



Sustainable City Management - Case Study of Curitiba, Brazil's Ecological capital

The Rio Earth Summit (1992) recognised the need to move away from the unsustainable development of recent decades, which took little account of the finite nature of resources or the damage being done to our environment. Sustainable development was seen as essential.

One aspect of initiating sustainable development is to look at the ways cities are planned and run. The launch of the European Sustainable Cities Campaign in 1993, and the European Sustainable Cities and Towns Conferences (1994, 1996 and 2000) are European outcomes of the 1992 Rio Earth Summit. The campaign and conferences have identified integrated town planning as one way of achieving sustainable cities. This Factsheet examines Curitiba in Brazil, a city which has made great progress towards sustainability.

Fig 1 Summarises the main features of a sustainable city by using the Rodgers model

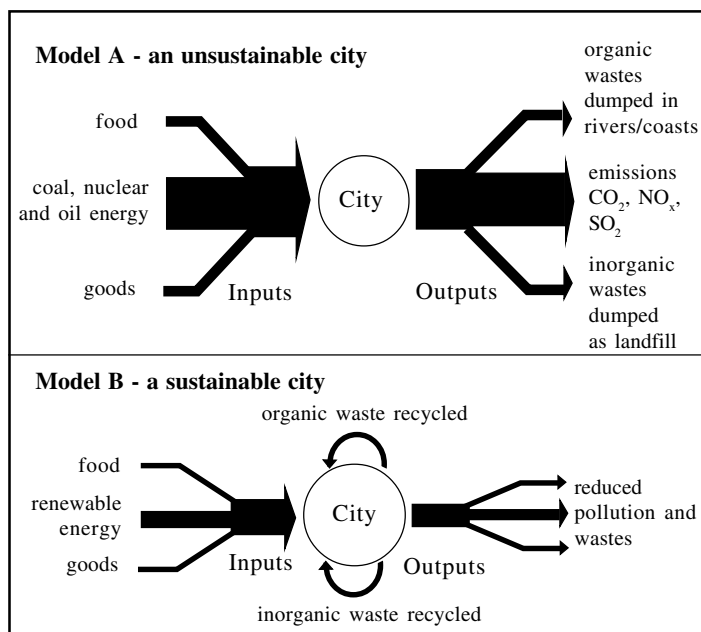
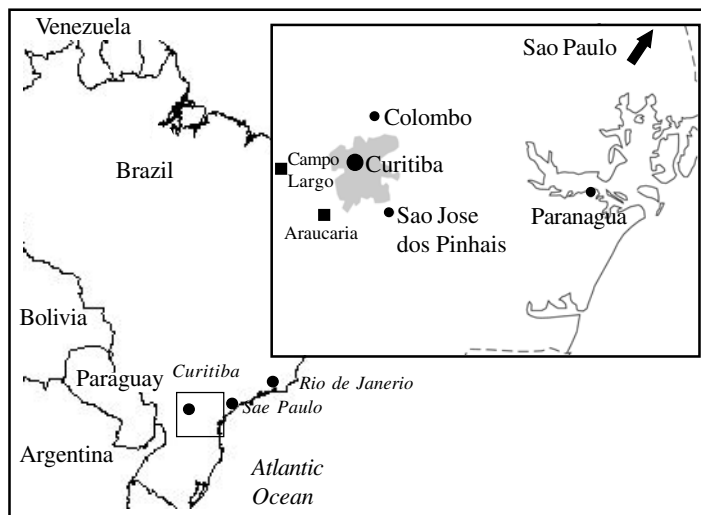


Fig 2 Location of Curitiba in Brazil



Background to Curitiba, and the influence of Jamie Lerner

Curitiba is 220 miles south-west of São Paulo, and is the capital of Paraná State which is one of the prime agricultural states in Brazil. Like all Latin American cities, Curitiba grew rapidly in the second half of the twentieth century, from 150,000 people in the 1950s to almost 1.6 million today. (Tables 1 and 2). Note that the population growth rate within Curitiba has been consistently higher than that for Brazil as a whole.

Table 1 - Populations of Curitiba and Brazil (millions)

	1980	1990	2000
Curitiba	1.03	1.32	1.59
Brazil	119	147	170

Table 2 - Population growth rates for Curitiba and Brazil (%)

	1970-80	1980-91	1991-2000
Curitiba	5.34	2.29	2.11
Brazil	2.48	1.93	1.61

Curitiba has suffered from all the typical problems brought by rapid urban growth: mass unemployment, transport congestion, lack of basic services and uncontrolled growth of squatter settlements. However, the city has been redesigned and has become a world recognised model for sustainable urban planning.

