



CITY PROFILES NO.5

# TERESINA, BRAZIL

NOVEMBER 2022

Lead authors: Lucas Turmena, Flávia Maia

TERESINA

# About TUC City Profiles

To fight the climate crisis, cities have to become more sustainable now. Transformations towards sustainability must be based on the specific urban characteristics of each city. An analysis of the current factors that may or may not enable urban sustainability transformations is a first step for developing locally suited strategies.

TUC City Profiles is a series of short reports developed as part of the Transformative Urban Coalitions (TUC) project to share insights into the existing challenges and opportunities to address cross-cutting urban sustainability transformation and development issues through inclusive climate action in the five Latin American TUC cities.

The following short report summarizes the main findings from a political economy and ecology analysis of Teresina, Brazil, describing its main geographic, socioeconomic and environmental characteristics as well as climate governance set-up. It concludes with suggested entry points for transformative change towards sustainability.

This TUC City Profile was developed by United Nations University – Institute for Environment and Human Security (UNU-EHS) in collaboration with the German Institute of Development and Sustainability (IDOS). It is based on an assessment carried out between February and August 2022.

This report should be cited as: **Lucas Turmena, Flávia Maia**, Flávia Guerra, Michael Roll. TUC City Profiles No. 5: Teresina, Brazil. Bonn: United Nations University – Institute for Environment and Humans Security (UNU-EHS).

Reviewers: Ariadne Samios, Camila Alberti.

Cover image: Praça da Bandeira in Teresina, on March 20, 2022. © LUCAS DE CARVALHO TURMENA / UNU-EHS

Supported by:



on the basis of a decision  
by the German Bundestag



UNITED NATIONS  
UNIVERSITY

**UNU-EHS**

Institute for Environment  
and Human Security

# Key Messages

## **Climate injustice is obvious in Teresina.**

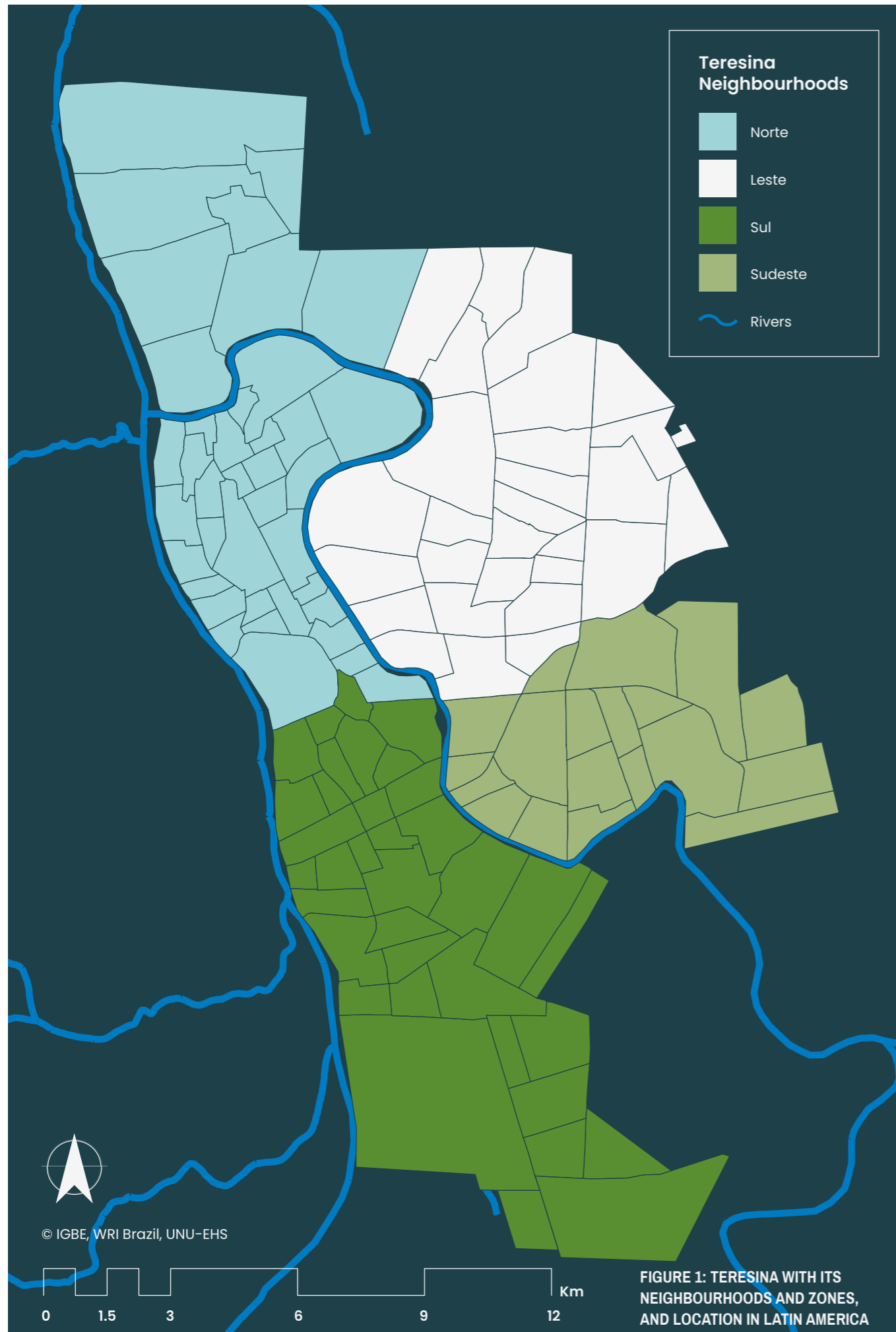
**Although the city makes a small contribution to national and global emissions, it is situated in a global warming hotspot.** Teresina is already affected by extreme heat, and models anticipate that it will become even hotter and drier in the coming years. The city's high vulnerability to climate change particularly affects Black, Indigenous and People of Colour (BIPOC) groups living in low-income neighbourhoods.

