Social-ecological transformation in cities in Asia

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List of Abbreviations

CBO Community-based organisation

CO2 Carbon Dioxide

COVID-19 Corona Virus Disease

GHG Greenhouse Gas

GT Gigatons

IPCC Intergovernmental Panel on Climate Change

NBS Nature-based Solutions

NGO Non-governmental organization

SDG Sustainable Development Goals

Executive Summary

Social-ecological transformation in Asian cities is instrumental to achieving many global development and climate targets. As dense settlements of human and economic activity, Asian cities present unique challenges but also opportunities for low-carbon transitions.

The challenge of transforming our societies may lie in tackling complex questions which pit ecological protection against social justice, or vice versa. On the other hand, there may also be synergistic solutions where progress in environmental protection is also accompanied by social justice - these are the social-ecological transformations that cities should strive for. We therefore use the term 'social-ecological transformation' to refer to societal processes of change that address social and ecological issues alongside each other, rather than in opposition to each other. Another requisite for social-ecological transformation is the participation of all citizens, including those most often excluded in decision-making processes, such as slum dwellers, youth, women and girls.

We explore such synergies in this report, focussing on three sectors that are crucial in driving these social-ecological transformations in urban settings, namely, built environment, transport and the public participation sectors. For instance, in the built environment sector, this means instituting energy efficiency into all new construction as this is more cost-effective than retrofitting existing buildings. It means ensuring that those living in informal settlements benefit from access to affordable and secure housing that integrates climate adaptation and energy efficiencies, but also recognises that wealthier population groups are far greater contributors to emissions and their housing should be built to minimise energy consumption too. It also requires considering opportunities for implementing nature-based solutions which can offer co-benefits for climate change mitigation and adaptation, rather than relying solely on concrete infrastructure.

In the transport sector, promoting active and public transportation modes will not only help achieving the carbon targets of cities, but also make the city more liveable and just for the working poor in cities, who actively use these modes of transport to access work opportunities, and suffer most from car-centric investments. Special consideration also needs to be given to the accessibility requirements of particular population groups, from those with limited mobility, to groups who may face safety concerns.

Effective urban planning plays an essential role in ensuring urban areas develop in ways which consider equity alongside development – too often, the poorest live furthest away from their places of work and from green spaces which are essential to mental health and wellbeing. Social-ecological transformations in cities warrant a deeper context-specific analysis of 'who wins and who loses' as a result of urban transitions. We therefore call for integrating the needs of low-income groups, women and elderly, amongst others, in the city development process. We offer some entry-points in the three key sectors, by highlighting the differentiated vulnerabilities of varied groups of people within the city, due to their wide range of emission contributions, preparedness and exposure to climate risks.

The current pandemic, has, at great social and economic cost, also presented opportunities for policymakers, industries and individuals to rethink unsustainable patterns of consumption and unequal distribution of development. It has highlighted the inequalities and injustices rampant in Asian cities, from deficient migrant housing conditions to misappropriation of the crisis to forestall participatory planning processes. It is time for initiatives towards green infrastructure or sustainable development in cities to step beyond a short-term, project-based approach towards long-term, structural shifts for social-ecological change. We explore what this means for future urban development in the region, highlighting the opportunities, challenges and the way forward for cities of Asia.

Section 1: Introduction

Balancing environmental, social and development priorities

The way in which we build and live in our cities today will determine the social, economic and environmental future of the world. Cities concentrate people, resources and risks, and contribute to more than 70 per cent of global carbon emissions (Coalition for Urban Transitions, 2019). Sustainable, climate-sensitive planning and development in cities will be crucial for emission reductions in multiple sectors and for meeting the Paris Agreement. The 2030 Agenda for Sustainable Development set multi-dimensional goals, recognising the role of "inclusive, safe, resilient and sustainable" cities (SDG 11) in pushing for social-ecological transformation. The New Urban Agenda, underlining the role of urban transitions for overall sustainable development, calls for the need to "transform the way we plan, finance, develop, govern and manage cities and human settlements". A sustained effort towards an inclusive, green transition in Asian cities is required in achieving these global development and climate goals, and for this to happen, social justice needs to be a core component of all actions. Without this, we will continue to see rising social inequality alongside continued environmental destruction, and as crises like COVID-19 and climate change will hit the most vulnerable groups hardest - those without access to social or financial safety nets, secure housing, medical care and education - this gap will only continue to widen.

