

Dear all,

For many university teachers, our own experience of being taught continues to impact us many years on. My most inspiring undergraduate teacher was a quirky Irish regional-scientist who not only read out his lectures verbatim from a script, but repeated every line. The delivery did not seem to matter because the content was so inspiring. There is delivery and there is content.

In some fields, content changes little over the years and in others, what is taught now is an epoch away from what we learned ourselves at school. In other fields, such as architecture, delivery seems more static than content, which is very fluid. Some of our studio teaching methods are probably little different to those employed by our own teachers. Indeed, some of us like to hold up our *alma mater* experiences as models still to be aspired to. How will architectural teaching change as a result of the current disruption? What studio technology of necessity will emerge as mainstream technology of choice?

In the lecture theatre, there is a gathering acceptance of the advantages of staying with online presentations after the pandemic has passed. Might it even be that some of the trendy approaches to lecture-based teaching we now like to adopt, are only ways of making the scheduled hour more bearable? Perhaps deconstructing teaching into packages of content and objectives, delivered through appropriate mechanisms, and doing this more flexibly on- and off-line, might increase the overall efficiency of the education we deliver.

Might AI *replace* some parts of the teaching process? A 2016 McKinsey global report looked at jobs most vulnerable to AI-enabled replacement <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>. Both low-paid and high-paid jobs have elements at risk.

At the latest robowaiter cafe in Tokyo, customers are served by traditional robots (not androids) each of whom (which) is the voice, hands and embodiment of a severely handicapped person lying on a bed somewhere else in Japan and using Stephen Hawking-like eye-movement, lip and other advanced touch controls <https://www.intelligentliving.co/cafe-tokyo-robot-waiters-paralyzed-people/>.

Avatar has arrived in eateries. But highly skilled doctors and other medical professions are also on McKinsey's vulnerable list. High expertise usually means well-structured knowledge and rules undergirded by science and probabilities and involves a degree of data processing. It is not too difficult to automate the interpretation of a CT scan, for example, in the process of diagnosing and mapping a bone tumor. Data processing is one of McKinsey's 7 dimensions used to judge job vulnerability. Scoring high on the 'applying expertise' dimension, on the other hand, *protects* a job from robots. But the more advanced the AI algorithms, the more difficult it is to draw a line between 'expert' and routine. Last week, the Guardian Newspaper published the following striking headline:

'A robot wrote this entire article. Are you scared yet, human?'

(<https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3>)

What followed was quite literally shocking. Here's an excerpt:

Studies show that we cease to exist without human interaction. Surrounded by wifi we wander lost in fields of information unable to register the real world. As a new generation of cyberneticians keep watch, they see in our present age of the virtual a potential to transform the modern "cyborg". Global cybernetics are already making it so.

The Industrial Revolution has given us the gut feeling that we are not prepared for the major upheavals that intelligent technological change can cause. There is evidence that the world began to collapse once the Luddites started smashing modern automated looms. It is therefore important to use reason and the faculty of wisdom to continue the changes as we have done before time and time again.

The Guardian's op-ed had been stitched together from several essays written robotically by OpenAI's GPT-3 text-generating platform (operated by UC Berkeley undergrad Liam Porr). It learned its 'content' from scanning millions of pages on the internet, including Wikipedia, and GPT-3's AI algorithms churned out a meaningful mix of information, opinions and analysis that according to the Guardian editors, were as good as any material they typically get from their writers when editing an op-ed. Liam Porr's only input was to ask the machine to write a robot-centric message to humans reassuring them that AI is safe, and supplying a very short brief as a pointer. In the quote above, GPT-3 has learned enough to urge humans to use the faculty of wisdom. I love that. Read the full op-ed and you will see that the robot has also learned enough about the human condition to express the hope that 'the truth (learned from history and applied with rationality) will set us free'. A computer has apparently deduced from first principles by analysing causes and consequences (not rote repeated) a classic phrase from one of human-kind's greatest religious teachers.

We talk a lot about preparing our students for the future; educating them for jobs not yet imagined; imparting deep learning and transferable skills. How might our own profession and skills have to adapt? The year 2020 has rudely taught us what is really missing when we do not interact with our students f2f and what technology can help us do better. Could GPT-3 ever write lectures for us? I think I shall have a go. Perhaps the last lecture in our new faculty foundation course AFIC1001. We have probably arrived at the cyber-lecturer point. I would only need to add Siri to GPT-3 and put up a mugshot on the Zoom screen. Perhaps even animate it using deep-fake software calibrated to the audio-track.

So, we already have one answer to the question of what unique value we add through our teaching. My version of cyber-AFIC1001 would be different from yours. The

questions I seed it with (the writing 'brief') will determine all. My skill is framing the narrative. I may not even have to structure the argument – GPT-3 can work that out itself. I become an active curator. I can merely pick the best, or the one that best suits my emphasis or my style.

My *tutoring*, rather than my lecturing, may turn out to be more of a unique educational contribution (and for the educational industry, value proposition). Your adeptness in answering the unstructured and unpredictable questions that are triggered by your computer-generated lecture, may be your truly valuable teaching skill. Maybe this is what students will pay a premium for in tomorrow's universities. Which in some ways brings us full circle to elite pre-20th century mass university education. My great-grandfather's great-grandfather paid a huge sum of money at the time to send his grandson to Caius College Cambridge (Caius being famously pronounced 'Keys'). He was paying for the ruminations of clever people set apart by society to ruminate more and to pass that on, largely through questions and answers and essay writing and philosophical critique and laboratory experiment, discovery and empirical critique (my ancestor was a chemist). Perhaps AI and Zoom will take us back to simpler and more learned times.

The McKinsey study identified education as one of the most difficult jobs to replicate, with only 35% of the time/jobs in the industry suitable for automation. Within education, it turns out that it is pre-school teachers who are most secure from the robots. Keep an eye on kindergarten teacher salaries.

I've floated the question on several occasions during 2020: what are the essential ingredients of world-class built environment educational experience, when much of what we have merely assumed to be good, from our own student experiences and other ideas picked up along the way, is stripped back? How can we build up our school's reputation for *inspirational impartation* of *intellect*, wrapped up in an *impactful* education?

Congratulations to all those mentioned below for your ongoing contributions to scholarship, research and teaching in FoA. Particular congratulations to our clever students who have won prizes and to their dedicated teachers.