Social injustice and racism are tied together in the urban development process of Teresina. Flood-prone areas often overlap with vulnerable neighbourhoods at the fringes of the city, resulting in precarious living conditions.

**Climate action at the city level must simultaneously favour racial and climate justice to promote transformative changes towards sustainability.**

Teresina will likely have to absorb climate-induced migration from its surroundings, which may increase the challenges of already overloaded basic services and infrastructure. **Urban planning in Teresina must accommodate future projections by combining climate mitigation with adaptation to provide low-carbon and resilient development.**

Urban climate governance is still emerging in Teresina, which makes this a key moment for transformative action towards sustainability. **Entry points for transformation in the city include: promoting vertical and horizontal coordination to implement the climate agenda; increasing climate-related technical knowledge within the municipal government and awareness at the community level; fostering collaboration to generate and disseminate municipal climate data and amplify bottom-up climate initiatives; creating new climate narratives; strengthening citizen participation while recognizing and including vulnerable groups; declaring a climate emergency; and leveraging additional public and private funds for climate action.**



**FIGURE 1: TERESINA WITH ITS NEIGHBOURHOODS AND ZONES, AND LOCATION IN LATIN AMERICA**



# 1. Urban Development in Teresina

The municipality of Teresina has 871,126 inhabitants, of which around 94 per cent live in the urban area. Social injustice and racism are intertwined with the city's development. The Gini coefficient, used to measure income inequality, stood at 0.6171 in 2010 (DATASUS, 2010). Poverty incidence is estimated at around 47 per cent (Instituto Brasileiro de Geografia e Estatística (IBGE), 2017), and only 33 per cent of people living in Teresina declared having a job in 2020 (IBGE, 2020). Poverty and inequality generally reduce the ability of a population to cope with climate risk. It means that they are disproportionately vulnerable to the consequences of climate change, such as droughts and flooding.

