How Green are Ireland's Cities?

Researchers at the MaREI Centre and Environmental Research Institute at University College Cork launch ***BIOPHILIC CITIES*** *-* ***a groundbreaking study that harnesses Google Street View imagery and artificial intelligence to measure urban greenspace and its impact on health and socioeconomics.***

Cork, Ireland, 23rd June 2021 – In a groundbreaking study, researchers at the Nyhan Future Sustainability Research Group at University College Cork (UCC) have discovered how to harness vast Google Street View imagery datasets and artificial intelligence (AI) to measure urban greenspace and its impact on human health and socioeconomic factors. They have achieved this in unprecedented accuracy and scale through case studies in three major cities in Ireland – Dublin City, Cork City and Galway City.

With urbanization occurring at a rapid pace globally, this poses immense challenges to urban sustainability, livability and public health. Currently, 55% of the world's population live in urban areas and this is set to increase to 70% by 2050. There is tremendous opportunity to counteract the negative impacts of urbanization on human health and well-being with positive environmental exposures such as urban greenspace. Urban greenspace includes natural environments, parks, and recreational spaces; green infrastructure including walking and cycling lanes; and natural vegetation including tree-lined streets, shrubs, gardens, lawns, green walls, and green roofs.
Increased exposure to urban greenspace has been linked with lower death rates, greater life satisfaction, and improved mental health and well-being. Urban greenspace alleviates the negative environmental health impacts of pollution and climate change as it mitigates air pollution, reduces noise pollution, and improves the thermal environment. It also enhances the aesthetics of urban areas and supports biodiversity.

A major barrier to the successful management of urban greenspace globally has been the lack of detail in greenspace maps and a lack of research examining its human health and socioeconomic benefits. To unlock the full environmental health and socioeconomic benefits of greenspace, a greater understanding of it is urgently required.

In response to this, researchers at UCC firstly computed and mapped urban greenspace using 750,000 Google Street View images and computer vision methods to cover the expanse of three major Irish cities. They then examined links between urban greenspace exposures, self-reported health and socioeconomic factors. The study revealed strong links between higher greenspace exposures and better self-reported health. Additionally, people who lived in areas with higher levels of greenspace reported higher levels of income and education than those living in areas with lower levels of urban greenspace.

"Urbanization and the threats posed by air pollution, climate change and the COVID-19 pandemic are exacerbating urban health inequalities worldwide. Biophilic Cities shows us how vast digital datasets and artificial intelligence can be powerful tools for understanding our urban environment and its complex interconnection with human health and well-being. Our research

will help governments and city authorities to identify where to prioritise urban greenspace infrastructure investments. It will also inform the design of sustainable, healthy and equitable future cities" says Dr Marguerite Nyhan, who is senior author on the paper, a Senior Lecturer in Environmental Engineering & Future Sustainability at UCC and Director of the Nyhan Future Sustainability Research Group.

Anna O'Regan, who authored the study and is a PhD student at UCC says *"Globally and in Ireland, cities are becoming more urbanised, bringing major challenges to sustainability and livability. We urgently need to minimise adverse environmental and health impacts associated with this trend by encouraging greenspace use. Expertise and research in the area of urban environmental engineering is especially relevant and will prove critical in future years. Our research focuses on using novel technologies to achieve healthier and more sustainable future urban societies. It provides an evidence base for future greenspace developments which will improve the quality of life of urban citizens."*

The research has been published in leading environmental engineering journal Environmental Science & Technology.

PUBLICATION CITATION AND LINK:

O'Regan, A., Hunter, R., Nyhan, M., 2021. "Biophilic Cities" – Quantifying the Impact of Google Street View-Derived Greenspace Exposures on Socioeconomic Factors & Self-Reported Health. Environmental Science & Technology. https://pubs.acs.org/doi/full/10.1021/acs.est.1c01326

ABOUT THE NYHAN FUTURE SUSTAINABILITY RESEARCH GROUP:

The Nyhan Future Sustainability Research Group investigates and develops intelligent solutions for sustainable, zero carbon, healthy, liveable and equitable cities of the future. The group, led by Dr Marguerite Nyhan, employs state-of-the-art technologies and methodologies from a number of disciplines including engineering, computer science, urban planning, public health and sociology to achieve its vision. The Nyhan Future Sustainability Research Group sits within the School of Engineering & Architecture, the MaREI Centre for Energy, Climate & Marine and the Environmental Research Institute at University College Cork.

As the challenges of urbanisation, environmental degradation and climate change are complex and multi-faceted, the Future Sustainability Research Group recognizes that pathways towards a sustainable future will only be achieved by successfully harnessing emerging technologies including data analytics and artificial intelligence; by embracing complexity; by fostering a systems thinking approach and by engaging with people, policymakers and government. Its research falls into two major categories – 'Sustainable Future Cities' and 'Technology, Policy & Society'.

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