This redesigning process started in the 1960s when a group led by Jamie Lerner, a young architect and urban planner, approached the mayor and suggested that the city needed a development plan. The group, who did not agree with the trend for huge projects built with borrowed money, were advocating a lower cost approach, which would look after the environment while still addressing the needs of the people – a sustainable approach.

In response, the mayor sponsored a competition for a Curitiba master plan and circulated the best entries, discussing them with the people of the town. He then returned the best plan to the group of architects asking them to amend it taking into account the views of the people. These architects became formally known as the Institute of Urban Research and Planning. Their leader, Jamie Lerner, was appointed Mayor for the first time in 1971 and has worked alongside the Institute ever since. He is now Governor of the state of Paraná. The Institute continues to monitor the plans and research future possibilities; they ensure that everyone understands the plan and that everyone is therefore working towards the same end point.

When he took over as mayor, Lerner had to continue to think small and cheap as there was not much money available. One of his main beliefs was that his dreams for the city needed to be shared by the citizens so that they would also accept some responsibility for achieving them. Part of his success has been based on his willingness to accept that initial plans sometimes have to be adapted in the light of experience; to this end the planning institute meets with the mayor every week to discuss progress and required changes.

Sustainable Developments in Curitiba

The next six sections look at various facets of sustainability.

1. Transport

In redesigning Curitiba, Lerner first created an efficient transportation system as he saw this as the key to integrating Curitiba's people with their living and working environments. A complete overhaul of the transportation system has taken place.

Arterial roads

- Work began in 1974 when the first two of five arterial roads were started which would form structural growth corridors and dictate the future growth pattern of the city. These arterial roads are radial, going from the outside of the city to the centre.
- Buses were used as the public transportation along these arterial routes - much cheaper than subways.
- These arterial roads have two central lanes that are used only by the express buses; on either side of these are lanes for local buses and cars - one lane going into the city centre and the other lane going out towards the edge of the city. This allows the express buses to travel faster without any danger to other traffic.

- The five arterial roads were finished in 1982 and measure 60km in total. Five concentric roads (covering 185km in total) circle the centre of Curitiba, producing a spider's web effect, and a further 300km of feeder roads ensure that everyone has easy access to the bus network. This network allows everyone to reach the arterial roads and the express buses, and saves people going into the centre unnecessarily.

