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Urban mobility in the interior of Brazil:

A diagnosis of Northern Paraná

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Editorial

Numan Yanar

As Innovative Governance of Large Urban Systems (IGLUS) community, we have published the online magazine IGLUS Quarterly since 2015 which focuses on a specific urban topic in each issue and accepted articles from scholars and urban practitioners. While writing this editorial, I am very glad to announce that IGLUS is now launching another line of publication which will contain articles from both professionals and non-professionals. With this study, we are publishing the 1st issue of IGLUS Case Studies, which aims at introducing cases from all around world. This new series of IGLUS will shed light on governance problems, success stories, new initiatives in urban systems.

We would like to take this opportunity to invite everyone interested to write a short case study of 1500 to 4000 words for IGLUS Case Studies series. IGLUS Case Studies is published by IGLUS at Ecole Polytechnique Fédérale de Lausanne (EPFL). It is openly accessible at www.iglus.org. Before you start to write your case study, we strongly recommend you to finish our Massive Open Online Courses(MOOCs) that will help you acquire basic knowledge about urban infrastructure systems which will also increase the quality of your work.

We sincerely hope that you enjoy the articles of this new series of IGLUS. We also invite you to join the discussion at iglus.org. If you feel that there are innovative practices underway in your city/region and you would like to contribute to an upcoming edition of IGLUS Case Studies, we encourage you to contact us at umut.tuncer@iglus.org. For inquires and questions about the content of this issue, you may also contact me at numanyanar@iglus.org.

Biography

Caio Felipe de Souza Fialho is an architect and urban planner. He obtained a Bachelor's Degree in Architecture and Urbanism at Cesumar University (Unicesumar) in Brazil. He has considerable experience in creation and development of architectural projects and landscape/ interior design. He is currently pursuing a Lato Sensu postgraduate degree in Traffic Planning and Management at Cesumar University.

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Abstract

Urban mobility has been facing great challenges at the regional level, especially in developing countries. It is also the case in Brazil, where it has dozens of large urban areas affected by a mobility plan, which has brought losses to the quality of urban life for the local economy and distanced cities, creating a social imbalance.

This urban problem is more visible in cities in the interior of the country, where resources are hard to come by, and urban-social development is slow, due to the lower demand for services and products, directly reflecting on the life of the local population.

Keywords: Urban, Regional, Urban-Social, Resources, Development, Urban Mobility

Introduction

Metropolitan regions in the world today face great challenges. These challenges are common in Brazil and the vast majority of Brazilian metropolitan regions, regardless of their configuration and urban proportions (Boareto, 2008). In this article, the idea of creating and developing a metropolitan region in the Brazilian interior will be analyzed. More specifically , there will be a focus on the Northern region of the State of Paraná, describing the area, its consolidation as a metropolitan region and the challenges of this location.

Northern Paraná is a conglomerate of cities planned and organized according to their size and influence (Almeida, 2016; Azevedo & Barbosa, 2013; Cardoso, 2007); however, they are disorganized in terms of urban mobility. Over the years and due to population growth, these cities have experienced a deterioration in the quality of urban mobility. The main transport mode is private cars due to a lack of urban transport services.

Among these cities, Maringá, the second largest city in the region stands out with a population of 423,000 inhabitants (Instituto Brasileiro de Geografia e Estatísticas [IBGE], 2019), consolidating itself as the most influential city in the region, responsible for dozens of municipalities that need services offered by the city, such as health, education, finance, banking, maintenance, travel and industrial development (Azevedo & Barbosa, 2013).

Despite all the projects carried out and planned for the city, there is still a need today for smart regional planning, not only in Maringá but also the surrounding cities.

Current Situation

Legal Perspective

Brazil has a history of poor urban and regional planning, which has been ongoing since its colonization (Carvalho, Imbronito & Maziviero, 2019). After a long journey, the country approved the Statute of Cities, Law 10.257 / 2001, which defines the rights and responsibilities in terms of urban development. It was released not only for cities and their planning, but also for the metropolitan regions, and their regional planning. Thus, it regulates and creates practices, that address political, economic, and social issues in the planning of municipalities and regions.

History and inhabitants of Northern Paraná.