The majority of the BIPOC population in Teresina lives in low-income neighbourhoods. Racialized communities settled at the fringes of the city, in places deficient in infrastructure and service provision and prone to climate risk. This disproportionate distribution of vulnerability dates back to the occupation of the city and the power dynamics established between white and BIPOC groups (Silva, 2015; 2016).

The overlap of socioeconomic vulnerability and climate risk for certain individuals and groups is an important aspect of climate injustice, and climate injustice is obvious in Teresina. The city does not have a dynamic economy. Agriculture and livestock, the most greenhouse gas (GHG) in Brazil, represent only 0.3 per cent of the economy in the city (Carvalho, 2018). Teresina's contribution to emissions at a national and global scale is thus relatively low. At the same time, the city is situated in a global warming hotspot, the Brazilian Northeast, and thus has high vulnerability to the effects of climate change.

**A complete inventory of GHG emissions for Teresina is still under development and is expected to be concluded in late 2022. Existing estimates suggest that a total of 1.45 million tons of carbon dioxide equivalent were emitted within city limits in 2019. The energy sector was responsible for 62 per cent of total GHG emissions in the municipality.** In second place was the waste sector (31 per cent), followed by agriculture, forestry and other land use (7 per cent) (Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa, 2022).

Teresina is already affected by extreme heat, and models predict that this will worsen in the coming years. Santos and Melo (2010) point out that the city “would show a tendency for discomfort close to unbearable in the thermal comfort index” (Painel Brasileiro de Mudanças Climáticas, 2016, p.53). According to the Vulnerability Index of the Latin American Development Bank (CAF), Teresina presents an extreme climate risk and scores as more vulnerable than the average Brazilian state capital (Mapplecroft, 2014). A report by UN-Habitat, part of the City Resilience Global Programme (CRGP, 2021), predicts that, for example, Teresina’s local climate will become hotter and drier for most of the year, particularly in the hot season (June, September and October); heatwaves will become more frequent and much more persistent; and rains will decrease for most of the year.

Teresina is located between two large rivers (the Poti and the Parnaíba) and is crossed by many tributaries, which makes a considerable part of the city prone to floods and landslides. Pluvial and fluvial floods often cause disruptions to infrastructure, in particular regarding power supply and mobility. Climate injustice is evident in the distribution of flood risk in the city. The most exposed area, the centre-north region (see **Figure 1**), encompasses low-income and vulnerable neighbourhoods with low sewage coverage (Chaves, 2015; Chaves and Lopes, 2011). Economically deprived households in Teresina are, therefore, particularly at risk of floods and landslides.

In 2019, Teresina’s gross domestic product (GDP) was around \$4.2 billion, corresponding to almost half of the total GDP of the state of Piauí (IBGE, 2019). Teresina attracts people from more deprived municipalities within the state who are looking for more and better jobs, education and health care. The metropolitan area of Teresina is part of a network with 13 other cities focused on economic development, the so-called RIDE Grande Teresina. Therefore, the city’s development has an impact on over more than 1.2 million people in the region, which highlights the importance of articulating with other municipalities and levels of government. Moreover, the city is considered the preferred destination for people from 300 Brazilian cities for its health-care services (CRGP, 2021). While the fact that Teresina is a regional health centre is positive, this also means that it receives more pressure in cases of health-related disruptions, such as the recent COVID-19 pandemic.

1 The biome of the interior north-eastern Brazil, characterized by a type of semi-arid tropical vegetation.

The region where Teresina is located, the Brazilian Northeast, is also considered a hotspot for food insecurity induced by climate change (Ericksen and others, 2011). Under one scenario, the Brazilian Northeast will become 2°C-4°C warmer and 15-20 per cent drier. High evaporation will affect water levels and impact hydroelectric energy production. It can also affect biodiversity in the caatinga, subsistence agriculture and population health. Researchers anticipate that Piauí will be one of the four Brazilian Northeast states with the most significant drop in GDP growth due to a 70 per cent shrinking of agricultural lands by 2050 (Centro de Desenvolvimento e Planejamento Regional (CEDEPLAR) and Fundação Oswaldo Cruz (FIOCRUZ), 2008) and a decrease in growing seasons to below 120 days (Ericksen and others, 2011). It is also expected that, between 2030 and 2050, there will be a significant increase in migration from rural regions to urban centres in the Brazilian Northeast (CEDEPLAR and FIOCRUZ, 2008).

