility plans (4)

Push measures

- Developing public transport
- Developing intermodality
- Sharing the road space:
  - Sidewalk and areas for pedestrians
  - Lanes for bicycles and buses
  - Right of way for BRT and LRT
- Priority for buses, BRT and LRT at traffic lights
Sustainable mobility plans (5)
Pull measures

- Parking control and restriction

- Taxation of the use of cars: petrol tax, road pricing
Link with land-use

- Low density = mobility by car
- High density = public transport, cycling, walking
- Hospitals, universities, commercial centers, ... have to be developed in central areas and not outside the dense city
Example of Curitiba (1)

- Curitiba, Brasil (state Parana)
- City inhabitants: 1 800 000
- City area: 435 km$^2$
- City density: 4150 inhabitants /km$^2$
- Urban area inhabitants: 2 700 000
Example of Curitiba (2)

- Master plan (1966)
  - Stops the sprawl development
  - Organizes development along 5 main axes
  - Includes public PT network

- On the main axes:
  - 2 lanes for BRT
  - Skyscraper allowed along these axes
  - Density decrease with distance from these axes
Example of Curitiba (3)

- Public transport network:
  - 340 lines, 221 stations (25 for interchange)
  - 60 km lanes right of way for 1900 buses
  - Network hierarchy: express lines, main lines, local lines

- Public transport use:
  - 85 % trips made by public transport
  - Rate of satisfaction : 89 %
Developing use of public transport in developing countries (1)

- Affordable transport for all:
  - Supply (metro, LRT, BRT, buses, minibuses, ...) linked with population needs
  - Fee linked with population revenue
Developing use of public transport in developing countries (2)

- High quality of service for those able to pay
  - Public transport has to compete with private car
  - « First class » public transport (seats for all, door to door, ... and high fee) very useful to develop use
The role of Local Governments

- Mobility, land-use planning, housing are key issues
- Involvement of stakeholders essential for success
- Choices and decision: level closed the citizens
Thank you for your attention

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