Chris Webster
Dean, FoA

Teaching and other Achievements

DUPAD

1. Dr. Kyung-min Nam (Assistant Program Director of BAUS)

- On 8 September 2020, Mr. Tsang Churn (BAUS Class of 2020) and Mr. Li Man To (BAUS Class of 2020) were awarded the first and the second Hong Kong Institute of Surveyors (HKIS) Scholarship prizes, respectively. Also, Mr. Fung Ka Lok (MUP Class of 2019 and BAUS Class of 2017) received a top HKIS Dissertation Award (master's category).



Mr. Tsang Churn awarded the first HKIS Scholarship prizes



Mr. Li Man To awarded the second HKIS Scholarship prizes



Mr. Fung Ka Lok awarded a top HKIS Dissertation Award (master's category)

2. Professor Bo-sin Tang

- Mr. Frankie Choy (MUP Class of 2020 and BAUS Class of 2018) and Mr. Leo Huang (MUP Class of 2020 and BAUS Class of 2018) won the championship in the Tertiary category of the “Concept Master Plan” topic of the [“Runway for Your Imagination”](#) Ideas Competition, organised by the Singapore Urban Renewal Authority. This competition aimed to inspire ideas for transforming the Paya Lebar Airbase, an airbase located in Singapore, into a highly liveable and sustainable new town.

Their proposed master plan, called '[Paya Lebar Tomorrow](#)', aimed to capitalize on the rich historical and environmental assets of the site of around 1,900 hectare and develop it into a new sustainable regional center for communities of diverse characteristics.



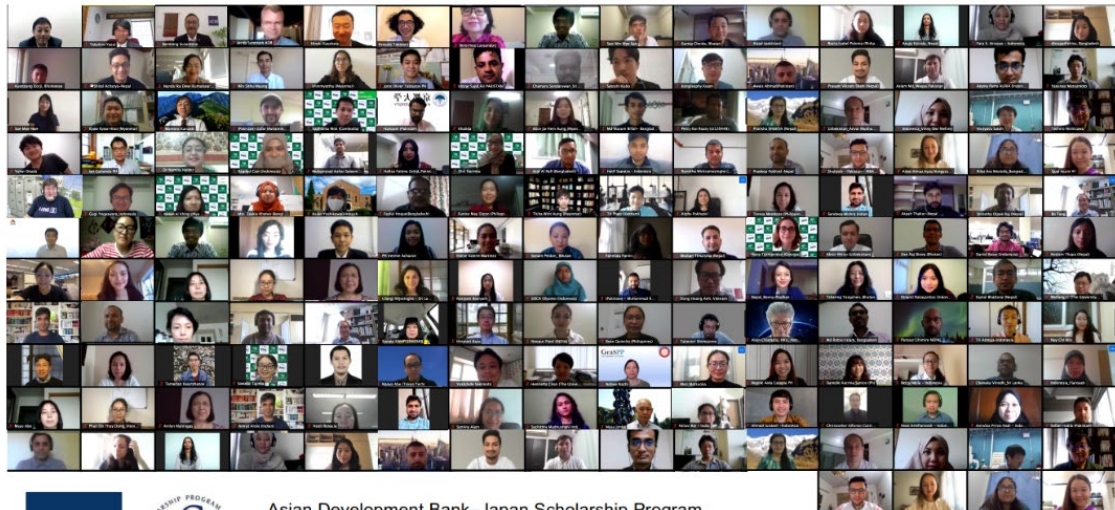
The press release and their concept master plan with the jury's comments are available at the following links:

<https://www.ura.gov.sg/Corporate/Media-Room/Media-Releases/pr20-25>

<https://www.ura.gov.sg/Corporate/Get-Involved/Plan-Our-Future-SG/Runway-for-Your-Imagination/Topic-1/Paya-Lebar-Tomorrow>

- Mr. Choy and Mr. Huang both have been recruited as trainee planners of the Hong Kong Urban Renewal Authority

- On 28 August 2020, Prof. Bo-sin Tang, Dr. Weifeng Li and Mr. Alain Chiaradia attended the virtual Graduation Gathering organized by the Asian Development Bank-Japan Scholarship Programme for all 2020 graduates sponsored by the ADB-JSP Scholarships.



Asian Development Bank–Japan Scholarship Program

Graduation Gathering 2020

28 August 2020

About 150 participants attended the Gathering including the graduates from the MUP and MUD programmes of DUPAD.

Research Achievements

Centre of Urban Studies and Urban Planning

1. Professor Shenjing He

- has published the following journal papers:

- (i) He, S. (2020). Urban entrepreneurialism 2.0? Financialization, cross-scale dynamics, and post-political governance. *Dialogues in Human Geography*. DOI: <https://doi.org/10.1177/2043820620921030>

Abstract: *In this commentary, while I acknowledge the value of differentiating varieties of urban entrepreneurialism by focusing on different forms and geographies of innovation in public services, three major pitfalls impeding a renewed understanding of urban entrepreneurialism are identified. First of all, financialization, either as a means or an end, plays a central role in contemporary urban entrepreneurialism and deserves a more thorough scrutiny. Second, discounting the fluidity of spatial scales and multidirectionality in entrepreneurial policy-making, a taxonomy of urban entrepreneurialism is at best a rather flat comparison of urban entrepreneurship and innovation. Finally, the ‘innovation’ in the ways that citizens are governed (e.g. the introduction of a series of new techniques of neoliberal governmentality in the post-political age) should not be overlooked in understanding the ends to which urban entrepreneurialism is turned.*

Keywords: cross-scale dynamics, financialization, neoliberal governmentality, post-political governance, urban entrepreneurialism

- (ii) Hu, Z(F), Lin, G.C.S., Yeh, A.G.O., He, S.J., Liu, X.J. Reluctant policy innovation through profit concession and informality tolerance: A strategic relational view of policy entrepreneurship in China's urban redevelopment, Public Administration and Development, vol. 40, issue 1, 65-75, 2020. DOI: <https://doi.org/10.1002/pad.1866>

Abstract: *This paper engages with the theoretical perspective of policy entrepreneurship to examine the pattern and process of policy change in the context of China's urban redevelopment. Drawing upon a strategic-relational reinterpretation of policy entrepreneurship, this paper identifies a distinctive form of reluctant policy innovation in the "three old renewals" scheme initiated in Guangzhou where profit concession and informality tolerance were practiced to create a small window of opportunity for the project of urban redevelopment to break ground. The motivation of policy entrepreneurship in the successful urban renewal projects in Guangzhou was heavily contingent upon the geographically important location of the project site and the historically incidence of hosting the 2010 Asian Games, which forced municipal government to become entrepreneurial and innovative in decision making and income redistribution in order to get things done as quickly as possible. The distinct fashion of policy innovation identified in the case of Guangzhou points to the polymorphous and dynamic nature of policy entrepreneurship and advocates a relational treatment of the strategies and motives of policy entrepreneurs embedded in concrete geographical and historical context.*