For all of the reasons above, in a future of climate-induced disruptions, Teresina is likely to have to absorb the impacts of migration from its surroundings (CEDEPLAR and FIOCRUZ, 2008).

**Because Teresina is not well equipped to cope with extreme weather events and stresses in urban systems, climate-induced migration is likely to further challenge basic services and infrastructure. These scenarios thus highlight the need for Teresina to plan ahead and consider both future pressure on urban systems and low-carbon infrastructure.** In addition, climate injustices (e.g. increasing exposure of low-income households to floods) and potential related conflicts in the city (e.g. urban violence, disputes over urban services due to migration) show the need to increase adaptive capacities, especially those of the most vulnerable groups, including BIPOC women and youth.

There are at least three key conflicts related to sustainable development currently ongoing in Teresina. The first is related to urban mobility and the limited coverage of public transport through bus networks without providing any other affordable and low-carbon alternatives. The second conflict relates to social housing policy and the lack of support for such measures, especially due to a lack of urban law enforcement and the pressure of the real estate market on unsustainable urbanization. Finally, there is a conflict around water management and flood risk, especially due to a failure in delivering adequate drainage systems. These three cases are demonstrative of a larger crisis within institutions and frameworks that exist on multiple scales and fail to contribute to urban sustainability.





Participatory Mapping Workshop in Edgard Gayoso, Teresina, on March 20, 2022.  
© PAULO SÉRGIO / WRI-BRASIL / UNU-EHS

## 2. Climate Governance

Teresina is in its early stages of climate policymaking; thus, urban climate governance is still emerging. The local government has undertaken several climate-related initiatives since 2015. First, it has been involved with global city networks, such as the Global Covenant of Mayors for Climate & Energy and ICLEI - Local Governments for Sustainability. Second, it has also been searching for partnerships and funding sources to build urban resilience, for instance, with Latin American Development Bank (CAF), the French Development Agency (AFD), UN-Habitat and others. Despite the leadership of the government in developing an urban climate agenda, implementation and monitoring as well as evaluation of concrete actions are still lagging behind.

Mention of climate change started to appear in municipal plans published after 2017. For instance, the issue was addressed by the Integrated Waste Management Plan in 2018, the Territorial Master Plan (PDOT) in 2019 and the Sustainable Urban Mobility Plan (still under development). However, these plans have not translated into concrete targets to tackle climate change. One of the most critical challenges to formulate climate targets is related to the lack of accurate data at the city level due to the fact that the first inventory of GHG emissions and the Climate Action Plan are expected to be released only in late 2022.

Although climate change is already present in some policy frameworks, projects related to climate action do not explicitly refer to this agenda. Examples include: (1) Lagoas do Norte

Programme, which has as one of its aims resettling people from flood-prone areas and promote economic development, thus contributing to climate adaptation; (2) the bus rapid transit (BRT) system, which reflects a strategy to mitigate emissions from the transport sector; and (3) the Urban Tree Planting Plan combined with investment in greening the city, which potentially represent the creation of municipal carbon sinks.

Because urban climate governance is only just starting to materialize in Teresina, it is not yet mainstreamed into local policymaking and institutions. Climate governance remains a niche area, mostly driven by governmental action and relying on siloed and fragmented decision-making processes. Climate policy and initiatives are formulated and led by specific departments that do not discuss them with other governmental bodies, including at the state and national levels. A more solutions-oriented perspective is the underlying rationale of the Teresina Agenda 2030 Strategy, released in 2017. It is a planning department linked to the planning secretariat to monitor achievements of the local Agenda 2030. This instrument emphasizes the need for mainstreaming sustainability and climate action across different sectors, but especially into infrastructure and service provision at the city level. It points to the possibility of integrating goals across government departments. Still, climate governance is approached as a responsibility mainly of urban planning and environmental departments rather than considered a cross-cutting issue that concerns all government bodies at all administrative levels.

