

Curitiba – a model for sustainable development

by John Holtzclaw

I'm back from viewing the remains of civilizations up to 5000 year old in Peru, to a model of sustainable development in Brazil. I had an excellent briefing at Curitiba's sustainable planning agency, IPPUC (Instituto de Pesquisa e Planejamento Urbano de Curitiba), and discussed planning with Mayor Taniguchi and former Mayor and Governor Jaime Lerner.

In the 1960s, architect, professor and Mayor Jaime Lerner led this Brazilian city of half a million, some 350 km (over 200 mi) WSW of Sao Paulo, to plan for an economically and environmentally sustainable future. The city has grown to 1.6 million, 2.7 million in the metropolitan area, and Curitiba's successes speak for themselves. It has one of the highest per capita incomes in Brazil, and a poverty level below 8%, well under the national average. But, it is most famous for developing an affordable transit system that works. Sustainability pays.

But the story is much broader. And instructive.

They developed a comprehensive plan: coordinating land use, open space, recycling, schools, city services, improvements to low income neighborhoods and public transit.

Recycling

The city picks up recyclables locally separated into four categories: glass, plastic, paper and metals.

Old buses have been recycled into classrooms to teach trades.

Green Exchange

In low income neighborhoods whose narrow streets prohibit recycling truck access, local residents are paid to bring separated recyclables out in hand-trucks. The pay is in improved local schools, city services and food grown in city vegetable gardens.

Citizenship Streets

Eight Citizenship Streets bring city government to local neighborhoods. These are colorful, block long buildings with city offices serving the local area, economic services, one-stop permitting, social and athletic facilities, and public transit centers.

Transportation

Biking – the city has 120 km of bikeways. Some are curbside on wide sidewalks, identified as bike lanes by surface color and texture. They continue across intersections with dashed lines. However, there was no signage or surface markings to identify them as bike-only lanes. Bikes are not allowed on BRT lanes, but I observed many infractions and was told of many biker injuries.

Public Transportation – Curitiba is justifiably proud of its public transportation, and the invention of Bus Rapid Transit (BRT). The city has five main types of bus services.

* grey cross-region fast Ligeirinhos buses. These are standard length high-floor vehicles, using the terminals and some of the tube stations -- in fact the tube stations were originated for them. They operate on regular city streets, freeways and BRT lanes, being a little bit faster because they have very few stops.

* red-orange biarticulated Expressas (BRT) buses. BRT operates in five corridors, radiating out from the Centro. These corridors are further discussed under Development, below. The buses are boarded at the same-level-floor from tube stations and the terminals. Passengers pay an attendant on entering the tube station so they can quickly board the bus through the central doors, while others depart through the end doors. The tube stations allow easy weather-protected transfers. The stations are ½ km or more apart, reducing stopping and boarding time. Except in some congested areas, the buses operate on separated bus-only lanes or streets. A set of BRT lanes (one in either direction) occupies one side or the center of wide avenues, separated by barriers from mixed flow lanes. The pavement on the bus-only BRT lanes is well maintained, giving a smooth ride. The tube stations are located on wide sidewalks or islands alongside the BRT lanes. Blocks along BRT avenues tend to be long and intersections far apart. There has been talk of replacing some lines with light rail or subways, but funding is not available.

* yellow local Alimentadoras buses. These are standard 3-step high-floor vehicles, with fares paid to an on-board conductor. They connect with BRT lines and terminals to distribute passengers locally.

* white Troncias downtown circulation minibuses. These are standard 3-step high-floor vehicles, with fares paid to an on-board conductor.

* colorful Linha Turismo buses circulate on a 2 ½ hour round trip to 25 major city attractions – urban centers, museums, monuments, parks and architecture, allowing passengers to get off and on at 5 stops.. These are standard 3-step high-floor vehicles, with the fixed one-day pass bought from the on-board conductor. There are also special buses connecting hospitals, connecting nine neighborhoods, and for handicapped students.