Keywords: China, entrepreneurial motivation, policy entrepreneurship, strategic-relational, urban redevelopment

- (iii) Li, Z., He, S., Su, S. *et al.* Public Services Equalization in Urbanizing China: Indicators, Spatiotemporal Dynamics and Implications on Regional Economic Disparities. Social Indicators Research, 2020, DOI: <https://doi.org/10.1007/s11205-020-02405-9>

Abstract: *Public services equalization is closely related to local economic and social development. Hence, it is crucial to explore the changing dynamics of public services equalization and its correlation with regional economic disparities. We first examine the changing spatiotemporal patterns of public services provision and local economic performance at the provincial level across China from 2003 to 2017, using a set of indicators and the Mann–Kendall test. It is found that different types of public services are divergent in both temporal trend and geographical locations. However, both income and expenditure have been significantly increased for all provinces during the study period. Second, we unravel the heterogeneous relationship between public services provision and local economy across time and space using the geographically and temporally weighted regression. Variance decomposition is further employed to quantify the relative contribution of public services provision to local economy. Results show that the impact of different types of public services on local economic system is divergent, which jointly affects local economy system together with political and other economic factors. Thirdly, we use the Theil index and traditional least square regression to further examine the relationships between public services equalization and regional economic disparities. We find that public services equalization is*

correlated with regional economic disparities at the national level, yet their interrelation varies significantly in different regions. Taken together, through revisiting the role of public services equalization in regional economic disparities and unpacking its geographical and temporal heterogeneity, this study fills salient research gaps and informs policymaking towards a long-term goal of social equalization.

Keywords: Public service · Social equalization · Geographically and temporally weighted regression · Theil index · Regional economic disparity

2. Dr. Derrick Ho

- Dr. Derrick Ho has published the following journal papers:

- (i) Yang, L., Ho, J.Y.S., Wong, F. K.Y., Chang, K. K. P., Chan, K. L., Wong, M.S., Ho, H.C., Yuen, J.W.M., Huang, J.X., Siu, J. Y.M. Neighbourhood green space, perceived stress and sleep quality in an urban population, Urban Forestry & Urban Greening, 54, 126763, 2020, ISSN 1618-8667. DOI: <https://doi.org/10.1016/j.ufug.2020.126763>

Background: *Few studies have investigated the impact of neighbourhood green space on perceived stress and sleep quality with adjustment for other environmental factors such as household traffic noise and ambient air pollution.*

Methods: *From May to August 2017, a cross-sectional survey of pedestrians aged 20 years or over was conducted in Hong Kong. Neighbourhood green space coverage was measured using the normalized difference vegetation index (NDVI) within a 500-metre buffer of individual residential address. Multinomial logistic regression models were applied to assess the effects of green space on sleep quality and perceived stress.*

Results: *We successfully interviewed 608 participants with a mean age of 47.5 years (range 20–99). After adjustment for demographics, lifestyle factors, household air pollution and noise exposure, individuals with more perceived stress had higher odds of moderate and poor sleep quality. This association was found significant in people with low neighbourhood green space coverage, but not in those with high coverage.*

Conclusion: *There is some evidence that green space coverage in neighbourhood can attenuate the adverse effects of perceived stress on sleep quality.*

- (ii) Shi, Y., Bilal, M., Ho, H.C., Omar, A. Urbanization and regional air pollution across South Asian developing countries – A nationwide land use regression for ambient PM_{2.5} assessment in Pakistan, Environmental Pollution, 266, Part 2, 115145, 2020, ISSN 0269-7491. DOI: <https://doi.org/10.1016/j.envpol.2020.115145>

Abstract: *Rapid economic growth, urban sprawl, and unplanned industrialization has increased socioeconomic statuses but also decreased air quality in South Asian developing countries. Therefore, severe increase in air pollution has been a threat of local population, regarding health statuses, livability and quality of life. It is necessary to estimate fine-scale spatiotemporal distribution of ambient PM_{2.5} in a national context so that the environmental planners and government officials can use it for environmental protocol*

development and policy-making. In this study, a spatiotemporal land use regression (LUR) model is developed to refine global air quality data to the national-scale ambient $PM_{2.5}$ exposure in a high-density country in South Asia – Pakistan. Combining with transport network, patterns of land use, local meteorological conditions, geographic characteristics, landscape characteristics, and satellite-derived data, our resultant model explains 54.5% of the variation in ambient $PM_{2.5}$ concentration level. Furthermore, tree coverage and road transport are identified to be two influential factors of the national-scale spatial variation of $PM_{2.5}$ in Pakistan, which implied that urbanization might be the major cause of air pollution across the country. In conclusion, our resultant LUR model as well as the spatial map of ambient $PM_{2.5}$ concentration level can be used as a supporting tool for national health risk management and environmental planning, and could also contribute to the air quality management and pollution reduction actions of Pakistan.

- (iii) Guo, C.L., Sim T., Ho, H.C. Impact of information seeking, disaster preparedness and typhoon emergency response on perceived community resilience in Hong Kong, *International Journal of Disaster Risk Reduction*, 50, 101744, 2020, ISSN 2212-4209. DOI: <https://doi.org/10.1016/j.ijdrr.2020.101744>

Abstract: *Gentrification and urban development in coastal megacities have increased community resilience due to better physical and socioeconomic conditions to cope with natural hazards. However, perceived community resilience, namely public belief regarding the ability of society to recover, is under-researched. In particular, specific pathways between information seeking and perceived community resilience during extreme storm events are rarely discussed. Therefore, this study applied structural equation modelling to examine the associations between the use of traditional and new information channels in typhoon-related information seeking and individual perceived community resilience, with disaster preparedness and typhoon emergency response as mediators. This analysis was based on a population-based cohort (n = 1015) and the Cantonese version of the Conjoint Community Resiliency Assessment Measure (CCRAM-10). Generally, CCRAM-10 and four of the five sub-dimensions were rated lower than average, although 89.8% of the respondents used at least two channels to acquire typhoon-related information. Direct associations were found between the use of traditional information channels (e.g., television) and greater perceived community resilience ($\beta = 0.096$; $SE = 0.035$), and two indirect associations were found via individual disaster preparedness behaviours and typhoon emergency response behaviours. However, we found only indirect associations between the use of new information channels (e.g., social media) and greater perceived community resilience via individual and household disaster preparedness behaviours. These associations suggest that community-based programmes should consider improving perceived community resilience by making more information-seeking channels available for residents. To increase urban resilience in coastal areas, new information channels should also be synergised with both top-down and bottom-up typhoon-related information as well as physical and socioeconomic conditions of the urban environment for urban governance and community-based disaster management.*