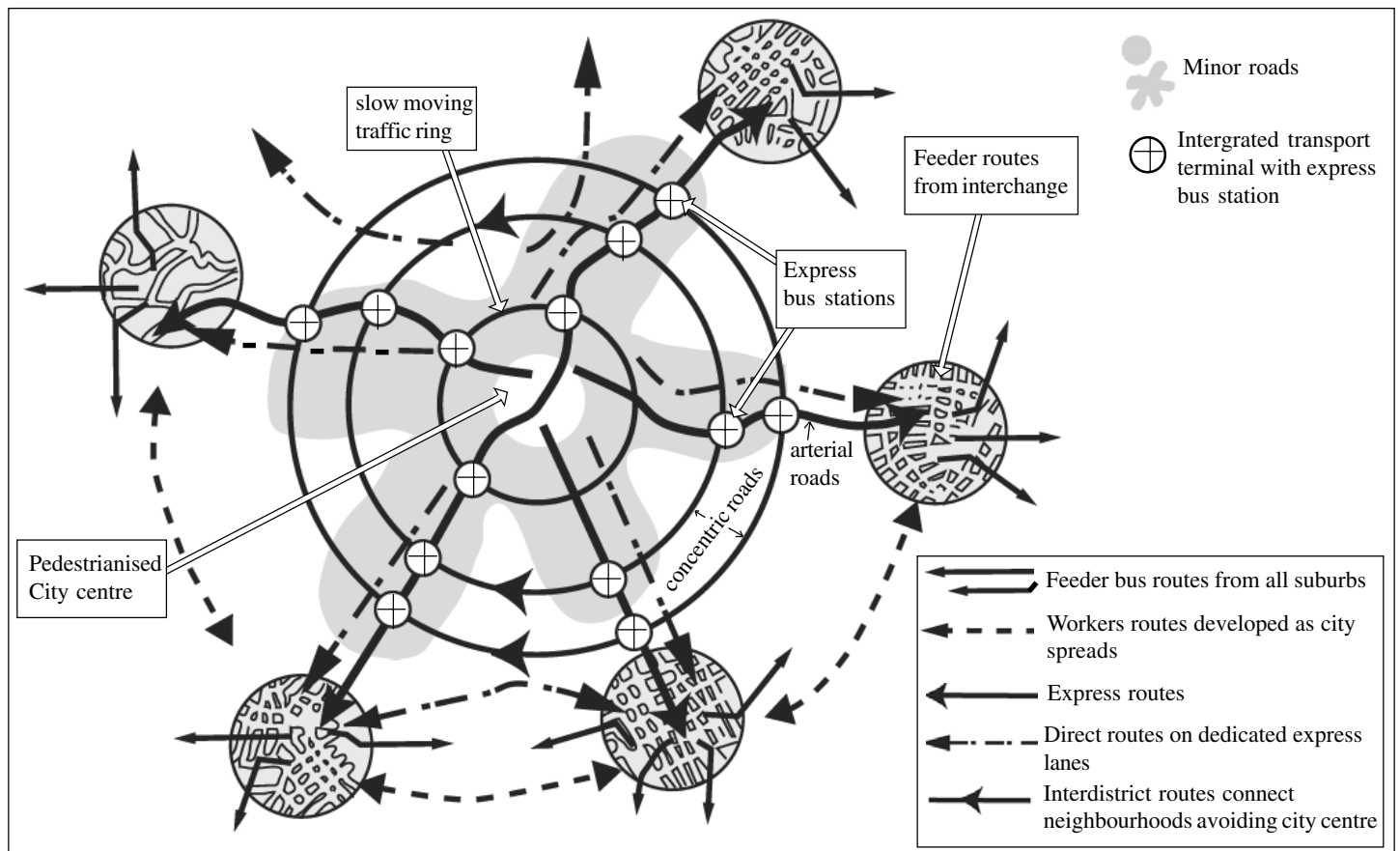
Pricing

- The buses are affordable and passengers only need one ticket to make a journey regardless of how many times they change buses.
- Up until 1979 the cost of a ticket reflected the length of the journey, with longer journeys costing more; however this was changed as they realised that such a system disadvantaged the lower income families who tended to live on the outskirts of the city. Now tickets are a single price regardless of the length of the journey.

Usage and advantages

- Public transportation is now used by 75% of commuters on weekdays with the result that there is 25% less congestion in Curitiba, and 30% lower fuel consumption than in other similar sized Brazilian cities.
- To allow for more passengers, they have introduced bi-articulated buses with three compartments, each bus holding up to 270 people.
- Greater efficiency is achieved with tube shaped bus stops with doors at the same level as the doors of the buses; passengers buy their ticket in advance and enter through one end of the bus while passengers exiting leave from the other end. This allows for faster loading and unloading so the bus idles for less time creating less air pollution. The system represents a time saving of up to an hour a day for passengers and reduces operation costs by 18%.
- The government operates the system in partnerships with private companies. The private companies operate the buses and the city council maintains the other facilities such as the tube stations. The heavy use of the system allows it to be run at a profitable level and without any direct subsidy from the city council.

Fig 3 shows a summary of the Curitiba transit system



2. Land use and public services

Everyone has easy access to public transport. The five arterial routes from the city centre to the outskirts have been used as the **growth corridors** of the city. Two blocks of high-density buildings line each of the arterial routes ensuring firstly that growth was radial rather than all downtown or haphazard, and secondly guaranteeing that people will use the express bus systems. As you move away from the five growth corridors the building density decreases through urban apartment buildings to low-density residential neighbourhoods.

'**Citizenship streets**', which are two-storey buildings, have also been built along the five arterial roads close to some of the most heavily used bus terminals. These buildings offer access to public utilities, such as water and electricity, and public services, such as police stations, job centres and job training. The streets also contain roofed multi-purpose sports grounds and conference rooms that are available free of charge or at a very low cost. The major hospitals are also located along the express bus routes. Total health care centres provide health care for all children up to 5 years for 24 hours a day. All Curitiba's citizens are now provided with clean drinking water and 90% have access to sewage systems as a result of the Environmental Cleanup Programme.