The implementation of climate action in Teresina has also been hindered by insufficient funds. The city is heavily dependent on transfers from the federal government and international loans to invest in sustainable urban development. Due to its high score on the national index of payment capacity, Teresina is also eligible to receive loans from national and international banks. In total, more than 60 per cent of municipal revenues came from external<sup>2</sup> sources in 2019 (CRGP, 2021). Therefore, climate action in the city is partly dependent on the prioritization of this issue by the national government and international stakeholders.

Since 2017, more budget has been allocated to climate projects in Teresina. A considerable part of this investment comes from credit operations or loans from international development banks and agencies, such as the World Bank (Lagoas do Norte Programme), CAF (Sustainable Teresina programme) and AFD (Agenda Teresina 2030). To a lesser extent, climate finance is also represented by small grants and technical cooperation, such as those provided by the Euroclima Observatory of Transport, the Technical Assistance for ICLEI (TAP Women for Climate) and the Laboratory for Food Municipal Policies. The municipality has also initiated Public-Private Partnerships (PPPs), including an arrangement in 2020 to replace public lighting with more energy efficient alternatives.

International loans and PPPs are becoming more widespread in the city in response to a decrease in resources transferred from the national government since 2015 due to a crisis on the federal scale. In the past, the federal government offered grants as part of a series of programmes to accelerate urban development, or *Programa de Aceleração do Crescimento* (PAC). The construction of train and BRT systems in Teresina are examples of an investment realized by the national government in 2011 under the Urban Mobility PAC.

In terms of the municipal budget allocation for urban development, there is a persistent trend towards the expansion of the road system. In Brazil, city councillors, state deputies and federal deputies can request amendments to the

municipal budget law. A large part of the requests for such amendments has been dominated by demands for investments in asphalt. For example, the recent participatory process for the Pluriannual Plan of Teresina (PPA 2022–2025) received 171 proposals for revision related to construction of new roads, whereas only 8.4 per cent of other proposals were related to the environmental agenda. As mentioned, urban climate governance is mainly led by the local government. There is a relative absence of civil society and other non-government actors in the development of the climate agenda in Teresina.

The municipality already promotes spaces for citizen participation, including a recently created city council that aims to track the implementation of PDOT. Teresina's government also offers opportunities for participatory budgeting to address community demands. However, as discussed, these demands are often still decoupled from environmental or climate agendas and can lead to measures that result in maladaptation, meaning that they tackle immediate issues but create a long-lasting negative backlash, as demonstrated by the emphasis on expansion of paved roads. Improving citizens' climate awareness and representation in participatory processes can be powerful entry points to allocate the municipal budget in ways that promote urban transformations.

The lack of integration among different levels of government can also lead to less desirable outcomes. This is exemplified by responses to tackle the housing crisis in Brazil. In order to promote social housing, the national government formulated and implemented the *Minha Casa, Minha Vida* programme. Location and accessibility were not fully integrated in the design of this policy. When it was implemented in Teresina, it propelled the construction of social housing far from the city centre and isolated from existing infrastructure and services. This shows that national policies that disregard the various needs of the local communities involved and lack clear goals related to climate resilience and low-carbon development can end up acting against sustainability transformation at the city level.

<sup>2</sup> Revenues that do not derive from municipal taxes but rather from national transfers and international credit operations (loans).