Paraná is one of the twenty-six states in Brazil, located in the south of the country, it was one of the last states to occupy its territory totally in the beginning of the 19th century through a large and daring project. The occupation of unpopulated areas in the north of the state, from the construction of a system of planned cities, a road and rail network, in addition to the division of land for agriculture and livestock. (Compainha de Melhoramentos do Norte do Paraná [CMNP], 1975; Almeida, 2016; Azevedo & Barbosa, 2013; Cardoso, 2007). The project is located in the northern portion of the state of Paraná, more specifically in the new north of Paraná, which is divided into

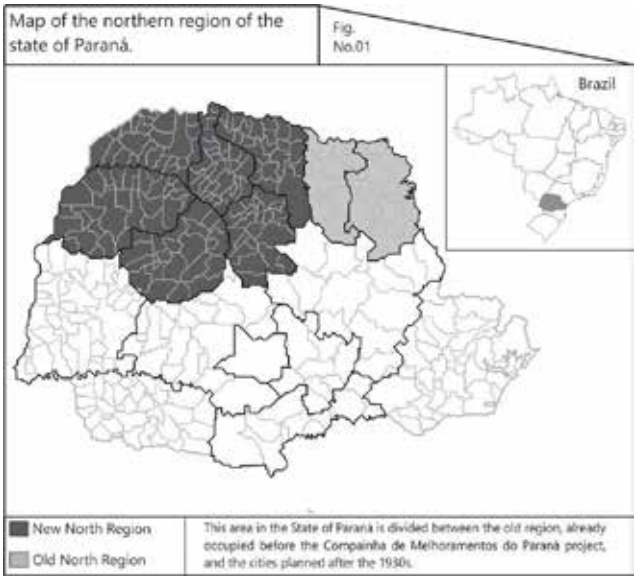

Figure 1*: Map of the northern region of the state of Paraná. (Source: Regioes Geograficas - IPARDES, 2010).*

six micro-regions (Fig. 1).

The project was organized based on a hierarchy between regional capitals: micro-regional capitals, micro-regional sub-capitals and dependent cities (Cardoso, 2007; Azevedo & Barbosa, 2013). In this way, a model was implemented, in which the regional capitals are at the center of the project. Micro-regional capitals were located about 70-90 km away and consecutively the micro-regional sub capitals located 60 - 80 km away (Fig. 2).

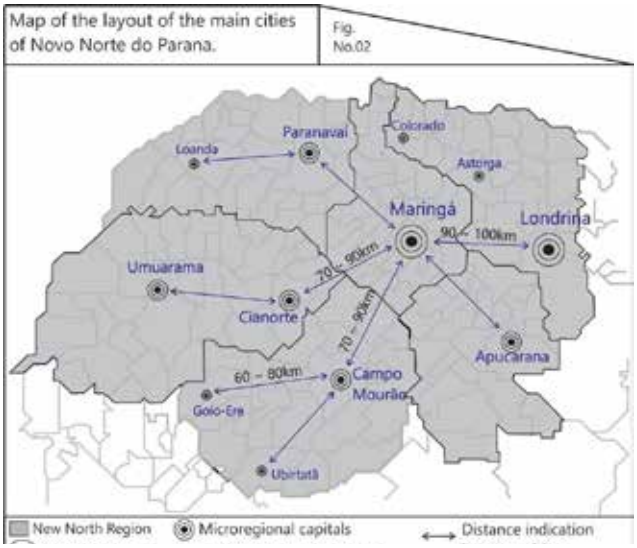

Figure 2*: Map of the layout of the main cities of Novo Norte do Paraná. (Data obtained from the SEDU Paranacidade tool.)*

Mobility between cities

Mobility between cities is not in a good condition, which extends to all modes of urban traffic. This arises from a recurring historical problem in Brazil, a disorganization in the urban planning, regional transport and social services policy, directly affecting the urban right of the population (Boareto, 2008; Carvalho, Imbronito&Maziviero, 2019; Rubim&Leitão, 2013). Today the region has a great dependence on road transport, with only one railway line that covers part of the area and used only for the transportation of cargo (Fig. 3).

