



Resilient Cities: Responding to Climate Change Challenges in Urban Environments

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Abstract

Climate change poses risks like heart and lung disease, thus impacting public health. The factors contributing to climate change, including electric power generation, manufacturing, deforestation, and transportation, are all linked to urbanisation. Organised by the Faculty of Health Sciences, Universiti Teknologi MARA (UiTM) Puncak Alam Campus, in collaboration with the Ipoh City Council (MBI) and Malaysian Association of Environmental Health (MAEH), a podcast broadcasted live on 5 June 2024 on the Facebook and YouTube platforms of the Studio Radio and TV, Bandaraya Ipoh (RTBI) aimed to explore comprehensive approaches to tackle infrastructure, public health, and informal settlement issues amidst climate change. It served as a crucial platform addressing urban resilience in Malaysia with the Ipoh City chosen as a role model city to be discussed. A total of three panellists were invited. The first topic on the health co-benefits of climate mitigation through active and public transportation in urban areas was presented by Professor Dr Jamal Hisham Bin Hashim, an Honorary Member of MAEH. Then, YB TPr. Haji Mohd Zainal Bin Abdul Hamid, the Director of Town Planning at Ipoh City Council, shared insights on Ipoh's initiatives in line with Ipoh Low Carbon City 2030. The third panellist, YB TPr. Dr. Zulqarnain Bin Mohamad, the Chief Secretariat of Ipoh Doughnut Economic City 2027, presented the innovative approaches of Ipoh Doughnut Economic City.

Keywords: urban resilience, low carbon city, active transportation



Scan here to watch the video abstract

Video link:

https://youtu.be/1X_DsGyP_Fg?si=QdltNydM3Hkm9G5b

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INTRODUCTION

Malaysia, a fast-developing country with a growing urban population, is exposed to the effects of climate change. Its infrastructure is highly vulnerable to severe weather events, like floods, landslides, and storms (Salleh et al., 2023), damaging essential systems such as highways, bridges, and water delivery networks. Rapid urban growth with inadequate planning worsens the effects of climate change, as cities are less prepared for its impacts. Accordingly, enhancing resilience requires better design, construction standards, and maintenance practices. In addition, rising temperatures and changing precipitation patterns increase the incidence of heat-related illnesses, waterborne diseases, and vector-borne infections. Thus, climate change significantly affects public health in urban areas (Creutzig et al., 2024). Urban pollution further exacerbates these health issues. Air pollution which particulate matter (PM₁₀) give

impact to urbanization and health impact to inhabitants. Vulnerable groups, including impoverished urban dwellers and migratory communities, are especially at risk. Addressing these challenges involves implementing heatwave preparedness plans, improving sanitary facilities, and ensuring accessible healthcare services.

Therefore, informal settlements and low-income communities are particularly susceptible to climate-related hazards. Many urban residents live in substandard housing with poor infrastructure, heightening their vulnerability to disasters. Climate change-induced displacement and loss of livelihoods deepen socioeconomic inequalities and urban poverty. Strengthening these communities through inclusive urban planning can enhance their resilience and empower them to face climate challenges.

Addressing urban resilience in Malaysia necessitates coordinated efforts from government agencies, urban planners, civil society organisations, and local communities. Integrating climate resilience into urban planning and development processes is crucial. Accordingly, Ipoh's initiatives as a Low Carbon City and Doughnut Economic City offer a valuable model for other cities aiming to improve their resilience and sustainability.

HEALTH CO-BENEFITS OF CLIMATE MITIGATION

i. Active and Public Transportation in Urban Areas

Environmental problems stem from many aspects. In the current study's focus group discussions (FGD), a small group of environmental health specialists highlighted ten major health challenges in Malaysia based on their severity. The top concern was urban health (Ayai et al., 2023). In 2023, 78 per cent of Malaysians lived in cities, with 90 per cent living in Melaka, Penang, and Selangor, moving to urban areas. However, urban society is compelled to adapt to climate change even though Malaysia has tried to control its carbon emissions.