Participatory Mapping Workshop in Edgard Gayoso, Teresina, on March 20, 2022.  
© PAULO SÉRGIO / WRI-BRASIL / UNU-EHS



Center of Arts and Sports, CEU Santa Maria da Codipi in Teresina, on March 20, 2022.  
© LUCAS DE CARVALHO TURMENA / UNU-EHS

### 3. Entry Points for Urban Sustainability Transformation

The entry points for transformative climate action identified in Teresina can be grouped into five core categories:

#### TRANSLATE CLIMATE POLICY INTO ACTION

Teresina lacks an integrated and multilevel strategy for climate governance and action based on interdepartmental and intradepartmental coordination. Technical knowledge about climate change should also be nourished within the municipal government and climate awareness raised at the community level to help translate climate policy into action, particularly in terms of the implementation, monitoring and evaluation of projects. Non-governmental actors can be allies not only in consultative processes but also in the design of innovative solutions, implementation of measures and monitoring of results. Therefore, the municipal government should seek ways of engaging with civil society organizations and other local actors to amplify bottom-up climate initiatives towards more just and less carbon-intensive urban development pathways for Teresina. Social movements and organizations that already work on issues related to social equality, sustainability and urban mobility, among other issues, can be leveraged for the climate agenda in the city. Adequately disseminating municipal data among all urban dwellers, particularly the first GHG emissions inventory and Climate Action Plan when they are ready, is a crucial step to enable transformative climate action in Teresina.

#### URBAN PLANNING

In a future plagued with climate-related disruptions, Teresina is likely to absorb the impacts of migration from its surroundings. The influx of migrants may overload the already precarious infrastructure of the city. Therefore, urban planning in general and the expansion of infrastructure in particular should already take into consideration and boost Teresina's capacity to cope with climate risk and migration. For this, and to help push Teresina's climate agenda beyond planning and towards implementation, PDOT should be enforced and the Agenda Teresina 2030 strategy strengthened. At the same time, low-carbon strategies should be prioritized, such as decentralized provision systems, community-led services and nature-based solutions. These measures could avoid future increments in GHG emissions and foster innovative solutions to existing problems. For example, Teresina has an enormous underused solar energy potential that could provide clean and secure electricity, through decentralized production and/or the grid. The city is located in Brazil's "solar belt" (Pereira and others, 2017), and has the quickest payback among the state capitals of Brazil in terms of investment in solar power (Comerc Energia, 2019).





#### RACIAL AND CLIMATE JUSTICE HAND IN HAND

Social injustice and racism are tied together in the urban development process of Teresina. A critical view of Teresina's setting, climate policy and governance, civil society action, and conflicts indicates the urgency of combining climate mitigation with adaptation in order to provide low-carbon and resilient infrastructure and services, especially for those who are already disproportionately affected by the effects of climate change. Furthermore, new climate narratives are needed to foster sustainability transformations in Teresina; for instance, a narrative about how floods and droughts are part of the same problem, namely climate change, and how these intersect with precarity (see Shift the climate narrative). This should include the recognition of typically marginalized voices in urban decision-making processes, for instance, by improving citizen participation in climate governance in order to place the needs of vulnerable groups at the centre of climate action.

#### CLIMATE EMERGENCY

Declaring a state of climate emergency represents an opportunity for Teresina to seek funds for actions that integrate climate justice with the needs of vulnerable communities. To strengthen its case, Teresina's government could partner with local academic institutes and think tanks to generate up-to-date and robust data and research at the city level to better understand local climate conditions, needs and future trends. In this manner, it would also be possible to better articulate new city projects with climate action and socioeconomic development as a more efficient way to make use of public funds. Framing climate action as an approach to improve social and economic prosperity in Teresina (see **Shift the climate narrative**) could also improve the chances of accessing additional public and private financial resources.