Fifty '**Lighthouses of Knowledge**' are located in accessible areas of the residential neighbourhoods. These are brightly coloured, lighthouse shaped towers that provide access to books and the Internet and are aimed particularly at children. The staff are selected for their passion for reading and they work in collaboration with the schools. There are policemen at the top of the towers and the towers are lit during the night, which helps improve security in the neighbourhoods. These are also 40 special centres for feeding 'street children' and teaching them basic skills.

Lerner was also one of the pioneers of **pedestrianised shopping streets**. He met with a great deal of resistance from shopkeepers when he proposed pedestrianising Rua 15 de Novembro in the centre of Curitiba in 1972. The shopkeepers feared the lost traffic would reduce their profits so Lerner agreed that it would initially be done on a thirty-day trial. The road was closed at 6pm on a Friday night and workmen worked all weekend laying the new pavement, installing street lighting, kiosks and planting thousands of flowers. By mid morning on the following Monday the street was so thronged that the shopkeepers from the surrounding streets were petitioning to have the scheme extended to include their streets.

The original street, Rua 15 de Novembro, is locally called Road of Flowers as it is so beautifully kept and full of flowers; street children do a lot of the tending to the flowers. One street in the area has been turned into a 24-hour street where none of the cafes, bars, newsagents and chemists ever closes.

3. Recycling

Recycling was introduced in schools. Children then took the idea home and encouraged their parents to take part. e.g. the Green Swap Programme

4. Parks, open space and flood control

The number of parks and amount of open space in Curitiba has increased dramatically over the last 30 years; in 1970 there was 0.5 m² of open space per resident, nowadays that figure has increased to 54m² per resident with 26 parks and woodland areas spread throughout the city. 1.5 million trees have been planted and builders get a tax break if their projects include green areas. The World Health Organisation recommends 16 m² of green space per resident.

Many of the parks are located alongside rivers and in river basins and the land is protected so that nothing can be built along it. This has been done as a way of protecting Curitiba from the effects of flooding. The woodlands slow the infiltration of the rain and use some of it, thus reducing the amount that reaches the rivers and lowering the peak discharge. Lakes in the parks act as storage points, regulating the amount of water that reaches the river following storm events. Costly flood events are a thing of the past. 100 km of bicycle paths, (the longest in Brazil) connects to the bus network and links to the city's main parks.

5. Economic Sustainability

During the 1970s Brazil experienced an economic miracle and became a NIC (newly industrialised country). During this period Curitiba developed an Industrial City (C.I.C.) some 10 km WSW of the city, to upgrade the city's economic profile and provide jobs for its citizens. The actual creation of CIC was chosen to be in an environmentally sustainable site the dominant SE trade winds would blow any pollution away from the Curitiba city, and nearby water sources would be fully protected. Industrial facilities were integrated with public transport and other services. Whilst the land was a "green area" the aim was to create a green park containing beautifully designed industrial developments (some 15% of the area is still Greenfield). Additionally, 20,000 housing units have been built in the area, so workers could cycle to work.

By 2000, over 550 factories were operating in the industrial city, providing some 50 000 direct jobs and 150 000 indirect jobs, for a city of 1.8 million people. These factories included major TNCs such as Bosch, Philip Morris, Volvo, and Toyota. The dominant focus was on high technology, such as electronics and telecoms, but also included textiles and plastic products.

As well as the industrial city, there are nearly 6000 other industrial enterprises in Curitiba, right across the full range of industrial activity. This high level of diversification is again very beneficial in sustaining the quality of life of Curitiba's citizens.

6. Return home schemes and improvements in the countryside

In spite of tremendous success in providing economic sustainability via a range of employment, Curitiba like other cities in the LEDCs suffers from a constant influx of migrants trying to leave the harsh life in the countryside in search of a better life. However when they arrive in the cities they find it hard to find jobs because of their lack of qualifications and they put increasing pressure on the already stretched city services.