We use the term 'social-ecological transformations' (Laurent, 2020) to refer to societal processes of change that address social and ecological issues alongside each other, rather than in opposition to each other. According to Laurent (2020), four areas that are relevant to a social-ecological transformation in cities are (i) improved transport between residential areas, jobs, leisure activities and government services, with associated impacts on environmental pollution and human health, (ii) redressing inequalities in the distribution of ecological benefits and risks and social assistance for ecological transformations, (iii) improving human well-being and integrating well-being indicators into public policies and (iv) bettering urban energy metabolism and adaptation to climate change. In his perspective, the challenge of achieving a social-ecological transformation lies in tackling complex questions such as: Will political measures of the ecological transformation be at the expense of social justice? Or, on the contrary and preferably, are there social-ecological synergy effects where progress in environmental protection is also accompanied by social improvements? (Laurent, 2020, p. 13) We explore opportunities for achieving the latter in this report, while integrating participation of a wide range of urban citizens in urban change, keeping in mind the Asian context for urban transformations.

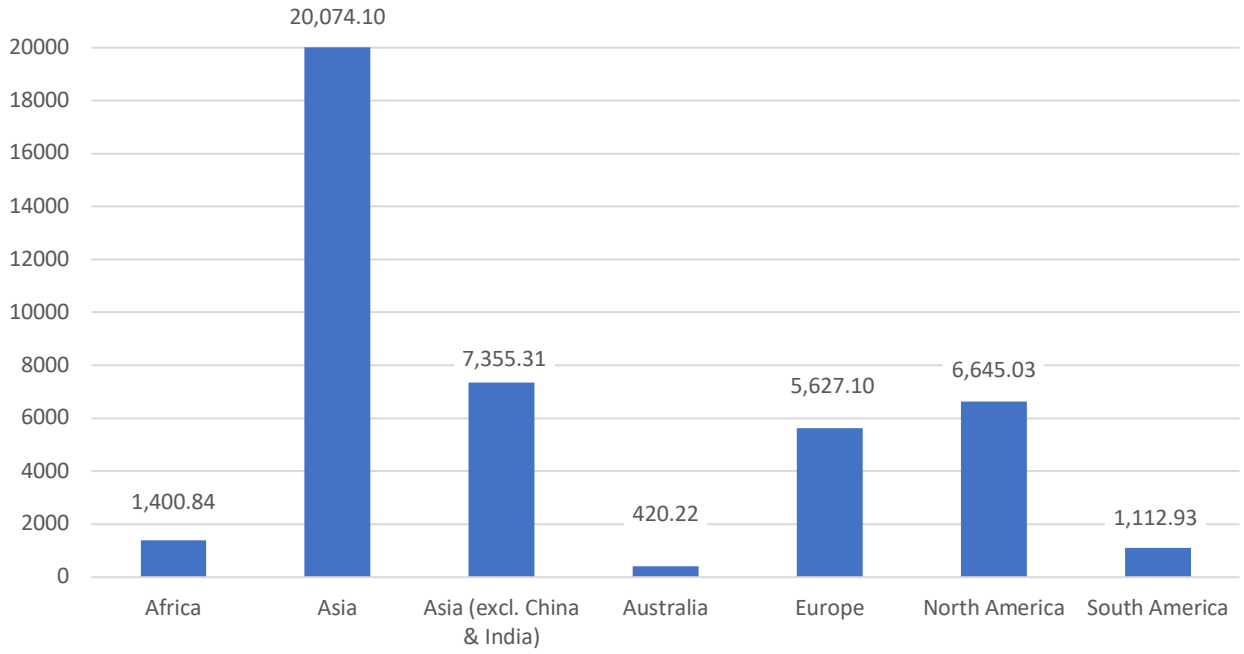
Asia has seen the largest increase in per capita GHG emissions over the last two decades, with countries in Asia making up the major share of emissions since 1990 as outlined by the IPCC (Blanco et al., 2014), see figure 1. Most of the land converted globally for urban purposes is in the Asian continent (Rode et al., 2014), even as the urbanisation rates in many countries of Asia are low (UNESCAP and UN-HABITAT, 2010). With more than half the world's urban population and megacities in Asia, Asian cities face a unique set of challenges and opportunities to address climate change and build climate resilience, while also transitioning to a just and liveable future.

The impacts of climate change will be felt by a large number of urban residents in Asia. As of 2015, nearly 710 million people lived in urban and quasi-urban settlements that are less than 10 metres above sea level, making climate change an important urban issue, and three-fourths of this population lives in Asia (Coalition for Urban Transitions, 2019). Cities like Jakarta, Manila, Bangkok, Ho Chi Minh City, Shanghai, Yangon and Dhaka, which are centres of national importance, are also at risk from rising sea levels.

Policy solutions advancing a social-ecological transformation of Asian cities should be considerate of the challenges of a wide range of cities in Asia, including world cities with advanced producer and financial services like Singapore or Hong Kong, thriving megacities, intermediary cities which are centres of importance to the regional economy, and rapidly urbanising medium and small human settlements, each with their own geographical and demographic characteristics. It is imperative to note that more than half the urban population in Asia lives in small and medium sized cities (UNESCAP and UN-HABITAT, 2010). Therefore, policy solutions in key sectors will have to take into consideration the social, economic, geographic and demographic characteristics of specific cities.