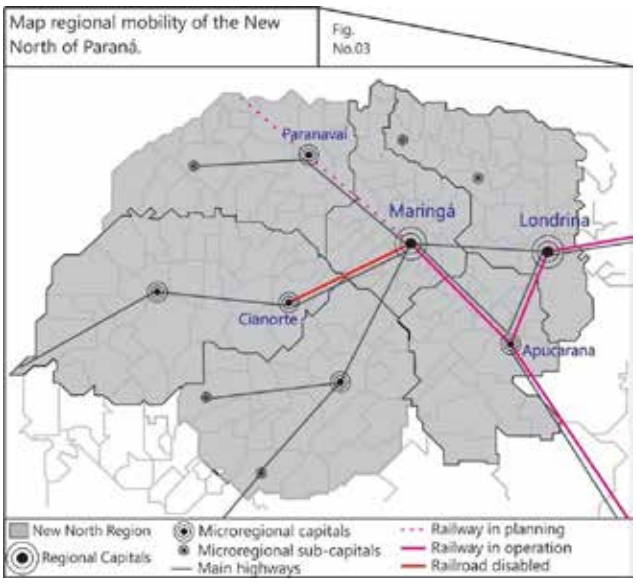

Figure 3*: Map regional mobility of the new North of Paraná. (Source: Malha Ferroviária do Paraná - Gazeta do Povo, 2019)*

Same situation occurs in urban areas. The municipalities are heavily dependent on private cars, and in contrast, a low adherence to public transport, thus creating a problem of urban traffic and use of urban spaces in the largest municipalities in the region, allocating roads almost exclusively to automobiles (Boareto, 2008). The increase in the number of vehicles is exponential in the largest municipalities. As general in other Brazilian cities, cities present a number of vehicles almost proportional to the number of inhabitants, with an average rate of 7 cars for every 10 inhabitants (Departamento Estadual de Trânsito do Paraná [DETRAN PR], 2020), directly affecting the spatial, political and social organization of cities (Table 1).

Town	Automobile fleet	Population	Percentage of car per inhabitan
Londrina	389.292	569.733	68.32%
Maringá	319.740	423.666	75.74%
Apucarana	84.342	134.996	62.47%
Umuarama	84.890	111.557	76.09%
Campo Mourão	70.359	94.859	74.17%
Paranavaí	66.459	88.374	75.20%
Cianorte	60.610	82.620	73.75%

Table 1: Number of vehicles by the number of inhabitants of the most important cities in Northern Paraná (***Source: IBGE, 2019 / Detran Pr, 2020.)***.

Geographical features

Currently, the region has a population about three million inhabitants, with its largest cities Londrina around 569,733 inhabitants, and Maringá with 423,666 inhabitants (Instituto Brasileiro de Geografia e Estatísticas [IBGE], 2019). The region also has other eight cities with more than 80,000 inhabitants. This shows that about half of the population lives in the 10 largest cities, which are in medium and large sizes. The other part of the population lives in small cities. The economy of these municipalities depends heavily on agricultural activity. Until today, municipalities relied on agriculture, with low industrial and economic diversification (Azevedo & Barbosa, 2013).

Energy demand

Energy demand in the region is met with two main sources. The first one is hydroelectric plants, such

as Itaipu and smaller plants located in smaller rivers in the region. Despite the fact that the energy from hydroelectric plants is cleaner in relation to thermoelectric plants, it has a great aggravating factor, the flooding of large areas. Thus, it creates a change in the microclimate and the local biology of the region. Another important energy source in the region comes from fossil fuels due to the strong dependence on private cars.

Identifying the main problems of the case

Regional challenges

The region has following major challenges:

• Political challenges: Despite the fact that Brazil has passed laws to facilitate the administration of metropolitan regions, such as the Statute of Cities, Law 10.257 / 2001, the differences in the interests of municipal governments make each city follow different courses. Therefore, there is no agreement between municipalities for the implementation of regional projects.

• Economic challenges: This major challenge is brought by financial investments. The largest cities have large GDPs compared to the smallest ones, and most of the small cities cannot afford to pay for more complex works.

• Geographic challenges: A large part of the area is on flat terrain, with little unevenness. A smaller part is found in rugged places, with many valleys, canyons and small mountain ranges, which create difficulties in accessibility.

• Energy challenges: As mentioned above, there is a great need for fossil fuels in the region, in addition to all local electricity coming from hydroelectric plants. In few locations, there is a use of solar energy.

• Mobility challenges: Local policy encourages only motor vehicles, causing a series of traffic problems. A policy of encouraging new regional modes is necessary, such as a greater implantation of the railroad for the transportation of passengers and cargo, in addition to the implantation of waterways for cargo transportation.