#### SHIFT THE CLIMATE NARRATIVE

Challenges related to culture and narratives must be considered in the context of a transformation towards a more resilient and sustainable Teresina. The first challenge is to tackle the false opposition between development or prosperity and climate action. As discussed, climate change adaptation and mitigation are not generally perceived as priorities in Teresina because there are more pressing issues. Climate action is often viewed as a concern for developed countries that have already solved challenges regarding provision of basic infrastructure, housing and other necessities. For people living in low- and middle-income countries, job and income creation is often more present in the public debate. However, these objectives need not be conflicting. A new narrative that couples the climate agenda with socioeconomic development is needed in Teresina. This could mobilize stakeholders that typically oppose climate mitigation or adaptation measures because they feel that these could threaten their businesses or lifestyles. A second challenge lies within the pervasive sense of low self-esteem related to being born in Teresina and its hot weather. This could be addressed by promoting a new local identity and city marketing strategy that support residents to find pride in their city, including its climate. Climate features are already deeply embedded in local culture and can serve as a starting point to localize climate action at the community level and make the topic meaningful for local actors.

Tackling climate injustices requires strengthening local adaptive capacities, especially those of the most vulnerable groups, including BIPOC women and youth.

Material about the TUC project distributed during participatory mapping workshop in Edgard Gayoso, Teresina, on March 20, 2022.  
© PAULO SÉRGIO / WRI-BRASIL / UNU-EHS





# References

- Carvalho, Francisco Prancacio Araújo de (2018). O Piauí no Contexto Regional: Uma Análise dos Efeitos Econômicos e Ambientais a Partir de Modelos Inter Regionais. Teresina, Brazil: Universidade Federal do Piauí.
- Centro de Desenvolvimento e Planejamento Regional and Fundação Oswaldo Cruz (2008). MUDANÇAS CLIMÁTICAS, MIGRAÇÕES E SAÚDE: CENÁRIOS PARA O NORDESTE BRASILEIRO, 2000-2050. Belo Horizonte, Brazil: CEDEPLAR/FIOCRUZ. Available at [https://www.fao.org/fileadmin/templates/cplpunccad/Cedeplar\\_Sumario\\_Executivo.pdf](https://www.fao.org/fileadmin/templates/cplpunccad/Cedeplar_Sumario_Executivo.pdf).
- Chaves, Sammya Vanessa Vieira (2015). Vulnerabilidade às Inundações em Teresina, Piauí. Rio Clara, Brazil: Universidade Estadual Paulista, Instituto de Geociências e Ciências Exatas. Available at <https://repositorio.unesp.br/handle/11449/139394>.
- Chaves, Sammya Vanessa Vieira, and Wilza Gomes Reis Lopes (2011). A VULNERABILIDADE SOCIOAMBIENTAL EM TERESINA, PIAUÍ, BRASIL. *Revista Geográfica De América Central*, vol. 2, No. 47E. Available at <https://www.revistas.una.ac.cr/index.php/geografica/article/view/2519>.
- City Resilience Global Programme (2021). *Diagnóstico da Resiliência Urbana. Teresina*. Nairobi: UN-Habitat. Available at [https://issuu.com/teresina2030/docs/\\_pt\\_draft\\_city\\_resilience\\_profile\\_teresina\\_pag](https://issuu.com/teresina2030/docs/_pt_draft_city_resilience_profile_teresina_pag).
- Comerc Energia (2019). Teresina e Vitória dominam ranking de payback de energia solar no Brasil, 10 December. Available at <https://panorama.comerc.com.br/teresina-e-vitoria-dominam-ranking-de-payback-de-energia-solar-no-brasil>.
- DATASUS (2010). Índice de Gini da renda domiciliar per capita segundo Município Período: 1991, 2000 e 2010. Available at <http://tabnet.datasus.gov.br/cgi/ibge/censo/cnv/ginipi.def>. Accessed on 14 October 2022.
- Ericksen, Polly J., and others (2011). Mapping hotspots of climate change and food insecurity in the global tropics. CCAFS Report 5. Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security. Available at <https://hdl.handle.net/10568/3826>.
- Instituto Brasileiro de Geografia e Estatística (2017). Mapa de Pobreza e Desigualdade. Available at <https://cidades.ibge.gov.br/brasil/pi/teresina/pesquisa/36/30252>. Accessed on 27 October 2022.
- \_\_\_\_\_ (2019). Produto Interno Bruto dos Municípios. Available at <https://www.ibge.gov.br/estatisticas/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?t=piib-por-municipio&c=2211001>. Accessed on 27 October 2022.
- \_\_\_\_\_ (2020). Trabalho e Rendimento – População ocupada. Available at <https://cidades.ibge.gov.br/brasil/pi/teresina/panorama>. Accessed on 24 October 2022.
- Mapplecroft (2014). *Vulnerability Index to climate change in the Latin American and Caribbean Region*. Caracas: Development Bank of Latin America. Available at <https://scioteca.caf.com/bitstream/handle/123456789/509/caf-vulnerability-index-climate-change.pdf>.
- Painel Brasileiro de Mudanças Climáticas (2016). *Mudanças Climáticas e Cidades. Relatório Especial do Painel Brasileiro de Mudanças Climáticas*, Suzana Kahn Ribeiro and Andrea Souza Santos, eds. Rio de Janeiro, Brazil: PBMC, COPPE – UFRJ. Available at [http://www.pbmc.coppe.ufrj.br/documentos/Relatorio\\_UM\\_v10-2017-1.pdf](http://www.pbmc.coppe.ufrj.br/documentos/Relatorio_UM_v10-2017-1.pdf).
- Pereira, Enio Bueno, and others (2017). *Atlas Brasileiro de Energia Solar*. São Paulo: Instituto Nacional de Pesquisas Espaciais. DOI: 10.34024/978851700089.
- Santos, Wially Roger T., and Maria Lucilene Dias de Melo (2010). Índices de conforto e desconforto térmico humano segundo os cenários climáticos do IPCC. Available at [www.sbmec.org.br/cbmet2010/artigos/446\\_95127.pdf](http://www.sbmec.org.br/cbmet2010/artigos/446_95127.pdf).
- Silva, Rodrigo Caetano (2015). A historiografia piauiense acerca da escravidão no Brasil (Séculos XVIII–XIX). *Revista De História Da UEG*, vol. 4, No. 1, pp. 172–97. Available at <https://www.revista.ueg.br/index.php/revistahistoria/article/view/3416>.
- \_\_\_\_\_ (2016). Teresina (Piauí – Brasil), uma capital escravista: relações sociais e trabalho escravo durante a segunda metade do Século XIX. *Revista De História Da UEG*, vol. 5, No. 1, pp. 157–76. Available at <https://www.revista.ueg.br/index.php/revistahistoria/article/view/4586>.
- Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa (2022). Estatísticas. Available at <https://plataforma.seeg.eco.br/cities/statistics#>. Accessed on 14 October 2022.