Figure 1 Annual CO2 emissions in 2018.

Source: Global Carbon Project (2019), Supplemental data of Global Carbon Budget (Version 1.0)



While innovating for climate-smart solutions in urban Asia, we should not only improve the resilience and sustainability of our environment, but also follow an inclusive and accessible pathway through these transitions. Much of the poverty reduction in the globe is attributed to progress in the East Asian and Pacific region over the last three decades. However, there are still nearly 216 million living in extreme poverty in South Asia alone (World Bank, 2018). Many Asian countries are highly unequal and the trend is worsening, with an increasing disparity of wealth between urban and rural areas (UN-Habitat, 2008), pointing to the need for developing integrated regional development policies that strengthens the rural economy.

Climate change impacts and disaster risks have and will pose threats to the health, well-being and employment of poor people disproportionately. Disasters such as the cyclones Bulbul and Amphan in low-income, dense settlements of east India and Bangladesh have displaced millions of people (Boyland and Adelina, 2020). Crises such as COVID-19 have plunged millions into poverty, with an increase of the poverty rate of 2.3% compared to a non-COVID scenario, and half of the project new poor in South Asia (World Bank, 2020). Urban agglomerations contributing to the rapid development of countries such as the Pearl River Delta in China are susceptible to sea level rise and flooding. Therefore, increasing the overall resilience of Asian cities and their residents will be as important as strengthening mitigation policymaking and implementation.

Aims of the report

Social-ecological transformation in Asian cities is instrumental to achieving many global development and climate targets. As dense settlements of human and economic activity, Asian cities present unique set of challenges and opportunities for low-carbon transitions. We recognise that 'urban Asia' is not a homogenous category, with cities of different sizes, socio-economic, demographic and geographical characteristics, governed through different mechanisms by different types of national regimes, each having their own needs, issues, aspirations and resources. Therefore, we aim to present an overview of these issues at the urban level, while emphasising the need to recognise the context-specific, people-centric pathways of development towards reaching the common global target of keeping emissions below 1.5°C above pre-industrial levels.

The report looks at three sectors that are crucial in driving these social-ecological transformations at the municipal level, namely, built environment, transport and the public participation sectors. We highlight the potentials for contributing to and the challenges in realising climate goals through participatory and non-technocratic measures in these sectors. Even though we offer some good practices and policy lessons in these

sectors, in reality, social-ecological transformations are much more complex and might warrant a deeper context-specific analysis of 'who wins and who loses' as a result of these changes to guide policymaking.

The current pandemic has caused enormous suffering, and at the same time, presented policymakers, industries and individuals with lessons and opportunities to rethink unsustainable patterns of consumption and unequal distribution of development in Asia. The crisis presents even more reason for governments to develop conjoined approaches and pathways to achieving environmental sustainability and social justice. It is time for green infrastructure or sustainable development in cities to look beyond a short-term, project-based approach towards long-term, structural drivers for change. We explore what this means for future urban development in the region, highlighting the opportunities, challenges and the way forward for cities of Asia.

Methodology and organization of the report

The report draws from desk review of literature including global policy frameworks, policy reports, academic literature and case study reports. For section 4 on the pandemic, we have mainly referred to news reports and blogs of reliable policy and research organisations.

We use a broad definition of cities, as each country in Asia follows different criterion in defining their cities. Very often an administrative definition is used by countries, even though many areas which have urban-like characteristics when considering population, population density and concentration of non-primary economic activity are not yet governed through a municipal body. In our report, we use the terms cities, urban settlements and urban areas interchangeably to denote to settlements that have high population and density in relation to their country-specific characteristics and are regions with concentrated non-agricultural activities. This also includes extended city peripheries and human settlements that are not yet subsumed under municipal boundaries. The term municipality refers specifically to areas that are governed as urban through an urban local body.

The report is organised in the following manner: In section 2, we detail climate change impacts on key sectors, namely (a) built environment (b) mobility and (c) public participation, including considerations of the differential impact of climate change on different city stakeholders, and emphasise the need for inter-sectoral co-ordination and planning to increase the overall resilience of the city through the help of a case study in Chennai. This is followed by section 3 on urbanization of the pandemic, which looks at the impact of COVID-19 in Asian cities, and the interactions between the pandemic and policy changes to key sectors. Section 4 addresses the challenges and bottlenecks to social-ecological transformations to brief the pressing challenges ahead for Asian cities to mitigate and adapt to the threats posed by climate change. Finally, in section 5, we highlight the ways forward for all concerned with the future of Asian cities - whether from policy, business, civil society or other sectors.