Temperature increases and climate change have a greater impact on urban areas. Issues like sanitation, air pollution, immigration, crime, and security are closely linked to urbanisation and the bigger problem of climate change. In Melaka, droughts, flash floods, El Nino, and problems with the water supply are caused by extreme weather. In addition, urban coastal regions may get submerged as a result of rising sea levels brought on by climate change. Because so many structures and infrastructure (such as roads and buildings) absorb heat, the urban heat island effect happens. Accordingly, urban areas must make efforts to mitigate climate change and the heat island effect. Among the efforts to mitigate climate change include adding more trees and other flora. Trees can shade parking lots and pedestrian areas by reflecting light. Prof Jamal also lists ten bike-friendly cities, the highest being in the Netherlands, with five per cent of young and old people in Utrecht riding bicycles. This is because it is convenient for cyclists, as there is bicycle parking available everywhere. While the Europeans ride as one of their primary modes of transportation, Malaysians ride for exercise purposes.

In addition to promoting active mobility, public transportation needs to be improved. However, health outcomes may calculate as changes in premature deaths and disability adjusted life years (DALYs) (Kwan et al., 2017). Public transportation has co-health benefits such as lowering carbon dioxide (CO₂), PM_{2.5} (which can induce heart attacks and asthma) and lowering the number of fatalities from illnesses and injuries or DALYs. Furthermore, the number of fatalities from road accidents can be avoided. The panel has emphasised that greater physical activity is the reason behind the decline in deaths from DALYS. Among the efforts to improve public transportation is punctuality. In Switzerland and Japan, public transit is extremely punctual. The Bukit Bintang area has a lot of pedestrian zones. This is one of Malaysia's creative approaches to offering secure and protected pathways for pedestrians. Modern transit systems like MRT come at a hefty price. However, MRT promotes a move away from personal automobiles and toward public transportation.

Reeducating society is one way to encourage people to use public transportation. People should be encouraged to use public transportation daily. Making public transportation fashionable is another, like with car-free days. Implementing car-free roadways is a potential measure that the government may adopt. Access to such places is restricted to pedestrians, and cars are prohibited. This might inspire 10,000 steps and develop it into a popular tourist destination. It is also critical to address security-

related problems, including theft, rape, and robbery. For this reason, the government ought to provide pedestrian tourist police.

The panelist welcomes the idea of green buildings in cities and applauds the notion of green buildings in urban areas. Thus, hydroponic gardening, greenery, rainwater recycling, and energy-efficient lighting should all be incorporated into future building designs. In this regard, municipal planners could modify buildings in a more climate-friendly manner by maximizing natural lighting and minimizing the usage of artificial lighting.

ii. Ipoh Low Carbon City 2030

Climate change is closely linked to human activities and carbon emissions. In Malaysia, the focus is on creating low-carbon cities, while in other developed countries, the goal extends to creating zero-carbon cities, eliminating entities that contribute to climate change. Research consistently shows that human activities are the primary drivers of climate change, unlike natural disasters like volcanoes, typhoons, and floods, which do not occur daily (Thomas, 2017; Zommers & Singh, 2014). Every day, human activities generate pollution and increase CO₂ levels.

Vehicle movement and urban activities, such as manufacturing, contribute significantly to pollution. Despite advancements in green technology, pollution persists due to human movement (car fuel combustion). Data indicates that since the 1950s, scientists have observed a worrying increase in Earth's temperature by 1°C to 1.5°C (Lindsey & Luan, 2023). Although humans can tolerate temperature rise, the rapid pace of this change (expected to occur before 2100) is alarming. In Malaysia, agencies like Malaysian Green Technology and Climate Change Corporation (MGTC) and other ministries play crucial roles in addressing this issue. MGTC focus on growing green products and services through programmes including the Green Technology Financing Scheme (GTFS), the MyHIJAU Mark Certification Program, and the Green Technology Investment Tax Exemption (GITE) in efforts to mainstream the green economy. MGTC also prioritize initiatives like improving energy efficiency, renewable energy, low-carbon urban programs, and low-carbon mobility to increase climate change mitigation.