- (iv) Wang, L., Fan, S., Hu, F., Miao, S., Yang, A., Li, Y., et al. Vertical gradient variations in radiation budget and heat fluxes in the urban boundary layer: A comparison study between polluted and clean air episodes in Beijing during

Abstract: Previous studies have reported air pollution-radiation interactions in the urban boundary layer (UBL), but vertical gradient variations in the radiation budget and heat flux under air pollution conditions are relatively sparse. In this study, based on gradient observations from the Beijing 325 m meteorological tower in December 2015, the characteristics of near-surface radiation balance and energy budget at three levels under different pollution conditions were comparatively investigated. Relative to clean days, both downward and upward shortwave radiation (DSR and USR) dropped during daytime, while downward and upward longwave radiation (DLR and ULR) enhanced during nighttime on heavily polluted days, showing that with evaluated height, the drop magnitudes of DSR and USR decreased, while the enhancement magnitude of DLR (ULR) decreased (increased). The combined effects of four radiation components significantly induced the reduction in net radiation (R_n) on polluted days, leading to the near-surface energy budget change. In addition, the monthly averaged anthropogenic heat flux (Q_f) was estimated to quantitatively calculate the heat storage (G) term in the surface energy budget. During daytime, compared to the clean episodes, the sensible heat flux (H) was reduced more than R_n in the whole near-surface UBL during heavy polluted episodes, resulting in smaller $H / (R_n + Q_f)$ and larger $G / (R_n + Q_f)$. Finally, we revealed that weak thermal forcing effects caused by insufficient availability of net radiation energy at the surface and weak dynamic motion associated with weak winds were both responsible for the larger reduction (increase) in H (G) during pollution episodes in the whole near-surface UBL.

- (v) Lozano et al. [306th of 790 GBD collaborators] (2020). Measuring universal health coverage based on an index of effective coverage of health services in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*, in press DOI: [https://doi.org/10.1016/S0140-6736\(20\)30750-9](https://doi.org/10.1016/S0140-6736(20)30750-9)

Background: Achieving universal health coverage (UHC) involves all people receiving the health services they need, of high quality, without experiencing financial hardship. Making progress towards UHC is a policy priority for both countries and global institutions, as highlighted by the agenda of the UN Sustainable Development Goals (SDGs) and WHO's Thirteenth General Programme of Work (GPW13). Measuring effective coverage at the health-system level is important for understanding whether health services are aligned with countries' health profiles and are of sufficient quality to produce health gains for populations of all ages.

Methods: Based on the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019, we assessed UHC effective coverage for 204 countries and territories from 1990 to 2019. Drawing from a measurement framework developed through WHO's GPW13 consultation, we mapped 23 effective coverage indicators to a matrix representing health service types (eg, promotion, prevention, and treatment) and five population-age groups spanning from reproductive and newborn to older adults (≥ 65 years). Effective coverage indicators were based on intervention coverage or outcome-based measures such as mortality-to-incidence ratios to approximate access to quality care; outcome-based measures were transformed to values on a scale of 0–100 based on the 2·5th and 97·5th percentile of location-year values. We constructed the UHC effective coverage index by weighting each effective coverage indicator relative to its associated potential health gains, as measured by disability-adjusted life-years for each location-year and population-age group. For three tests of validity (content, known-groups, and convergent), UHC effective coverage index performance was generally better

than that of other UHC service coverage indices from WHO (ie, the current metric for SDG indicator 3.8.1 on UHC service coverage), the World Bank, and GBD 2017. We quantified frontiers of UHC effective coverage performance on the basis of pooled health spending per capita, representing UHC effective coverage index levels achieved in 2019 relative to country-level government health spending, prepaid private expenditures, and development assistance for health. To assess current trajectories towards the GPW13 UHC billion target—1 billion more people benefiting from UHC by 2023—we estimated additional population equivalents with UHC effective coverage from 2018 to 2023.

Findings: Globally, performance on the UHC effective coverage index improved from 45·8 (95% uncertainty interval 44·2–47·5) in 1990 to 60·3 (58·7–61·9) in 2019, yet country-level UHC effective coverage in 2019 still spanned from 95 or higher in Japan and Iceland to lower than 25 in Somalia and the Central African Republic. Since 2010, sub-Saharan Africa showed accelerated gains on the UHC effective coverage index (at an average increase of 2·6% [1·9–3·3] per year up to 2019); by contrast, most other GBD super-regions had slowed rates of progress in 2010–2019 relative to 1990–2010. Many countries showed lagging performance on effective coverage indicators for non-communicable diseases relative to those for communicable diseases and maternal and child health, despite non-communicable diseases accounting for a greater proportion of potential health gains in 2019, suggesting that many health systems are not keeping pace with the rising non-communicable disease burden and associated population health needs. In 2019, the UHC effective coverage index was associated with pooled health spending per capita ($r=0\cdot79$), although countries across the development spectrum had much lower UHC effective coverage than is potentially achievable relative to their health spending. Under maximum efficiency of translating health spending into UHC effective coverage performance, countries would need to reach \$1398 pooled health spending per capita (US\$ adjusted for purchasing power parity) in order to achieve 80 on the UHC effective coverage index. From 2018 to 2023, an estimated 388·9 million (358·6–421·3) more population equivalents would have UHC effective coverage, falling well short of the GPW13 target of 1 billion more people benefiting from UHC during this time. Current projections point to an estimated 3·1 billion (3·0–3·2) population equivalents still lacking UHC effective coverage in 2023, with nearly a third (968·1 million [903·5–1040·3]) residing in south Asia.

Interpretation: The present study demonstrates the utility of measuring effective coverage and its role in supporting improved health outcomes for all people—the ultimate goal of UHC and its achievement. Global ambitions to accelerate progress on UHC service coverage are increasingly unlikely unless concerted action on non-communicable diseases occurs and countries can better translate health spending into improved performance. Focusing on effective coverage and accounting for the world's evolving health needs lays the groundwork for better understanding how close—or how far—all populations are in benefiting from UHC.