## ABOUT

# Transformative Urban Coalitions

The Transformative Urban Coalitions (TUC) project is implemented by the United Nations University – Institute for Environment and Human Security (UNU-EHS), the World Resources Institute (WRI) together with its national offices in Brazil and Mexico, the International Institute for Environment and Development (IIED) together with IIED – América Latina in Argentina, and the German Institute of Development and Sustainability (IDOS), with support from the German Federal Ministry for Economic Affairs and Climate Action under its International Climate Initiative.

TUC seeks to shift the sustainability trajectory of cities towards zero carbon emissions by 2050 by altering the deeper social, technological and political structures and systems that are currently reinforcing high-carbon, resource-intensive urbanization. To achieve this goal, this project facilitates the establishment of transformative urban coalitions in five Latin American cities to develop new strategies for addressing local challenges in urban development and inequality while at the same time reducing carbon emissions.

Learn more: [www.urbancoalitions.org](http://www.urbancoalitions.org)

-  [facebook.com/unuehs](https://facebook.com/unuehs)
-  [linkedin.com/school/unuehs/mycompany](https://linkedin.com/school/unuehs/mycompany)
-  [twitter.com/UNUEHS](https://twitter.com/UNUEHS)
-  [instagram.com/unuehs](https://instagram.com/unuehs)