Section 2: Climate change impacts on key sectors

Urban emissions

While cities are frequently 'blamed' for greenhouse gas emissions (Dodman, 2009), due to their concentration of people, transport, economic activity, and buildings, it should also be recognised that urban areas present great opportunities for minimising GHG through their density, which allow for efficiencies and economies of scale. However, this is very much dependent on effective, climate-sensitive urban planning, which also considers the other important development objectives, including those outlined in SDG11 and the New Urban Agenda. There also still remain gaps in understanding the link between urban environments and mitigation: "While there is ample evidence, for instance, that urban form, density, mobility, land use and planning have strong implications on GHG emissions, there is little robust quantitative evidence and information on this relationship. Among others, models are needed that are better able to characterise the impact of urban form on emissions" (Prieur-Richard et al., 2018, p. 9).

The opportunities for urban development that present co-benefits for both climate change mitigation and adaptation, alongside human health and well-being and social justice, should also be considered. This section will explore the possibilities for a social-ecological transformation in urban areas, by exploring specifically a) the built environment, b) transportation, and c) public participation. In each section we seek to highlight the potential for reducing emissions while also contributing to more inclusive, just and equitable cities.

The built environment

This section will consider the built environment in urban settings, in particular housing, and physical infrastructure which is essential to well-functioning cities. The built environment is in and of itself a contributor to GHG emissions, especially through cement, which in 2018 accounted for around 4 per cent of CO2 emissions from fossil fuels (Andrew, 2019), and 71 per cent of cement's cumulative CO2 emissions have occurred since 1990 (Andrew, 2019), indicating the rapid growth in the construction industry globally. The IPCC states that "1.5 °C-consistent pathways require building [GHG] emissions to be reduced by 80-90 per cent by 2050, new construction to be fossil-free and near-zero energy by 2020" (de Coninck et al., 2018). And as "current and future patterns of urban growth will determine emissions, vulnerabilities and potentially constrain adaptation options for decades, sometimes centuries" (Prieur-Richard et al., 2018, p. 9) it is important to act now to ensure that any new construction is as sustainable as possible, since retrofitting infrastructure can be three times more expensive than investing in energy efficient urban forms to begin with (Coalition for Urban Transitions, 2019). Existing cities will need to upgrade and retrofit their infrastructure to reduce emissions, especially to reduce dependence on private cars for transport and ensuring buildings are energy efficient (Colenbrander et al., 2017)

Adequate housing is a necessity and a basic human right, yet in East and South-east Asia, 370 million people live in informal settlements, and 227 million do so in South and Central Asia as of 2018[1], lacking security of tenure and access to basic services. This makes them especially vulnerable to the impacts of climate change, despite this population group's minimal contribution to GHG emissions. Affordable housing for lower income groups, such as migrant or informal workers, is often located in the urban periphery, where land is cheaper, however, informal settlements may also be on vacant, exposed and under-serviced land in the city, such as riverbanks or hillsides, where they can be affected by extreme weather events. At the same time, the "environmental risks faced by informal-settlement dwellers intersect with social drivers of vulnerability, such as low-income and gender discrimination. Informal-settlement residents usually have difficulties engaging with the local governments whose support they need" (Satterthwaite et al., 2020, p. 151) for provision of essential services ranging from water and sanitation to education, healthcare and house registrations. Among informal settlement residents, women and children are most likely to bear the burden of collecting water from communal sources, women and girls face safety threats from the lack of toilets, while women are more likely to be home-based workers and therefore suffer loss of income and assets in the event of a disaster damaging their homes.

The infrastructure deficiencies are huge, for example in South Asia it was estimated in 2013 that an investment of between USD 1.7-2.5 trillion was required to close the infrastructure gap by 2020 (Andrés, Biller and Herrera Dappe, 2013, p. 4). Urban development remains dominated by grey infrastructure, so "further exploration is needed on low-carbon and environmentally-friendly infrastructure options that go beyond traditionally dominant grey infrastructure for transformational climate solutions" (Prieur-Richard et al., 2018, p. 10).

There are a number of examples across Asia of informal settlements organising to gain security of tenure and upgrade their homes, as an alternative to public housing which often remains under-supplied. In the process of both upgrading housing and infrastructure,

or building new public housing, the opportunity should be taken to integrate design and construction features that minimise GHG emissions, energy needs, and can also offer co-benefits for climate change adaptation. Residents of informal settlements are already demonstrating such measures, such as using perforated bamboo partitions as indoor walls for ventilation, or growing fruit-producing vines on their roofs for cooling effects while providing additional food (Haque, Dodman and Hossain, 2014). Other low-cost options for reducing peak temperatures in buildings including painting rooftops white, reflective roofs, or double roofs (UN-HABITAT, 2010), using local materials and more openings for air movement (Rangwala and Pai, 2018). As women and girls are more likely to be caregivers and home-workers, ensuring thermal comfort is especially important for their health and productivity.