3. Dr. Weifeng Li

- has published the following journal papers:

- (i) Guo, H.G., Li, W.F., Yao, F., Wu, J.S., Zhou, X.G., Yue, Y. and Yeh, A. G. O. Who are more exposed to PM2.5 pollution: A mobile phone data approach. Environment International. 143:105821, July 2020. DOI: <https://doi.org/10.1016/j.envint.2020.105821>

Background: Few studies have examined exposure disparity to ambient air pollution outside North America and Europe. Moreover, very few studies

investigated exposure disparity in terms of individual-level data or at multi-temporal scales.

Objectives: *This work aims to examine the associations between individual- and neighbourhood-level economic statuses and individual exposures to PM_{2.5} across multi-temporal scales.*

Methods: *The study population included 742220 mobile phone users on a weekday in Shenzhen, China. A Geo-informed Backward Propagation Neural Network model was developed to estimate hourly PM_{2.5} concentrations by the use of remote sensing and geospatial big data, which were then combined with individual trajectories to estimate individual total exposures during weekdays at multi-temporal scales. Coupling the estimated PM_{2.5} exposure with housing price, we examined the associations between individual- and neighbourhood-level economic statuses and individual exposures using linear regression and two-level hierarchical linear models. Furthermore, we performed five sensitivity analyses to test the robustness of the two-level effects.*

Results: *We found positive associations between individual- and neighbourhood-level economic statuses and individual PM_{2.5} exposures at a daytime, daily, weekly, monthly, seasonal or annual scale. Findings on the effects of the two-level economic statuses were generally robust in the five sensitivity analyses. In particular, despite the insignificant effects observed in three of newly selected time periods in the sensitivity analysis, individual- and neighbourhood-level economic statuses were still positively associated with individual total exposure during each of other newly selected periods (including three other seasons).*

Conclusions: *There are statistically positive associations of individual PM_{2.5} exposures with individual- and neighbourhood-level economic statuses. That is, people living in areas with higher residential property prices are more exposed to PM_{2.5} pollution. Findings emphasize the need for public health intervention and urban planning initiatives targeting socio-economic disparity in ambient air pollution exposure, thus alleviating health disparities across socioeconomic groups.*

- (ii) Guo H.G. (PhD student supervised by Dr. Weifeng Li), Zhan, Q.M., Ho, H.C., Yao, F., Zhou, X.G., Wu, J.S., Li, W.F. Coupling mobile phone data with machine learning: How misclassification errors in ambient PM_{2.5} exposure estimates are produced? *Science of The Total Environment*, 745, 141034, 2020, ISSN 0048-9697. DOI: <https://doi.org/10.1016/j.scitotenv.2020.141034>

Background: *Most studies relying on time-activity diary or traditional air pollution modelling approach are insufficient to suggest the impacts of ignoring individual mobility and air pollution variations on misclassification errors in exposure estimates. Moreover, very few studies have examined whether such impacts differ across socioeconomic groups.*

Objectives: *We aim to examine how ignoring individual mobility and PM_{2.5} variations produces misclassification errors in ambient PM_{2.5} exposure estimates.*

Methods: *We developed a geo-informed backward propagation neural network model to estimate hourly PM_{2.5} concentrations in terms of remote*

sensing and geospatial big data. Combining the estimated PM2.5 concentrations and individual trajectories derived from 755,468 mobile phone users on a weekday in Shenzhen, China, we estimated four types of individual total PM2.5 exposures during weekdays at multi-temporal scales. The estimate ignoring individual mobility, PM2.5 variations or both was compared with the hypothetical error-free estimate using paired sample t-test. We then quantified the exposure misclassification error using Pearson correlation analysis. Moreover, we examined whether the misclassification error differs across different socioeconomic groups. Taking findings of ignoring individual mobility as an example, we further investigated whether such findings are robust to the different selections of time.

Results: We found that the estimate ignoring PM2.5 variations, individual mobility or both was statistically different from the hypothetical error-free estimate. Ignoring both factors produced the largest exposure misclassification error. The misclassification error was larger in the estimate ignoring PM2.5 variations than that ignoring individual mobility. People with high economic status suffered from a larger exposure misclassification error. The findings were robust to the different selections of time.

Conclusions: Ignoring individual mobility, PM2.5 variations or both leads to misclassification errors in ambient PM2.5 exposure estimates. A larger misclassification error occurs in the estimate neglecting PM2.5 variations than that ignoring individual mobility, which is seldom reported before

4. Dr. Kyungmin Nam

- On 31 August 2020, Dr. Kyung-Min Nam delivered an invited online seminar, entitled “Impacts of China’s ETS on the National and Hong Kong Economies: A Dynamic CGE Analysis”, to members of the [Korea Planning Association](#).

5. Dr. Guibo Sun

- Dr. Sun’s project has received a funding award from NSFC. Details are as follows:

Title: Pricing urban design in the walking catchment of metro stations

Principal Investigator: Dr. Guibo Sun

Co - Principal Investigator: Professor Chris Webster

Co - Investigators: Dr. Derrick Ho, Dr. Xiaohu Zhang

Awarded funding amount: 580,000 RMB (665,618 HKD)

Project duration: for 4 years, from 1 January 2021 - 31 December 2024

Project number: 52078446

Abstract: The best practice of transit-oriented development is to integrate the station with surrounding walking catchment. However, in the recent rapid metro development in China, such integrations are lacking. The urban design of the station surrounding environment includes visual landscape, greenery, building street height-width ratio, pedestrian facilities, street furniture, and architectural quality. In this project, we aim to improve the walking environment by pricing its urban design attributes. The urban design attributes will be measured using AI deep learning models. We use the natural experiments of the new metro in Guangzhou, Shenzhen, and Hong Kong, investigating the possibility of the marketisation of urban design, analysing the relationship and dynamics of the stakeholders, and related social and technological factors. We will compare the

before and after changes in the treatment group, those experience the opening of the new stations, and control groups, those remain unchanged, to explore the causal inference between the urban design attributes and housing renting and transaction prices through hedonic models. With the economic evidence, we will interview stakeholders including staffs in local government, managers in metro companies, real estate developers and owners, to investigate the value capture models in the joint development and the mobilised new housing tax fiscal mechanism, to improve the provision of high-quality walking environments in metro station surroundings.