Urban challenges

Urban areas also have major challenges, which affect the local economy and the quality of life.

• Mobility challenges: Although cities are well-planned, urban mobility is a major challenge, due to the exclusive incentive for automobiles, and the lack of planning for public transport, causing a low utilization rate in municipalities. Pedestrians and bicycles are generally ignored by the government, despite of having a great potential. There are currently small investments in some municipalities in the creation of bicycle paths, and here Maringá stands out, which has about 40 km of bicycle paths in its urban territory (Maringá City Hall, 2019). Furthermore, cities provide only two options for residents. One is their own personal cars, and the other is a bus system as the only public transport mode since trains stopped transporting passengers in the 1980s.

• Cultural challenges: The Brazilian population in general has a culture of prioritizing the car in relation to other modes, which is a big problem, as this is reflected in its policy, where more money is spent on adapting and repairing roads than on education and health (Boareto 2008).

• Challenge in the connection between municipalities: Many of the local inhabitants live in one municipality, even though they work or study in another city. That's why, daily transportations between cities carry great necessity. However, there are few cities that have interurban transport service. Those cities do not have a good integration with their urban network. There is a need for making the car as the last option for the population, and intensifying the need for a dependence on public transport (Fig. 4).

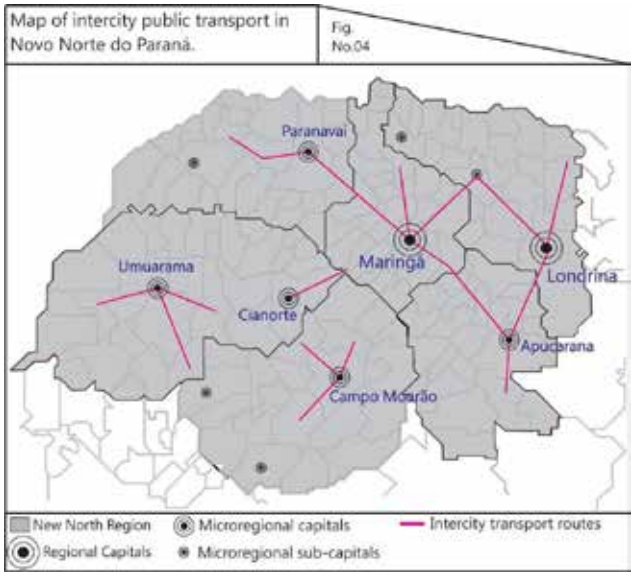

Figure 4*: Map of intercity public transport in Novo Norte do Paraná. (Data obtained from Expresso Maringá, Viação Garcia e Expresso Nordeste)*

Analysis of the case

Historically, Brazil is a country that focuses on the individual development of its cities, not on regional planning. Thus, it is not connecting them and transforming municipalities into an integrated body (Boareto, 2008). This policy is reflected in the region of the New North of Paraná, initially planned to be a system of cities connected and dependent on each other. Over time, they moved away, reaching the point that we are today, where several cities do not have a connection, affecting the quality of smaller municipalities. This is due to the national policy of encouraging the use of the car, which was initiated in 1950s / 1960s (Carvalho, Imbronito & Maziviero, 2019). Projects for the implementation of rail lines to connect these cities, were replaced by road projects, changing the form of connection between cities.

Analyzing the cities in the region, we realize that they continue to follow the national planning guidelines implemented in 1950 and 1960, focusing exclusively on road policy, both in city planning and in inter-municipal planning, which significantly affects urban and social development, distancing them socially and economically, creating a social abyss (Carvalho, Imbronito & Maziviero, 2019). Therefore, the largest cities can individually afford the costly services needed as a result of prioritized road planning. However, the region mostly comprises of cities which are smaller in size and they cannot afford such costs (Boareto, 2008) (Fig. 5).