However, it must be recognised that the emissions from the housing of higher wealth groups remain significantly larger, in both their construction and in their energy needs for cooling and consumption of electrical goods, and therefore any transformational approach should focus efforts on reducing emissions of the wealthy while ensuring the poorest have access to safe and secure housing. Integrating minimum standards of energy efficient design (such as maximising natural light and ventilation) and materials into building codes is one measure to ensure improvements across the construction sector. Public buildings such as schools, hospitals and local government offices could carry out emissions inventories and integrate low-carbon measures to demonstrate feasibility and make cost savings on energy bills (Roberts, 2008), while contracts for public construction projects should stipulate the need for low-emission design elements.

Beyond housing, the GHG emissions of the infrastructure that serves residential areas and makes up urban environments need to be considered, and effective urban planning and enforcement is essential. New construction should not be permitted to damage or destroy natural resources such as wetlands which serve both as carbon sinks and flood adaptation areas, but should instead incorporate nature-based solutions (NBS) (Raymond et al., 2017). Building codes should limit the number of car parking spaces available in new housing or commercial developments near public transport, to disincentivise private car use. Essential services such as schools and hospitals should be accessible by mass transport.

Nature-based solutions can be used instead of, or alongside, grey infrastructure, to enable benefits of carbon sequestration and reduced ecosystem degradation (Rizvi, Baig and Verdone, 2015) and can also provide adaptation co-benefits (Raymond et al., 2017). One example of a nature-based solution in urban contexts is in water management, through the use of sustainable urban drainage which mimics nature, enables surface water drainage through permeable materials, rooftop gardens, and tree planters. This can be mandated in all new developments and applied in the public realm such as by ensuring pavements are planted with trees or green verges. Currently, many authorities continue to favour 'hard' flood infrastructure and megaprojects as these are more politically visible and acceptable, fit in with current governance structures and funding systems - despite the high GHG emissions created by the required concrete.

On a larger scale, the sponge cities concept as promoted by Chinese cities, not only helps with flood management and creates green public spaces, but also contributes to reductions in GHG. For example, a case study of Xiamen city estimates that its urban greening reduces carbon emissions by 66,266.7 tonnes per year, and the lake and river wetlands can reduce carbon emissions by 962.8 tonnes per year (Shao et al., 2018). As research shows that in China and the US, poorer parts of cities often have lower tree coverage and public green space, while in cities like Mumbai and Jakarta green space in poorer areas tends to be 'unmanaged' (i.e. unused land that could be paved over for development) (Hwang et al., 2020), active implementation of NBS, for example by protecting existing natural spaces in cities, can help to improve equity in access to green spaces and the benefits these confer on individuals' health and well-being, as well as contribute to urban adaptation and reduce GHG emissions.

Transport

Decarbonizing transport is essential for achieving the Paris Agreement on Climate Change. Emissions from the transport sector account for 23 per cent of all CO_2 emissions and it is globally projected to be the fastest growing sector in terms of carbon emissions (Sims et al., 2014). Asia has seen the greatest rise (92 per cent) in transport-related CO_2 emissions between 2000 and 2016, with an absolute emission of nearly 2.3 gigatons (GT) of CO_2 in the year 2016 (SLoCaT, 2018). Increasing urbanisation and motorisation in Asia along with compounding private vehicle ownership contribute to unsustainable development in the region. At the same time, inadequate public transportation infrastructure and the adoption of active transport (transportation options which facilitate an active lifestyle, such as walking and cycling, also known as active mobility) is challenging in the region. Although freight transport is an important contributor to the carbon emissions from the transport sector, we focus on land passenger transport due its greater relevance for planning at the urban level.

Public and non-motorised transport is essential not only for achieving global mitigation targets but is also an instrumental means to create socially just cities. Wealth is a major determinant of the mode of transport, with poorer groups heavily reliant on affordable public transport, informal transport or non-motorised transport (Rode et al., 2014). Negligence of planners and lack of affordable housing means that the lowest income groups often have to live furthest out, with the longer commute time and distance, and greater exposure to air pollution during their commute. Having an accessible and affordable means of transport increases the opportunities for accessing decent jobs for the urban and peri-urban poor.

The health impacts of tailpipe emissions are well understood. Emissions from transport have drastic health impacts for children in big cities and reduced fertility in women (Institute for Transportation & Development Policy, 2018). About one in ten asthma cases in children is linked to intensity of traffic pollution (Achakulwisut et al., 2019). Researchers have found the hospitalisation of elderly in Ho Chi Minh city due to cardio-vascular diseases to be a direct result of traffic pollution (Phung et al., 2016). The health impacts will also be borne disproportionately by poor and vulnerable populations such as street vendors, mobile hawkers, construction workers and the homeless. For countries such as Thailand with an ageing society, the public health costs of transport-related emissions will be particularly high.