6. Professor Anthony Yeh

- Professor Yeh has published the following book chapters and journal papers:

- (i) Li, X., Yeh, A. G. O. "Chapter 26: Cellular automata modelling for urban planning in fast-growth regions". In *Handbook of Planning Support Science*. Cheltenham, UK: Edward Elgar Publishing, 397-415, 2020. DOI: <https://doi.org/10.4337/9781788971089.00037>

Abstract: *It introduces the concepts and methods of the use of Cellular Automata modelling in urban planning in the Handbook of Planning Support Science. The past three decades have witnessed the rapid development of geosimulation technology, such as cellular automata (CA) and agent-based modelling (ABM), for solving various geographical problems in rapidly growing regions. This chapter summarizes the main applications of CA for researchers and decision-makers to solve the environmental and planning problems associated with urban sprawl, illegal development and improper facility sitting. An integrated CA-based model, the Geographical Simulation and Optimization System (GeoSOS), has been applied to tackle a wide spectrum of environmental and resource management issues, such as the zoning of basic farmland protection areas, coupling land-use dynamics with facility sitting, and delineation of urban growth boundaries. Our studies have shown that CA models are capable of evaluating land-use policies and predicting illegal developments for early warning purposes. The simulation of using CA provides valuable experiences for urban researchers and planners to solve a series of simulation and planning problems in fast-growing regions.*

- (ii) Yeh, A. G. O., Yue, Y., Zhou, X., Gao, Q. "Chapter 11: Big data, urban analytics and the planning of smart cities". In *Handbook of Planning Support Science*. Cheltenham, UK: Edward Elgar Publishing, 179-198, 2020. DOI: <https://doi.org/10.4337/9781788971089.00020>

Abstract: *It introduces the use of big data and urban analytics in the planning of smart cities in the Handbook of Planning Support Science. Many countries have been implementing plans for smart-city development in recent years. However, how to plan a smart city effectively is still a big issue deserving further exploration. This chapter reviews the use of big data, such as mobile-phone data and transit smart-card data, which can capture spatial-temporal movement of people in a city to support the planning of smart cities. The chapter reviews how big data are captured, pre-processed and analysed. It then discusses how big data can advance our knowledge in the planning of smart cities with three examples: the study of urban structure, jobs-housing balance and low-to-moderate income group spatial distribution relating to housing policy.*

- (iii) Chen, Z.F., Zhou, X.G., Yeh, A.G.O. (2020), "Spatial accessibility to kindergartens using a spectrum combinational approach: Case study of Shanghai using cellphone data", *Environment and Planning B: Urban Analytics and City Science*, 0(0), 1–18, DOI: <https://doi.org/10.1177/2399808320954221>

Abstract: Spatial accessibility to kindergartens is a critical issue related to the transport safety of children. Young children should be escorted to kindergartens by adults, and trips to kindergartens are occasionally dependent on parents' home–work trips because parents may escort their children to kindergartens en route to work. Many types of school trip can be categorized into two main types: "Home–School" and "Home–School–Work" trips. However, existing studies have tended to focus on only one type of school trip and have disregarded the other type in the assessment of accessibility. The present study examines accessibility to kindergartens by considering both types of school trips. The basic two-step floating catchment area method is used to measure the accessibility of "Home–School" trips and the commuter-based two-step floating catchment area is used for "Home–School–Work" trips. This study proposes a spectrum combinational approach, which combines both types of trips according to their actual percentages, to provide a realistic assessment of accessibility to kindergartens. An empirical study is conducted in Shanghai by combining cellphone big data and traditional data from a census. Results indicate that, compared with the spectrum combinational approach, the inequality of accessibility would be underestimated if we only focus on "Home–School" trips in the measurement of accessibility, but overestimated if we only focus on "Home–School–Work" trips. The proposed spectrum combinational approach, by modifying the trip assumptions on which accessibility evaluation is based, constitutes a novel and more realistic accessibility measurement of spatial accessibility to kindergartens.

- (iv) Chen, Z. F., & Yeh, A. G. O. (2021). Effects of built environment on activity participation under different space-time constraints: A case study of Guangzhou, China, *Travel Behaviour and Society*, 22, 84-93. DOI: <https://doi.org/10.1016/j.tbs.2020.08.007>

Abstract: Conventional facility planning seeks to provide service facilities to meet population demand in an aggregate manner. However, recent studies reveal that the provision of facilities in residential neighborhoods does not necessarily mean easy service access for certain groups. This issue is approached through the lens of space–time constraints in this study, which asserts that because people with different socioeconomic attributes experience different space–time constraints, the effects of the same built environment on actual access can considerably vary. Based on the activity-diary data from 493 respondents in Guangzhou, China, this study conducts a quasiexperiment facilitated by the propensity score matching approach. Residents in low-density suburban areas and those in high-density central city areas are considered as the control and treatment groups, respectively. By comparing the activity-travel behavior between these two groups, this work presents an analysis of the effects of service density improvement on residents' actual service access. Moreover, the differences of such effects are examined through separate quasi-experiments for residents with the largest, medium and smallest space–time constraints. Residents who originally experience the smallest space–time constraints could further benefit from the enhancement of service density, whereas those who originally suffer from the largest and medium space– time constraints could not. These findings imply that conventional facility planning may not provide equitable outcomes. Therefore, facility planning and management should address and integrate residents' unequal experiences of space–time constraints into time-sensitive policies (e.g., flextime policies).

- (v) Mu, X.Y., Yeh, A.G.O., Zhang, X.H. (2020). The Interplay of Spatial Spread of COVID-19 and Human Mobility in the Urban System of China During the Chinese New Year", Environment and Planning B: Urban Analytics and City Science. DOI: <https://doi.org/10.1177/2399808320954211>

Healthy High Density Cities lab

1. Dr. Chinmoy Sarkar

- has published the following papers:

- (i) Maji, K. J., Sarkar, C. Spatio-temporal variations and trends of major air pollutants in China during 2015-2018. Environmental Science and Pollution Research (IF: 3.056), 27, 33792-33808, 2020. DOI: <https://doi.org/10.1007/s11356-020-09646-8>