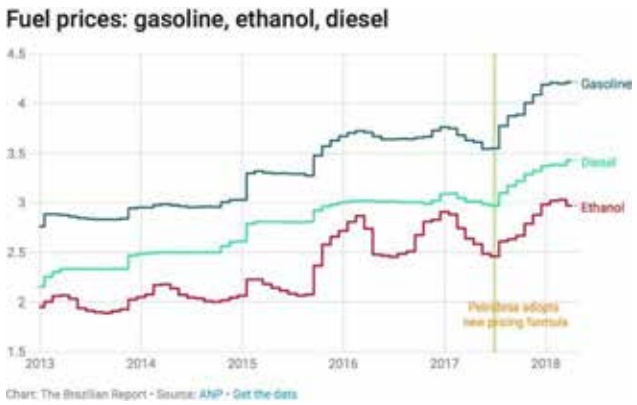

Figure 5*: Fuel prices: gasoline, ethanol, diesel (Source: How the hike in oil prices affects Brazil - Brazil Report, 2018)*

With the price of fuels growing year after year, it leads to a significant increase in the population's cost of living, raising the prices of products and transportation, in addition to the high cost of maintaining the road network, resulting in low social development, in the way that cities direct investments initially aimed at health, education and others to keep the road system working (Brazilian Report, 2018).

Political decisions made by these municipalities directly affect the quality of life of the population and creates a social distance, as it becomes more difficult for the inhabitants of small municipalities to have access to basic infrastructures, which are available only in the largest Brazilian urban areas. The table below (Table 2) compares the cities with the five highest and the five lowest HDI (Human Development Index) as well as their populations.

Highest HDI	City	Population	Lowest HDI	City	Population
0,806	Maringá	423.666	0,621	Tamarana	12.262
0,788	Londrina	569.733	0,629	Cândido de Abreu	16.655
0,763	Paranavaí	88.374	0,638	Corumbataí do Sul	4.002
0,761	Umuarama	111.557	0,639	Mariluz	10.224
0,757	Campo Mourão	94.859	0,640	Rio Branco do Ivaí	3.898

Table 1: Number of vehicles by the number of inhabitants of the most important cities in Northern Paraná (***Source: IBGE, 2019 / Detran Pr, 2020.)***.

Mobility problems do not only affect small cities. As mentioned above, the main transportation mode in New North of Paraná is private cars, which is causing traffic problems in the largest cities such as Maringá and Londrina. This problem is driven by a low use of public transport that does not present a good quality for its users, as it is poorly integrated. In addition to being an expensive transport mode, having equivalent monthly costs of owning a car, it is also uncomfortable for passengers due to several factors such as; lack of air conditioning, vehicles with more passengers than allowed, degraded, or in some places unsafe, bus stops. These reasons have the inhabitants migrate to the car, for its ease and convenience.

Figure 6 shows the travel time and distance from some points in the three largest cities in the region, by three modes, the car, public transport (bus) and

cycling (important points in the city were chosen for the study are universities and central areas).

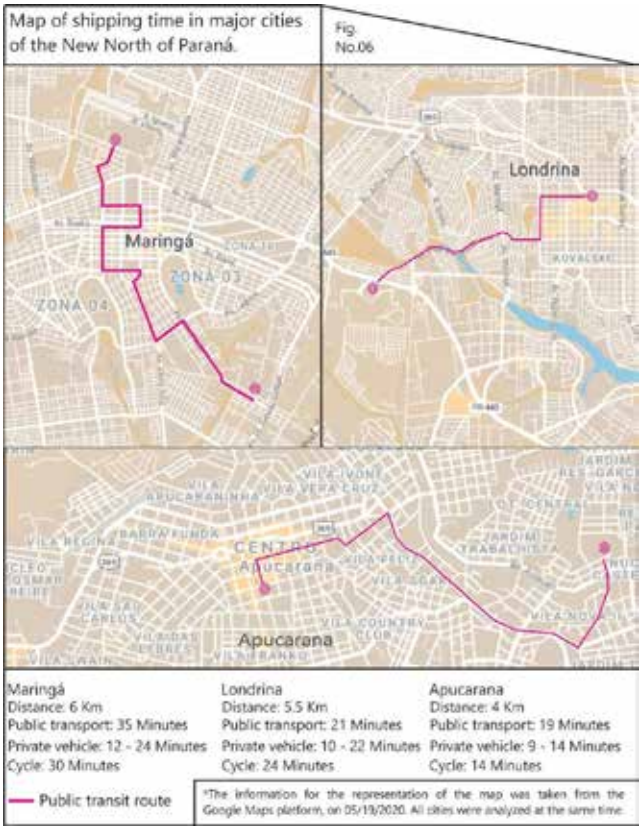

Figure 6*: Map of shipping time in major cities of the New North of Paraná. (Data obtained from the Google Maps tool.)*