Inclusive urban transport policy should incorporate the potential and address issues of informal and platform economy workers. A large number of workers are employed in the transport sector, especially the paratransit sector (intra-urban transportation options that are demand-responsive and often provide first and last mile connectivity, also known as intermediate public transport), such as those driving two or three wheelers, taxis, buses, minibuses, vans and pedicabs. Of these, many fall under the informal sector such as cycle rickshaw drivers who are extremely poor, unorganised and therefore have job insecurity, and operate under dangerous work conditions (Women in Informal Employment: Globalizing and Organizing, no date; Breman, 1996). They are also a reliant choice of transport for people who do not own vehicles, in addition to transporting crucial raw materials and finished goods within the city (Cervero and Golub, 2007). There have been many innovations in the platform economy in Asia in the transport sector which could help promote shared transit options. Asia has the highest number of bike-sharing services and also 58 per cent of the world's car-sharing vehicles (SLoCaT, 2018). However, the role of car-sharing in emission reductions is unclear (Erhardt et al., 2019) and the labour conditions, such as the incentive structures set by the corporations and the precarious role of the drivers, are increasingly questioned (Surie and Koduganti, 2016; Schmidt, 2017).

Transport is highly gendered in Asian cities and therefore planning in these contexts should be cognizant of the socio-cultural and gender dynamics. Women's travel patterns and choice of transport modes, time and purpose of commute and ownership levels of private transport is significantly different than men (Iqbal, Woodcock and Osmond, 2020). They might make shorter trips than men, travel in both peak and non-peak hours and are likely to travel for domestic responsibilities with children or the elderly and with heavy loads. These patterns are also impacted by other dimensions such as race and class (Institute for Transportation & Development Policy, 2018). Having accessible and safe transport option for women is crucial, as they are more sensitive to trip times and length and are even susceptible to drop out of work as a result of unsafe or inaccessible transport (Institute for Transportation & Development Policy, 2018). Women in Asia become targets of gender-based violence while using public spaces while commuting in public transport, cycling or walking and so, perceptions of safety can determine mode choices (Hidayati, Tan and Yamu, 2020) In addition to providing infrastructure such as street lighting and women-only transport options, gender sensitisation and awareness raising under these circumstances become an important area for policy intervention and civil society action. Collectives such as Lyari Girls Café in Karachi challenge traditional gender roles based on community organised cycling events (Bukhari, 2019).

Transport solutions depend on urban form and therefore, transport planning needs to be linked to urban planning. Metropolitan cities need to have plans for active and inter-modal transport backed by a robust rapid transit system (bus rapid transit, metro rail or light rail) to efficiently transport dense numbers of people over a large area. While the Asian region has seen substantial investments in the rapid transit sector as seen in the case of Ahmedabad and Guangzhou (Rode et al., 2014), there is still scope for improvement in most cities, for example regarding the provision of 'last mile' transport options. A measure of the percentage of people living near rapid transit in metropolitan cities developed by ITDP illustrates disparities between Asian cities, as rapid transit in places such as Beijing covers 46 per cent of the people living within the metropolitan area but in Manila covering only 23 per cent. This is due to the poor coverage of the elevated rail infrastructure in Manila serving a very densely populated city spread over a relatively small area (Marks, Mason and Oliveira, 2016).

An integrated transport planning system should be statutory for metropolitan cities, as it is essential in order to promote inter-modality. For instance, integrated mobility plans are a requisite in India for national funding of transportation projects but instituting a common mobility card or having a functional unified metropolitan transport planning body is still rare (Rode et al., 2019). In heavily polluted cities, disincentivising use of private transport through congestion fees, parking fees or reduced parking space is essential. Singapore not only introduced congestion pricing in 1975, but also upgraded its tracking technology to an electronic system and more recently to one that uses satellite data (Rode et al., 2019).

In smaller cities where rapid transit becomes financially unviable, public transport and active transport should be planned pro-actively to meet the future population and land demand. National and city budgets need to reallocate resources from infrastructure that supports private vehicles to those that enable public and active transport (Rode et al., 2019). Without an active push towards active transport infrastructure such as walking and cycling lanes and bridges, pedestrians and cyclists face danger of road accidents and health hazards from outdoor pollution. For instance, when low-income groups who primary cycle as their mode of transport were surveyed in Delhi, half the respondent felt unsafe to cycle in high traffic, 46.8 per cent felt upset at the behaviour of motorized vehicles' drivers, 37.2 per cent worried about cycle theft, and 58 per cent of the respondents said they would cycle more if there were dedicated cycle lanes (CEED, 2020). In addition to infrastructure, land use zoning regulations need to encourage mixed use development, that are more conducive for short trips for walking or cycling, in the vein of Paris' "15-minute city" plans. The goal of transport should be proximity and access more than mobility - with compact neighbourhoods where people can live, work and shop without much travel. COVID-19 has offered an opportunity for city governments to re-evaluate the health and physical benefits of active transport and invest in these opportunities (See more in Section 3).