The Ipoh City Council presented its 2024 profile, highlighting a population of 807,481 people with a multicultural composition (43.9% Chinese, 38.2% Malay, 14% Indian, and 3.9% others). The council covered an area of 643 km², comparable to Singapore, with 388 km² built up. Ipoh maintained a large amount of green space as forest reserves made up 44.76% of Ipoh, while the remaining space was used for industrial zones (4.56%), residences, public institutions, and agriculture (10.91%). Although its industrial activity was small, it significantly contributed to pollution.

With various pre-war and post-war shophouses spread across both old and new towns, Ipoh's history is closely linked to the tin mining business. By 2030, the city aims to become a Low Carbon City by reducing greenhouse gas emissions. Ipoh successfully raised its greenhouse gas reduction goal from 13.94 per cent to 40.22 per cent between 2017 and 2022, intending to achieve a 45 per cent reduction by 2030.

Building (B), Urban Infrastructure (UI), Urban Transportation (UT), and Urban Environment (UE) are the four primary criteria that the Ipoh City Council (MBI) is concentrating on. Since 2021, MBI has worked with Faculty of Health Sciences, Universiti Teknologi MARA (UiTM), Perak Branch Campus, Seri Iskandar to create a framework and master action plan, which its

implementation phase began in 2024. Three strategies are included in the plan: urban form, urban greening, and environmental quality.

Ipoh intends to rehabilitate unoccupied land and transit locations to preserve heritage places and allow controlled high-density development. The city attempts to reduce CO₂ emissions from global examples, like the use of electric vehicles (EVs), bicycles on buses, and electric tourist boats in countries, including Paris. Ipoh wants to promote micro mobility and urban greening by adding additional green areas, covered walkways, and cosy bike lanes as tourists are drawn to the old town area's pedestrian zones.

To prevent incidents like the pollution in Sungai Kim Kim, Ipoh teams up with the Department of Environment to keep an eye on pollution in industrial areas. They check the industries' adherence to licensing rules and impose fines to ensure the city stays sustainable. Ipoh also uses smart traffic to cut down on carbon emissions and participate in ASEAN Green City projects, which provides them with the experience and funding from the ASEAN bank. According Humayun et al., (2022), the smart traffic management system uses modern technologies such as the Internet of Things (IoT), cloud computing, 5G, and big data to aid conventional traffic management systems and efficiently handle the stated problem.

A few of Ipoh's successful green projects include installing solar panels on the UTC Building, setting up EV charging stations, building a rainwater collecting system, and encouraging eco-friendly transportation. Further initiatives include the collecting of e-waste, the eradication of illicit dumps, and programmes for recycling used tyres and oil. Developing a sustainable recycling programme is a collaborative effort that requires active participation from everyone in the recycling value chain. The panellist also highlighted the importance of decarbonisation (trees capture CO₂ in their biomass and soils), which can be addressed through programmes such as tree planting. Therefore, the tree planting efforts have been implemented as a viable way to counteract anthropogenic emissions as part of net-zero emission strategies (Kirschbaum et al., 2024).

At the end of the session, by responding to the feedback from respondents, the panellists emphasised the importance of maintaining green zones, which are gazetted and cannot be changed. These zones are vital for neighbourhood activities and sports. Despite a decline in outdoor activities among the younger generation, Ipoh recognises the need to preserve green spaces for community engagement and environmental sustainability.

Ipoh aspires to be an example for other local authorities in Malaysia, and this is demonstrated by its comprehensive initiatives, community involvement, and adherence to environmental standards, all of which demonstrate its dedication to low-carbon and sustainable development.

iii. Ipoh Donut Economic City 2027

Ipoh Donut Economic City 2027 is a forward-thinking concept adapted from traditional models to promote environmental sustainability. This initiative positions Ipoh as a human-centric city, aiming to achieve the 15th Flagship of Perak Sejahtera 2030. The concept integrates various plans specifically Social Development, Environmental Sustainability and Biodiversity and Empowerment of Local Authorities and cultural elements such as Traditional Arts and Crafts, Traditional Malay Houses, Performing Arts, Temples and Mosques, and Cultural Museums. Hence, Perak Sejahtera 2030 plan, as detailed in Second Year Progress Report, which outlines 270

projects implemented through this strategic development initiative.