New perspectives for the future

Against the traditional way of local planning, some cities started looking for other solutions for urban development. In particular, Maringá, has been looking for other ways since mid-2010, such as the creation of a cycle network that can cover a good part of Maringá, which is on relatively flat terrain, with maximum elevations of six percent. It also has wide avenues, with large flowerbeds and excellent urban afforestation (Fig. 7) (Neri, 2012). Currently, the city has a total of approximately 40 kilometers of bicycle lanes (Fig. 08) (City Hall of Maringá, 2019), which is integrated with public transport in some points, serving as the second transport mode option in the city.

The city also sought to improve its public transportation systems with the implementation of electric

Figure 7*: Maringá Bike Path, Avenida Cerro Azul. (Source: City Hall of Maringá, 2019)*

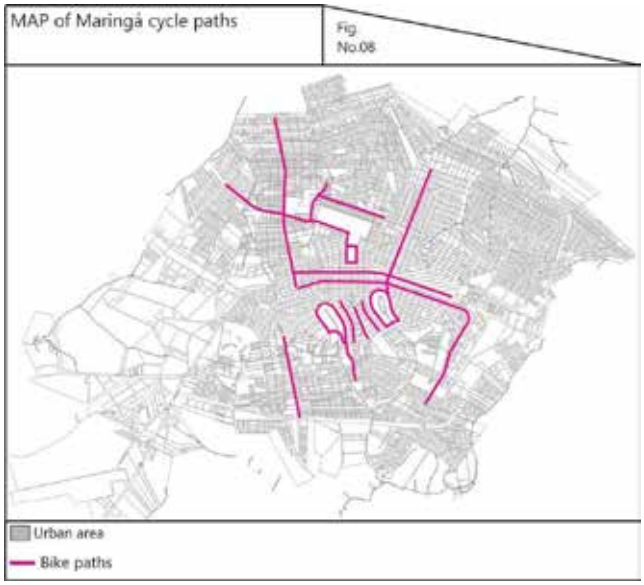

Figure 8: *Map of Maringá cycle paths. (Data obtained from the Maringá City Hall).*

buses, new bus stops and the construction of a new multimodal terminal (Fig. 9) to optimize its public transport, offer better quality and increase sustainability. It was also to attract a greater number of passengers to public transport, which, over the years, has been losing users (Neri, 2012). Seeking to be a smart city, it can be said that Maringá stands out from the rest, for the initiative of changing from an archaic planning, to a modern planning that corresponds to the human needs of today.

Conclusions

The Novo Norte Region of Paraná was initially planned representing a new vision of urban organi-

Figure 9*: New multimodal terminal in Maringá. (Source: Tiago Louzada, City Hall of Maringá, 2020).*

zation in Brazil. However, it does not reflect the planned ideals, it reflects the same problems as in any other Brazilian region (Azevedo & Barbosa, 2013). The main reason is that planning focused too much on the urban core and exclusively on road organization, with few other options for urban transport modes. This created a series of problems that affect their inhabitants, the economy and urban development.

The main problem apparent today is the lack of connection between cities in terms of mobility, which keeps the population of smaller cities away from the basic infrastructure accessible only in large cities, creating a low quality of life in these places. Another major problem is the planning focused on road traffic, which ignores rail and waterway transport in the region as a whole and within urban cores. It also does not encourage public transport, cycling and walking, transforming the region into an area dependent on automobile to carry out all its activities (Boareto, 2008).

The result of poor planning is reflected in the economy today. Municipalities need to make large investments to maintain the road infrastructures and to construct new ones. Consumer goods are more expensive due to the transport being costly and slow. On the social layer, the quality of life decreases due to pollution, costly transport and goods, in addition to the lack of adequate infrastructure for the population (Boareto, 2008; Gehl 2013).

In order for cities to develop, a change in urban planning approach is needed. There is a need for an intelligent policy, taking into account the social, economic and digital layers, connecting these cities physically through transport and digitally through a unique information system, facilitating mobility and trade among these municipalities (Evers, 2018; Ellsmoor, 2019).