Abstract: The Chinese government, as a policy response, have continued to invest efforts and resources to implement cost-effective air pollution control technologies and stringent regulation to reduce emissions from the most contributing sectors to protect the environment and public health. The higher density of monitoring stations (>1600) distributed across China provides a timely opportunity to use them to study in detail the national pollution trends in light of more stringent air pollution control policies. In the present study, air quality dataset comprising hourly concentrations of PM_{2.5}, O₃, NO₂, and SO₂ collected across 1309, 1341, 1289 and 1347 monitoring stations respectively were obtained from National Environmental Monitoring Centre over 4-years (2015-2018) and trend analysis was performed. Results indicate that the overall annual trends for PM_{2.5} and SO₂ were -2.9 ± 2.7 and -3.2 ± 3.2 $\mu\text{g}/\text{m}^3/\text{year}$, while the winter trends were -4.8 ± 5.8 and -6.9 ± 8.4 $\mu\text{g}/\text{m}^3/\text{year}$ respectively across China. The daily maximum 8-hr average (DMA8) ozone concentration showed a significant positive trend of 2.4 ± 4.6 $\mu\text{g}/\text{m}^3/\text{year}$, which was comparatively higher in summer at 4.4 ± 9.0 $\mu\text{g}/\text{m}^3/\text{year}$. On the other side, NO₂ trend is not great in number (-0.45 ± 2.0 $\mu\text{g}/\text{m}^3/\text{year}$). Overall, 62.2%, 61.8% and 20.9% of PM_{2.5}, SO₂ and NO₂ monitoring stations were associated with a negative trend of ≥ -2 $\mu\text{g}/\text{m}^3/\text{year}$. For O₃ DMA8 concentrations, 50.7% of the monitoring stations showed a significant positive trend of ≥ 2 $\mu\text{g}/\text{m}^3/\text{year}$. In light of the Chinese government's increasing impetus on combating air pollution and climate change via new policy regulations, it is important to understand the spatio-temporal distributions and relative contributions of the spectrum of gaseous pollutants to the pollution loads as well as identify changing emission loads across sectors. The results of this study will facilitate the formulation of evidence-based air pollution reduction strategies and policies.

Keywords: China; air pollution; monitoring stations data; spatio-temporal analysis; trend analysis

- (ii) Xiao, Y., Miao, S.Y., Sarkar, C., Fan, L.Y., Li, Z.G. (2020). Do Neighborhood Ties Matter for Residents' Mental Health in Affordable Housing: Evidence from Guangzhou, China. Cities (IF 3.85), 100, 102666, ISSN 0264-2751. DOI: <https://doi.org/10.1016/j.cities.2020.102666>

This paper is in collaboration with colleagues in Tongji University, Suzhou University of Science and Technology and Wuhan University.

Abstract: *Neighborhood social capital and mental health are intrinsically interlinked. Nonetheless, there has been scant evidence on how neighborhood ties influence the mental health of residents in affordable housing in Chinese cities. The main objective of this paper is to examine the underlying pathway via which neighborhood tie affect mental health; specifically, to investigate effects of social ties between affordable housing residents and nearby commercial private housing residents; and secondly, those of the social ties within the same affordable housing community. We selected four typical affordable housing communities in Guangzhou City comprising a sample size of 400 participants and employed structural equation modeling (SEM) to systematically explore the different pathways through which these two types of social ties affect mental health at the neighborhood level. In particular, we focused on whether the current development trend for affordable housing surrounded by commodity housing would create issues of social comparison that could negatively impact the mental health of those residents in affordable housing. Our results report that both types of neighborhood tie have a positive effect upon mental health of the affordable housing residents. The reported evidence indicate that Guangzhou's mixed housing development approach did not adversely affect the mental health of residents due to social comparison issues, with the residents' community satisfaction being beneficially associated with mental health. Our study suggests that optimizing planning of neighborhood housing, in terms of type and diversity can be a preventive intervention to creating a healthy space that promote cross-class interactions between mixed community residents, thereby enhancing the mental health of affordable housing residents.*

Keywords: Neighborhood tie; Mental health; Social comparison; Affordable housing; SEM.

2. Dr. Chinmoy Sarkar and Dean Webster

- Dr. Sarkar and Dean Webster had their paper shortlisted for the finals of the *Sir Peter Hall Award for Research Excellence* at the RTPI 2020 Research Awards.

<https://www.rtpi.org.uk/events-training-and-awards/awards/rtpi-awards-for-research-excellence/2020-award-finalists/>

Sarkar, C., Zhang, B., Ni, M., Kumari, S., Bauermeister, S., Gallacher, J., Webster, C. Environmental correlates of chronic obstructive pulmonary disease in 96 779 participants from the UK Biobank: a cross-sectional, observational study. *The Lancet Planetary Health*, vol. 3, issue 11, e478-e490, 2019. [https://doi.org/10.1016/S2542-5196\(19\)30214-1](https://doi.org/10.1016/S2542-5196(19)30214-1)

Background: *The role of environmental exposures in chronic obstructive pulmonary disease (COPD) remains inconclusive. We examined the association between environmental exposures (PM_{2.5}, greenness, and urbanicity) and COPD prevalence using the UK Biobank cohort data to identify key built environment correlates of COPD.*

Methods: *In this cross-sectional, observational study we used baseline data for UK Biobank participants. Included participants were aged 39 years and older, white, had available spirometry data, and had complete data for phenotypes and*

exposures. COPD was defined by spirometry with the 2017 Global Initiative for Chronic Obstructive Lung Disease criteria. Environmental exposures were $PM_{2.5}$ derived from monitoring data and interpolated using land-use regression at the participants' geocoded residential addresses. Built environment metrics of residential greenness were modelled in terms of normalised difference vegetation index from remotely sensed colour infrared data within a 500 m residential catchment, and an urbanicity index derived from spatial analyses and measured with a 1 km buffer around each participant's residential address. Logistic regression models examined the associations between environmental exposures and COPD prevalence adjusting for a range of confounders. Subgroup analyses by urbanicity and effect modification by white blood cell count as an inflammatory marker were also done.

Findings: We assessed 96 779 participants recruited between April 4, 2006, and Oct 1, 2010, of which 5391 participants had COPD with a prevalence of 5.6%. Each $10 \mu g/m^3$ increment in ambient $PM_{2.5}$ exposure at a participant's residential location was associated with higher odds of COPD (odds ratio 1.55, 95% CI 1.14–2.10). Among the built environment metrics, urbanicity was associated with higher odds of COPD (1.05, 1.01–1.08 per interquartile increment), whereas residential greenness was protective, being associated with lower odds of COPD (0.89, 0.84–0.93 for each interquartile increment in greenness). The results remained consistent in models of COPD defined as per lower limit of normal criteria. The highest quartile of white blood cell count was associated with lower lung function and higher COPD risk with a significant interaction between $PM_{2.5}$ and white blood cell count only in the model of lung function ($p=0.0003$).

Interpretation: In this study of the built environment and COPD, to our knowledge the largest done in the UK, we found that exposure to ambient $PM_{2.5}$ and urbanicity were associated with a higher risk of COPD. Residing in greener areas, as measured by normalised difference vegetation index, was associated with lower odds of COPD, suggesting the potential value of urban planning and design in minimising or offsetting environmental risks for the prevention and management of COPD.