Electrification is a necessary element for a low-carbon transition, in preventing tailpipe emissions and offering the possibility of using decarbonized energy. However, electrification in itself cannot be green without a transition to clean and renewable fuel sources. The Asian region has shown great promise in this sector, for instance, with Chinese cities such as Shenzhen converting to a fully electric bus fleet (SLoCaT, 2018), and smaller Thai cities investigating implementation of electric bus routes, through private-public partnerships.

Finally, the links between adaptation and the transport sector is poorly considered in many public transit policies. However, it is important to develop the resilience of transport infrastructure, as we begin to face the impacts of climate change including sea level rise, storm surges, increased temperatures, heatwaves and other short- and long-term impacts. These concerns should especially inform transport policies in cities located in coastal areas, floodplains and regions more prone to natural disasters. Road and rail infrastructure, especially underground rail transit, is vulnerable to heat and flooding (Institute for Transportation & Development Policy, 2018; SLoCaT, 2018). In many cities including Bangkok, inland waterways are an important mode of urban transportation. These channels will be impacted by droughts and unpredictable water flows (SLoCaT, 2018). There is a need to incorporate climate considerations and science-based inputs into the choice, design and location of transport options to increase the resilience of transport infrastructure.

Public Participation

Climate change is a complex issue and therefore multi-level governance approaches are necessary, bringing together a number of actors, sectors, capacity and governance levels (Leck and Simon, 2013). Formal governance structures should be open to and guide the inputs and interests of other actors for gaining valuable local knowledge that can guide policy, increases the awareness and engagement of citizens, and legitimises policy action (Berry et al., 2019). Public participation is an important component of planning, regardless of outcome, as the marginalised might be most vulnerable to the effects of climate change and adaptation takes place on the local level, so co-producing knowledge at the city scale should include local communities, indigenous peoples, city networks, researchers and practitioners, as well as policy makers (Prieur-Richard et al., 2018).

Planning processes and participatory, gender-responsive budgeting are necessary for understanding the priority of the local populations and increasing a sense of ownership of projects in communities. Planning also needs to consider the specific needs of people in the community based on gender, age, migrant status, disability and other factors. Even though many local governments have instituted mechanisms for public participation, it becomes essential to ensure that participatory governance moves beyond "instrumental use" towards "deliberative approaches" (Castán Broto, 2017, p. 6). As the process of reaching a consensus with multiple stakeholders is complex and time-consuming, some agencies may pre-emptively decide the agenda. This will affect the trust of people in formal channels

of participatory processes. Therefore, governments or private organisations who implement public projects need to collect more qualitative data and stories which allow multiple interpretations and a plurality of experiences to co-exist to co-develop solutions (Borie et al., 2019). This might include disclosing key financial information in climate-sensitive sectors and instituting the right to information for complete disclosure to concerned citizens (Tanner et al., 2009). They would also need to make sure that the participatory processes are not overly technocratic or reliant on technical knowledge to be as inclusive as possible.

In many projects, even when there is a thorough participatory exercise, the outcomes may not be truly inclusive. Some groups of civil society actors may be more powerful and have the time, resources and networks for active participation. This could have undesirable or even harmful consequences for the poor and grassroot movements or activists may be side-lined. For example, Rowan (2011) demonstrates how the demand for canal rejuvenation in Chennai by middle-class environmental activist groups led to the eviction of low-income groups who were living in the canal-side settlements.

Decentralised forms of governance and democratic participation may be more institutionalised in some Asian countries than the others. In many Asian cities, undemocratic regimes may be unwilling to engage in participatory processes and push for more technology intensive, autocratic solutions (Padawangi, 2018). In addition to opening up the forums for public participation, participants need to be given sufficient time and resources to ensure representation of the widest range of actors.

Very often a form of indirect representation is instituted at the city level. For example, in the case of Udon Thani, a small city in north-eastern Thailand, a monthly meeting enables dialogue and information sharing between the municipality administrators and elected community representatives for the city's 104 designated communities, many of whom are women. This direct and active form of communication with city wide representatives ensures transparency in governing the city and gives the representatives a say in budgetary allocations and urban plans and projects (Adelina et al., 2020). As a result of these meetings, there is also a horizontal scale of partnership and network building within the communities. The charter for the city, which sets the overall development goals, was also developed with the efforts of volunteers, who represent different stakeholder groups, as they were given an opportunity to feed their interests into the local development agenda (Adelina et al., 2020). In the case of Ho Chi Minh City, a high degree of centralisation leads to delays in implementation of municipal infrastructure projects. There are also no clear information channels provided to the public and public trust and accountability is questioned (Tanner et al., 2009).

