Sustainable Planning and Design in Curitiba, Brazil

Sustainability is an important aspect of successful transportation planning, and has been at the forefront of planning and design in the city of Curitiba. One way to judge the sustainability of a city is by whether its transportation systems and land use comply with the nested box model of sustainability. This model prioritizes transportation planning in terms of its environmental impact first, then social implications, and finally the economic factor, as a byproduct of society.

Curitiba has striven to be as eco-friendly as possible. This is especially evident when it comes to land use. With 28 parks and undeveloped land covering nearly 20 million square meters, equating to around 52 square meters of green space per person, Curitiba has the highest rate of green space of any city in Brazil. Rather than converting green spaces into industrial areas, city planners decided it was more important to maintain the placemaking that the open space already provided.

Some parks that exist today are byproducts of planning decisions designed to solve a problem while minimizing environmental impact. A good example of this is the Parque de Sao Lourenco, which at once was filled with favelas, but is now one of the most popular parks in Curitiba. This park lies in the middle of a river floodplain, and citizens living here experienced periodic flooding destroying their streets and homes which forced them to rebuild often. To solve this problem, Curitiba did two things. First off, they launched the Bairro Novo Project. The goal of this project was to use vacant urban space to provide housing for nearly 20,000 families, many of which were currently living in areas affected by floods. After relocating these families, they converted the Sao Lourenco area into a park designed to catch river run off after flooding, rather than resorting to the alternative of building concrete canals. This helped to maximize land use efficiency in placemaking, while minimizing its impact on the ecological system.

In addition to parks, Curitiba has built sustainable buildings throughout the city which represent the culture and its dedication to environmental sustainability. The Opera de Arame is a major venue for musical and artistic performances, and is also a prime example of green building. The Jardim Botanico is an example of green building and placemaking combined into one big green space. But, one of the most innovative green buildings in Curitiba is the Universidade Livre de Meio Ambiente, which translates to the “Free University for the Environment”. Not only is this building made entirely of recycled materials, it is also a base for local nonprofit groups to conduct free environmental training and teach sustainable environmental practices to local businesses. This is open and free to all individuals.

Transportation planning in Curitiba has also had a major focus on environmental sustainability, with systems built in hopes of decreasing consumption of resources and pollution while increasing access for citizens throughout the city. Even with limited funds, Curitiba was the first city to design and implement a BRT system. This system provided an alternate option to automobile use that granted greater mobility while producing less pollution. To add to the environmental sustainability of the BRT system, Curitiba initiated the B100 Biodiesel Project in 2009. Through this project, they developed buses that could run entirely on biodiesel created from soybeans. As a result, six city buses were designed and are now used for public transportation on the BRT Green line route.

Transportation planning in Curitiba is catered to its citizens with regard to where they live and work. It is also geared towards community development and citizen participation in the collective goal of designing a city reflective of the cultural and social values of its people. This contributes to the social sustainability of the system as a whole.

It is imperative that areas where people live and work are designed with respect to effective land use and accessible transportation. Transit Oriented Development has occurred along the BRT routes making these areas densely populated with people and businesses. This has increased access for those who live and work in these areas.

Curitiba has also worked towards creating equity in their transportation systems to meet basic access needs for all. One way this has been done is through "social fares" for the BRT, which means that the fare is uniform regardless of the distance traveled. This caters to lower-income people who live in favelas on the outskirts of the city who need to travel into the city.

Another important social program, that has helped increase access and equity for people living in these favela areas, is the Green Exchange Program. This program was initially developed for both environmental and social purposes. Trash and recycling were big problems in the favelas, as most garbage trucks were unable to reach areas within these communities due to the narrow roads, and everything was seen as waste. The Green Exchange Program incentivized citizens to clean up trash and collect recyclables by providing bus tokens in exchange. This made the system more accessible for all, even those who couldn't afford the fares. The system also worked for those who didn't need access to the bus system as it allowed for people to exchange trash and recyclables for food. It even worked for children, who could make an exchange for school supplies, toys, games, tickets to movies, and more. This program drastically improved recycling rates to nearly 70% with 90% of citizens reporting recycling of 2/3 of their trash. It also facilitated social interaction between the lower-income citizens and the rest of the city.