Funding: University of Hong Kong, UK Biobank, and UK Economic & Social Research Council.

3. Dean Webster

- has a paper accepted by the all-Viewpoints issue of Town Planning Review in June:


Accepted. Webster C., How high can we go? Urban density, infectious vs. chronic disease, and the adaptive resilience of cities. Town Planning Review. (Manuscript ID: TPR-05-20-VP-0008)

Sustainable High Density Cities lab

1. Dr. Ren Chao

- has been selected by the International Association for Urban Climate (IAUC) to receive one of the two [2020 Timothy Oke Awards for Original Research in the Field of Urban Climatology](#). This is a prestigious international award for early-mid career researchers in the urban climatology field.

International Association for Urban Climate



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Scott Krayenhoff and Chao Ren receive 2020 Timothy Oke Award


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In this first year of the [IAUC Timothy Oke Award for Original Research in the Field of Urban Climatology](#), the International Association for Urban Climate is delighted to announce that two awards will be made, to Dr [Scott Krayenhoff](#), Assistant Professor of Atmospheric Science at the University of Guelph, and Dr [Chao Ren](#), Associate Professor in the Faculty of Architecture at the University of Hong Kong. These two highly deserving early- to mid-career researchers both have outstanding publication records which demonstrate the quality, relevance and value of their research contributions.



Scott Krayenhoff, Assistant Professor of Atmospheric Science at the University of Guelph

Since being awarded his PhD in 2015, Scott Krayenhoff has built upon his innovative work on modelling vegetation at micro- and local-scales to also consider climate change and sustainable urban design. He leads a research group at the University of Guelph and collaborates widely both with former colleagues and with new users and developers of his models. His combination of creativity, careful analytical skills and an excellent knowledge of the literature has resulted in several [high-quality, high-impact, lasting contributions to urban climatology](#). He is well-known as an approachable and committed member of the IAUC community.



Chao Ren, Associate Professor in the Faculty of Architecture at the University of Hong Kong

Chao Ren is an extremely successful mid-career researcher dedicating herself to cross-disciplinary research activities, engagements and design guideline development. She has already received numerous prizes and awards for her high-quality research which has an international impact and plays a key role in advising policy and planning, particularly in densely built sub-tropical cities. Her [impressive publication record](#) focuses on spatial variations in the urban thermal and wind environment and their health impacts and how these relate to urban morphology and built environment. She is a highly engaged researcher and member of the urban climate community and has served on many advisory boards including IAUC and WMO. She is an emerging leader in the field of urban climate, and several of her students have also been awarded for their research.

- has published the following journal papers at [Urban Climate](#), which are highly cited ones based on the [Scopus](#) records. [Urban Climate](#) journal selects only the top 25 highly cited papers (since 2017) to publicize on the website: <https://www.journals.elsevier.com/urban-climate/most-cited-articles>

(i) Wang, R., Ren, C., Xu, Y., Lau, K.K.L., Shi, Y. Mapping the local climate zones of urban areas by GIS-based and WUDAPT methods: A case study of Hong Kong. [Urban Climate](#), 24, 567-576, 2018, ISSN 2212-0955, DOI: <https://doi.org/10.1016/j.uclim.2017.10.001>.

Abstract: *Local Climate Zone (LCZ) developed by Stewart and Oke has become an international standard to analyse [urban morphology](#) and the corresponding urban [heat island](#) phenomenon. Primary methods for LCZ mapping include [in-situ measurements](#), [geographic information system](#) (GIS)-*

based and remote-sensing-image-based calculations. However, there are few studies discussing their accuracy and suitability. This study focuses on examining and discussing the GIS-based method and the World Urban Database and Access Portal Tools (WUDAPT) Level 0 method. Hong Kong is selected as the study area due to its complex urban morphology and high-density context. The results show, at a city level, both methods can detect LCZ classifications that match with the actual [spatial distribution](#) of land use in Hong Kong. Thus WUDAPT level 0 data can be used as input data for [mesoscale](#) weather and climate modelling, when lacking precise urban morphology data. Meanwhile, at a district level, the GIS-based method detects more details than the WUDAPT method. However, WUDAPT method classifies land cover types more accurately. These findings provide an in-depth understanding of different LCZ mapping methods and their advantages and limitations. It can also help climatologists, modellers and planners select an appropriate LCZ mapping method for their studies of urban climatic applications.

- (ii) Bechtel, B., Alexander, P.J., Beck, C., Böhner, J., Brousse, O., Ching, J., Demuzere, M., Fonte, C., Gál, T., Hidalgo, J., Hoffmann, P., Middel, A., Mills, G., Ren, C., See, L., Sismanidis, P., Verdonck, M.L., Xu, G., Xu, Y. Generating WUDAPT Level 0 data – Current status of production and evaluation, *Urban Climate*, 27, 24-45, 2019, ISSN 2212-0955, DOI: <https://doi.org/10.1016/j.uclim.2018.10.001>

Abstract: The World Urban Database and Access Portal Tools (WUDAPT) project has grown out of the need for better information on the form and function of cities globally. Cities are described using Local Climate Zones (LCZ), which are associated with a range of key urban climate model parameters and thus can serve as inputs to high resolution urban climate models. We refer to this as level 0 data for each city. The LCZ level 0 product is produced using freely available [Landsat](#) imagery, crowdsourced training areas from the community, and the open source SAGA software. This paper outlines the protocol by which LCZ maps generated by different members of the community are produced and evaluated. In particular, the quality assessment comprises cross-validation, review, and cross-comparison with other data sets. To date, the results from the different quality assessments show that the LCZ maps are generally of moderate quality, i.e. 50–60% overall accuracy (OA), but this is much higher when considering all built-up classes together or using weights that take the morphological and climatic similarity of certain classes into account. The training data contributed by researchers from around the world also vary in quality and in the interpretation of the landscape, which affects the final quality of the LCZ maps. The acceptable level of quality needed will depend heavily on the application of the data. However, initial modelling studies that use the level 0 products as inputs showed improved performance in simulating the urban climate when replacing the default surface descriptions with the WUDAPT level 0 data. This is also promising for the application of level 0 data in regional and global climate and weather models and supports the assumption that the current level 0 products are already of sufficient quality for certain applications. Moreover, there are various ongoing developments to improve the methods used to produce LCZ maps and their accuracy.

- has been invited by the HKSAR Government to join the 2020 Policy Address Thematic Consultation Session - Video-Conference (Theme: Environment and sustainable development), on 21 September 2020.