Aligned with the Islamic economy, this initiative focuses on competitiveness, societal benefits, and environmental regeneration. The three phases of the Ipoh Donut Economic City 2030 implementation include the preliminary stage, preparation of the action plan, and implementation. Increased community involvement through discussions, town halls, and departmental meetings is the first step. The action plan is formulated in the second phase, and it is then implemented in the third phase.

Under this effort, several improvements have been implemented, such as turning abandoned buildings into Green Buildings. For example, UTC Super Kinta houses several government offices to minimise carbon emissions and facilitates public services. The government offices' centralisation helps reduce human movement. Additionally, Ipoh has implemented an Integrated Operation System, an AI-based traffic control system, to reduce traffic congestion and cut down on carbon emissions. To ensure that all developments are both socially and environmentally inclusive, the initiative stipulates that they cannot exceed the Ecological Ceiling. The Ecological Ceiling consists of twelve basic human development needs (social conditions); and nine ecological ceiling metrics 2, as set out by Nair et al., (2022) beyond which lie unacceptable environmental degradation and potential tipping points in Earth systems. This strategy ensures holistic development by addressing problems including housing, health, education, and poverty. The second phase of the project, which began in May 2023, entails developing an action plan with eight ecological and twenty-one social indicators. It should be completed by July 2024, with complete deployment predicted by 2026.

The success of the Ipoh Donut Economic City 2027 relies on community involvement and the principle of togetherness. Despite being a novel concept in the country, its implementation faces challenges, especially in aligning various plans with set indicators. For example, collaboration with SDG 17 aids in overcoming these obstacles. The local community plays a crucial role in this initiative, with activities like urban farming and recycling being essential. Continuous nurturing of the residents' attitude towards sustainability is vital.

In summary, Ipoh Donut Economic City 2027 is a progressive initiative focusing on sustainable and inclusive development, integrating cultural and economic elements while relying on strong community involvement and collaboration.

PARTICIPANTS FEEDBACK

A survey was conducted to get views from the audience regarding this programme. The aim of this survey is to get the participants' views on the concept of the donut economy being implemented in the city of Ipoh, the effectiveness of the implementation of the low-carbon city program and understanding of climate change. The question was divided into four sections: Section A (Demographic), Section B (Doughnut Economic City), Section C (Low Carbon City), Section D (Climate Change), and Section E (Program Feedback).

(i) Section A (Demographic)

Most of the participants (94%) came from the government sector, mainly from higher education institutes.

(ii) Section B (Doughnut Economic City)

Section B measured the degree of agreement and disagreement regarding the overall topic of Ipoh Donut Economic City 2027. Five questions were provided, and 82% respondents indicated agreement or strong agreement. The results revealed that respondents welcomed the concept of Ipoh Donut Economic City 2030.

(iii) Section C (Low Carbon City)

This section measured the degree of agreement and disagreement on the overall topic: Ipoh Donut Economic City 2027. Five questions were given, and 84% respondents indicated their agreement, choosing 'agreed' and 'strongly agreed' options. The results revealed that respondents welcomed the concept of Ipoh Donut Economic City 2030.

(iv) Section D (Climate Change)

The section measured the degree of agreement and disagreement on the overall topic: health co-benefits of climate mitigation through active and public transportation in urban areas. A total of five questions were given. The respondents generally agreed that an adaptation strategy is crucial for addressing the challenges posed by climate change. They recognised that extreme weather significantly impacted public transportation. To mitigate these risks, the majority supported using signage and maps and implementing sustainable city initiatives.

CONCLUSION

The effort of climate mitigation through active and public transportation in urban areas offers significant health co-benefits, such as encouraging physical activity and reducing pollution. Ipoh City's commitment to becoming a Low Carbon City aligns with this goal by prioritising sustainable infrastructure and green initiatives. For example, the Ipoh Donut Economic City 2027 concept integrates these efforts by fostering a human-centric, environmentally friendly urban environment.

The outcomes from these discussions highlight Ipoh's holistic approach to sustainability, combining improved public health, reduced carbon emissions, and inclusive economic growth to create a resilient, ecologically, and socially advanced urban society. This podcast innovatively addresses global issues, giving live listeners from all community groups a chance to voice their ideas and learn more from the panellists.

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