Transportation planning in Curitiba aims for positive community development and involvement. In addition to the BRT, Curitiba wanted to focus on access for pedestrians and bicyclists, encouraging greater social interaction and more vibrant communities.

After being a military dictatorship, the city officials wanted to prove that they were dedicated to democracy and wanted citizens to get involved in the planning of their city. Public debates were held, and Citizenship Streets were created by the IPPUC to help achieve this goal.

The first Citizenship Street was built in Boqueirao in 1995. It was a great example of decentralized government and allowed citizens to have better access to the governmental agencies in control of decision making within their communities. Citizenship Streets consist of local governmental agencies and offices, banks, courts, affordable professional training centers, and even shops and sports centers. Having all of these in one area makes it easier for people to accomplish multiple tasks while in one area. They have also been useful due to their accessibility by use of the BRT. Citizenship Streets have been planned and placed in areas near or at main terminals of the BRT.

Through the planning process, governor Jamie Lerner talked about "urban acupuncture" which was an idea of his that revolved around making small changes within the community and having the people decide what happens from there. A monumental example of "urban acupuncture" came in 1972 when Lerner pedestrianized a busy area in the center of the city, transforming six city blocks in under 72 hours and closing it off to cars. In order to ensure that no cars were able to access the area, children were encouraged to paint in the streets. This area is now one of the major pedestrian parts of Curitiba known as Rua XV de Novembro. The reason this was so successful was because the community was willing to take part in the plan to improve their cityscape.

Curitiba has also been focusing on biking as a viable mode of transportation. Biking is not only better for the environment, but can also close gaps in social classes and act as a more

economical transportation choice for those who earn lower incomes. As a result, Curitiba has invested $90 million in a new bike plan.

First off , this plan aims to connect the bikes to the city with a cycling microgrid consisting of 19.5 km of roads linking different parts of the city, and a city park circuit linking 8 major parks throughout the city. Next, it aims to give bikes higher priority on the roads by providing bike priority areas at intersections, and adding a bike lane to the BRT green line. Lastly, it focuses on the sharing community and storage of bikes when not in use. The plan will create a bike share program and allocate 5% of the total parking space in the city to bikes for parking closer to the sidewalks, and at bus terminals, to increase accessibility between modes.

Finally, Curitiba has made sure to plan and implement transportation systems that are economically sound. From the start, the city lacked proper funding to pursue many projects which forced them to come up with creative solutions to solve problems of accessibility and sustainability as a whole. The BRT was designed as an alternative to light rail which the city could not afford to create at the time. It was also made without widening the roads due to this economic strain which discouraged an increase in automobile travel on the roads that the BRT ran through. They aimed to design cost effective systems that also saved the people money. The BRT, and creating more walkable areas, helped decrease transportation costs, in addition to the programs launched by the government and planning agencies. This helped create a system that was efficient for moving people and goods, as well as affordable for all.

In addition, new transit routes and mixed use buildings built upward in the densest areas at the center of the city attracted new businesses, created new jobs, and further developed the city. This led to net economic gains. Curitiba is currently one of the wealthiest cities in Brazil, which can be partially attributed to its successful, and sustainable, transportation and land use planning.

Its overall economic prosperity also contributes to its self sufficiency with most of its projects and planning funded by local revenue from taxes and private donors. The planning agencies receive very few government subsidies and/or federal funding.

Overall, Curitiba has followed a sustainable approach according to the priorities of the nested box model. Decisions for transportation systems and land use heavily weigh environmental impact, while also ensuring the choices made are for the good of all citizens within the community as a whole. Economically, there has been success, but mostly as a product of successful environmental and social factors. With the continued support of the people who live in Curitiba, implemented plans and designs will create a higher quality of life that can be sustained for many years to come.