The Green Swap programme

- Citizens asked to sort rubbish into organic and inorganic - rubbish is then collected and further sorted at the plants.
- The plants employ recovering alcoholics and homeless people thus giving them a chance to improve their lives.
- Recovered materials are sold to local industries and Styrofoam is shredded to stuff quilts for the poor.
- In the favelas, where refuse lorries cannot negotiate the narrow unpaved roads, the poor are encouraged to sort their rubbish and bring it to collection points.
- At the collection points the favela dwellers receive, in exchange for their rubbish, basic food bags of rice, beans, eggs, bananas and carrots that the city buys inexpensively from the state's farmers.
- The whole recycling program costs no more than landfill and has the advantages of improving public health with less litter, rats and disease, as well as improving nutrition amongst the poorest sectors of society, and creating jobs.
- The program is voluntary, but 70% of households take part and 20% of Curitiba's waste is now recovered or recycled.

Curitiba has adopted a two-part approach. Social workers, who are stationed in the interstate bus stations, provide the first part of the approach. They try to spot potential migrants and offer them free bus tickets to return home.

The second part of the approach is to try and improve life in the countryside to eliminate the push factors making people want to move to the cities in the first place. One example of this is the 'Rural Village' programme, which has been set up by a partnership between the local government and the state government as a means of keeping seasonal agricultural workers in the countryside. Big areas of land are bought and divided into 5000 m² plots on which a house of 44.5m² is built.

Families who work daily during harvest time for big land owners are given the land and a house, and they can then look after their own land outside harvest time, growing food for themselves and selling the surplus. The programme gives two years of technical assistance and the land is always where the family can have easy access to schools and health facilities. 74,000 people or nearly 15,000 families have already benefited from the scheme.

The state government has also improved roads to give better access to essential services, as well as improving drainage systems and energy transmission networks. They have also opened the 'Escola do Campo', a school whose aim is to give professional qualifications to young farmers, which they will then share with their families. The course lasts three years and students start at 14; they spend one week in school followed by two weeks back at home passing on the information. More than 10 million people have already benefited from the scheme if the families of participants are counted.

Conclusions

Table 3 shows how successful Curitiba has been compared to Brazil overall in improving the quality of life of its inhabitants. The citizens think they live in the world's best city.

Exam Questions

- (a) Outline some of the sustainable developments that have taken place in Curitiba. (10 marks)
- (b) What have been the major reasons for the success of these developments? (10 marks)

Answer Framework

- (a) Can be straightforwardly answered using this resource: Try to group your ideas under a framework of environmental, social, and economic sustainability.

Sustainable city management can be considered under three aspects:

Environmental

- minimising damage to the environment, e.g. reducing pollution and waste
- Preventing the depletion of natural resources, e.g. using renewable energy, less reliance on fossil fuels, a compact city to minimise travelling distances
- Developing a green city environment, e.g. Green space initiatives

Economic

- providing adequate and secure livelihoods and/or
- access to income via a range of employment

Social

- provides a reasonable quality of life, e.g. affordable housing
- provides opportunities to maximise personal potential. e.g. education, medical services
- provides political freedom, e.g. equal opportunities and community involvement in the decision-making process

- (b) A number of possible answers include:

- Integrated nature of planning of practical problem solving
- Emphasis on sustainable green growth – linking both environment & economy
- Involvement of people at all stages in planning [bottom up]
- Emphasis on help for all – even the very poorest people [equality]
- Dynamism of leader – readiness to go for workable medium cost solutions

Further Research and useful websites

People & Planet. Vol 5 Number 2 Special Habitat 2 issue

Brazil Advanced Case Studies Paul Guinness Hodden & Stoughton 1988

<http://www.curitiba.pr.gov.br> - there is a section in English, which gives some useful information and has photos of some of the schemes and places mentioned in the text.

<http://www.busways.org> - bus ways in Curitiba

<http://www.solstice.crest.org/sustainable/curitiba> - Curitiba transport planning

<http://www.midrand-ecocity.co.za> develops the idea of Ecological Cities with an example in S.Africa

Table 3 Quality of life in Curitiba compared to Brazil

	Curitiba	Brazil
Per Capita Income GDP (US\$)	8149 (2000)	7037 (1998)
Employed Population with income above 2 minimum wages (%)	70	N/a
Urban housing units with running water (%)	97	66
Urban housing units with electricity (%)	99	68
Urban housing units with sewage facilities (%)	61	40
Urban housing units with garbage collection	98	55
Infant mortality per 1000 alive	20	34
Telephone terminals per 1000 inhabitants	272 (1999)	238 (1999)
Cars per 1000 inhabitants	267	110
Literacy (%)	94	85
Basic Inoculation care	90	61
Green area per person	54m ² (Highest in Brazil)	N/a

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