Fares can be paid with smart cards or cash. However, with the exception of Linha Turismo, the system has no discounted daily, weekly or monthly passes like the Paris Metro's Carte Orange or San Francisco Muni's Fast Pass. Employers are required to provide monthly transit passes – and lunch tickets -- to employees.

Successful public transit depends upon a number of symbiotic factors, including:

* a wealth of pedestrians – with few exceptions, once a person gets into her car, even if only for a loaf of bread, you've lost her to public transit. Where people walk for many trips, they are likely to hop into public transit for those longer ones. What does it take to get people walking?

+ many nearby destinations, or short trips. That means high density. With scant parking since it can easily cut the density in half, and attract traffic congestion, with its pollution and threats to pedestrians.

+ mixed uses – markets, restaurants, services and parks in residential areas.

+ broad sidewalks, short block fine-grain street grid, and slow, safer traffic.

+ all within easy walking distance of transit stations.

- * public transit that gives fast trips between major centers, yet has good connectivity to adjoining areas. Fast trips on trunkline routes require:
 - + convenient, frequent stations, in pedestrian areas.
 - + enough distance between stations to keep stops less frequent and speeds up. This, of course, conflicts with the previous requirement, and requires compromises.
 - + quick boarding – pre-paid boarding area, wide doors and no steps up or down to board.
 - + fast transit vehicle speeds, not impeded by auto, truck or pedestrian traffic, streetlights, etc.
- * user convenience – cheap or no fares, multi-ride fare cards, easy connectivity (transfers), transparent system operations and good information on where routes go.

Curitiba's affordable solution has been:

- * mixed-use, high density neighborhoods along major transit corridors.
- * fast, high-capacity BRT along major transit corridors, connecting to fast cross-region buses, and to local buses.
- * smart farecards and monthly employee passes.

BRT works well because:

- * tube stations are located along high density, high pedestrian corridors.
- * passengers step up onto the tube station boarding platform and pay the attendant to enter the boarding area.
- * the high-capacity buses are frequent and have wide entry doors.
- * the buses operate on their own right-of-ways with few intersections.

But BRT has limits. Increasing its capacity requires increasing the number of operating buses—each with a driver. And increasing the capacity of the tube stations. and the number of station attendants. Some stations are already side-by-side doubles or triples. These staff and equipment requirements increase costs. As the bus flow increases, some buses will be slowed by queuing behind others already at tube stations. At this point rail becomes more attractive because its capacity can be greatly expanded with longer stations and trained cars. Electrification and grade separated, often elevated or underground, right-of-ways increase transit speeds. Eric Bruun ericbruun@earthlink.net and others have analytical models to compare operating costs of LRT and BRT.

Zoning and Development

From the 1960s, IPPUC recognized that public transit success depends upon a wealth of destinations and pedestrians along the routes. This requires high density development, so they planned accordingly. The BRT corridors are zoned for 10 to 20 story buildings on either side of the BRT avenues, with 4 to 7 story buildings on adjacent blocks. These linear high-rise corridors spike the city's skyline. Canadian and U.S. Transit Oriented Development takes another approach -- high rises within ¼ to ½ mile (0.4 to 0.8 km) of the transit station, providing much broader high-density areas near stations.

There was some neighborhood resistance to up-zoning early on. But it was alleviated by mutual discussion and government consultation. IPPUC develops plans with specific clear rules and zoning for an area, which must be adopted by the City Council before implementation. People have confidence in the process.

In a pattern typical of European cities, the wealthy live in convenient, high density neighborhoods near the city center, with lower income families in lower density peripheral areas.

Open spaces and parks

The city has an abundance of dedicated public open spaces, and a general leafy, campus-like, ambiance. Broad green corridors line the rivers that border the city on the east and west sides. Smaller green spaces border the two smaller rivers running north-south within the city. In order to protect these areas from development, and to create new open spaces, landowners can exchange development rights for height increases elsewhere (Exchange of Builders Rights in Curitiba, or Transfer of Development Rights in the U.S.). Similarly, large landowners can use EBRs to cluster development and increase open space. Or use EBRs to preserve buildings of historical, cultural or architectural value. In a show of neighborliness, Curitiba offered EBRs to suburban land owners to preserve land along the other side of the rivers, but no suburban government has allowed it. EBRs can also be sold to provide low income housing funds. The city has 55 m² of dedicated open space per person (1 acre/73 people).