With the implementation of an intelligent information system, and together with a new approach to urban mobility, dependence on fossil fuels could be much less. It could reduce the number of vehicles in the urban area, lower the pollution levels, open new spaces for residents in cities, and turn the city back to people (Evers 2018; Gehl 2013).

Although this idea seems a bit far, some cities already started to change. We see this in Maringá, which seeks new means for its development, which can be an example for other cities.

Despite all the challenges, there is a way out for social urban development, focusing on the population, integrating cities and increasing sustainability. Transforming the municipalities into intelligent and egalitarian cities can offer good quality of life, economic and social development to its inhabitants.

References

Almeida, A. C. S. (2016). A colonização do território paranaense e o dinamismo dos municípios da frente norte. Available at <http://www.fecilcam.br/revista/index.php/geomae/arti cle/viewFile/273/pdf_190> Acessed: 08/05/2020.

Azevedo, J. R., Barbosa, T. (2013). O Novo Norte do Paraná: as transformações do espaço sob a tutela da ética aquisitiva. Available at < https://www.researchgate.net/publication/272704797_O_novo_norte_paranaense_as_transformacoes_do_espaco_sob_a_tutela_da_e tica_aquisitiva> Accessed: 21/04/2020.

Boareto, R. (2008). A política de mobilidade urbana e a construção de cidades sustentáveis. Ciência & Ambiente, Santa Maria: UFSM, n. 37, p. 73-92.

Cardosa, C. R. S. (2007). O processo de ocupação do Noroeste Paranaense nas décadas de 1950 e 1960. Thesis (Master's degree) – State University of Maringá – UEM, Maringá.

Carvalho, L. K., Maziviero, M. C. e Imbronito, M. I. (2019). Resistencia no espaço urbano. Available at: <https://www.vitruvius.com.br/revistas/read/arquitextos/20.235/7 587>. Accessed: 27/ 04/ 2020.

Companhia Melhoramentos Norte Do Paraná Cmnp. (1975).

Colonização e Desenvolvimento do Norte do Paraná. Publicação comemorativa do cinqüentenário da Companhia Melhoramentos Norte do Paraná. São Paulo: Ave Maria

Detran PR – Departamento de Estadual de Trânsito do Paraná. (2020). Frota de veículos cadastrados por município e tipo, Paraná – Posição em fevereiro – 2020. Available at:

<http://www.detran.pr.gov.br/sites/default/arquivos_restritos/files/documento/2020-03/frota_fevereiro_de_2020_6.pdf>. Accessed: 01/07/2020.

Evers, H. et al. (2018). DOTS nos planos diretores. WRI Brasil (São Paulo), 21 –129.

Gehl, J. (2013). Cities for People.Copenhagen: Island Press.

Gazeta Do Povo. (2019). Malha Ferroviária do Paraná. Available at: <https://infog raficos.gazetadopovo.com.br/politica/parana/malha-ferroviaria-parana/> Accessed em:

Announcements

IGLUS Quarterly

IGLUS Quarterly is an analytical open access journal dedicated to the analysis of Governance, Innovation and Performance in Cities and is edited at EPFL ME, Ras Al Khaimah, U.A.E. IGLUS Quarterly aims to facilitate knowledge and experience sharing among scholars and practitioners who are interested in the improvement of urban system's performance in terms of the service efficiency, sustainability and resilience.

IGLUS Quarterly applies the highest academic standards to analyze real world initiatives that are dealing with today's urban challenges. It bridges the gap between practitioners and scholars. IGLUS Quarterly therefore adopts a multidisciplinary perspective, simultaneously considering political, economic, social and technological dimensions of urban systems, and with a special focus on how governance affects and is affected by the use of technologies in general, and especially the pervasive application of the ICTs.

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Our Executive Master in Innovative Governance of Large Urban Systems (IGLUS) responds to today's needs: growing cities evolve into metropolitan areas with their major infrastructures – transport, energy, buildings, water and greens – becoming increasingly interdependent, not the least because of the pervasive nature of the information and communication technologies. Managers and policy-makers concerned with such large urban infrastructure systems not only need to learn how to operate them, but must also become experts in maintaining, planning, and financing them in order to better respond to changing customer demand and evolving citizen needs. In short, the complexity of cities faced with ever more pressing challenges requires skills and expertise that our Executive Master's program offers.

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