However, there is room for improvement. I offer a couple simple suggestions to increase walking and public transit use and reduce traffic. Public transit use and levels of walking are synergistic – where one is high, so is the other. Only where many people walk is public transit patronage high.

1. Provide transit maps.

I spent my first full day in Curitiba haunting Tourist Information offices, bookstores, news kiosks, and tube stations looking for a transit map. Not available. There are local area maps on many bus shelters, showing where the stops are, but not where the lines go.

Determined to take BRT to IPPU the next morning, I left 1 ½ hours early, and with directions from my hotel clerk, a kiosk attendant, 2 BRT drivers and 3 tube station attendants, I walked and BRTed a grand circle around the Centro, passing again within a block of my hotel, but finally getting to IPPUC a half hour early. I could have walked the 5 km (3 mi) faster – well, except for my arthritis.

I'm an experienced and persistent transit advocate; most visitors would have just jumped into a taxi, increasing traffic congestion and pollution. Those commuting daily will, after a few trips, finally find a route that works, but even they are hard pressed to find the most efficient route, or how to get to some other destination. A good transit map could greatly increase transit ridership. Please.

And transit nuts like me love to use transit maps to describe the system, service and how to use it. I have used great transit maps to show off Paris, Madrid and Barcelona's Metro, the New York City subway and San Francisco's Muni. Since public transit is an integral part of how a real city functions, transit maps are absolutely essential.

2. Increase pedestrian safety (and increase walking).

While Curitiba probably has more pedestrian-only streets than the five largest U.S. cities combined, it has failed to rein in traffic engineers on other streets. Most major non-BRT streets are one-way with lights timed to keep the traffic flowing at maybe 40 mph (65 km/hr), similar to Manhattan's avenues and San Francisco's 1-way couplets. And the city's long blocks exacerbate the speed problem. And discourage walking.

These plans fail to recognize that street lights are only necessary because motor vehicles are so dangerous to pedestrians and each other. A car's momentum = mv^2 , so at 10 times walking speed and 20 times greater mass, its momentum is 2000 times greater than a pedestrian's. Not only is a car's wallop so huge, an SUV's bull bars are effectively designed to kill or maim anyone they hit. That danger is why we have traffic lights. And need slow traffic in inhabited areas.

Curitiba's traffic engineers further discourage walking by keeping pedestrians at intersections in the dark about which traffic has the red light. Strangely, the single light facing one-way traffic is placed before the intersection, and hooded to keep waiting pedestrians from seeing whether approaching traffic has a red or green light. This I have not seen anywhere else in the world.

You're standing at an intersection waiting to cross the street and the fast approaching cars are a half block away. Do they have a green light or a red light? You hesitate to cross the street until the cars completely stop. Even when traffic stops, is their red light about to change to green and allow them to mow you down? This terror factor greatly discourages crossing streets. As this traffic scares away pedestrians, drivers know they can speed even faster. Some intersections do have "Walk/Don't Walk" lights, but seeing that drivers have red lights is more reassuring.

Contrast this with Manhattan -- when lights turn red for vehicles, pedestrians swarm across the street. Pushy peds tame drivers. However, Curitiba traffic engineers' strategy seems to be: herd pedestrians into specific streets/areas without cars; keep traffic, including buses, moving fast on most streets; and scare pedestrians off those streets. Is this a compromise necessary to get adequate funding for public transit? Hopefully not.

NYC's Transportation Alternatives has an excellent, brightly illustrated, guide to traffic calming for safer streets, "Streets For People," available at <http://www.transalt.org/info/streets4people/index.html> or <http://www.transalt.org/info/streets4people/streets4people.pdf>.

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