In addition to "invited spaces" where the state extends participation through formal channels, "created spaces" are also important. Civil society organisations, citizen movements and online advocacy may exist in addition to or lieu of formal participatory mechanisms (Berry et al., 2019) and are all important modes of achieving citizen awareness and generating momentum for public-led climate action. Community-based organisations (CBOs) act as channel between local residents and local authorities. Examples of partnerships between CBOs and local governments that enable low-income communities to play a role in shaping development in the city to reduce carbon emissions do not have negative social effects. NGO projects in low-income communities can increase the preparedness and engagement of communities to lead their own initiatives in the long run. For example, community savings and co-ordination between local organisations and the local government has been funnelled to achieve both resilience and poverty reduction in the Philippines, which is prone to disasters. The Homeless People's Federation of the Philippines have strengthened slum federations to provide inputs and knowledge into building their own homes post disasters and advocated for the considerations of the poor into disaster risk reduction planning (Crawford, 2011).

Lesser visible forms of participation may be present in cases where participation is not formalised or encouraged within planning systems. An example of this was seen in the enforcement of a solar water heating system in an affordable housing community, Qiaoxiang Village in Shenzhen city (Huang, Castán Broto and Westman, 2020). The village was selected to be the model village in accordance with a national demonstration project on green energy transitions. The technology, still at its immature stage of development, was enforced in the village without public input. Eventually, the private service provider of the heating system went bankrupt leading to lack of service maintenance and everyday inconvenience for the residents. Even though initially indifferent, this led to conflicts within the resident community to retain or remove the system and the public engaged in forming tacit responses and forms of "defensive" participation to get their voices heard to shape policy outcomes such as compensation for damages in their houses for repairing the system (Huang, Castán Broto and Westman, 2020).

Inter-generational learning can be a valuable way of transferring the local repository of knowledge (McQuaid et al., 2018), and can instil a source of neighbourhood pride and ownership in developing pluralistic pathways to sustainable development. Boundary organisations such as researchers and activists can play a key role in organising the forums for transferring these forms of local knowledge within communities or to policy makers based on their needs and can use innovative approaches to encourage citizen engagement. Examples include the use of community theatre in explaining the impacts of air pollution on poor groups (Lambe, 2018) or visual methods such as photovoice in increasing civic engagement amongst older adults or marginalised youth (Gant et al., 2009).

Some of the challenges for city governments in ensuring 'true' public participation may include the lack of financial resources and capacity to execute processes, the lack of clarity in dividing tasks between different levels of the government, or because low-income people reside outside the municipal boundaries falling under the jurisdiction of these planning processes (Tanner et al., 2009). The targeted citizens may also not have the time, interest or resources to participate. Where this is found to be the case, a volunteer-led program that incentivizes low-carbon transitions can be instituted. A good example in this area is from Seoul, where energy reduction actions were volunteered by households and communities, and were rewarded with reinvestments in other green services such as subsidies in public transportation user cards (Seoul Metropolitan Government, 2017).

Finally, the mandate of urban sustainability should be broadened to include a broader range of civil society groups and movements. Advancing environmental sustainability should be carried out alongside advancing other causes of the urban poor such as right to land ownership, decent jobs or affordable housing - since these demands are also pathways of integrating and prioritizing low-carbon developments (Cohen, 2016). The contributions of certain population groups to minimising GHG emissions should be recognised – such as the role played by usually low-income urban residents in recycling through informal waste collection. This contribution to more effective and efficient waste management could be supported with better health and safety equipment as a start, to connecting their work to formal waste collection services such as in Pune, India (Moora and Barde, 2018), which can lead to more socially just and sustainable cities.

The case for people-centred urban planning

Chennai is a metropolitan city in the southern province of Tamil Nadu in India with a population of more than 8 million. We discuss the impacts of a particular resettlement case to Gudapakkam and Perumbakkam public housing colonies in the periphery of the city, drawing extensively from the work of Dr. Coelho (Coelho and Raman, 2010; Coelho, Venkat and Chandrika, 2012; Coelho, Mahadevia and Williams, 2020)

Tamil Nadu's Slum Clearance Board constructed one of the largest resettlement colonies in a marshland located in city periphery to evict and resettle slum dwellers who were living in the central core areas of the city. Slum dwellers located near the waterways and canal banks of the city were evicted mainly citing reasons of flood rehabilitation, river restoration and a storm water development project (Coelho, Mahadevia and Williams, 2020). Each unit was about 30 sq.m. in area and had piped water, toilet and electricity connection. Most of the residents in the resettlement colony belonged to marginalised castes and were informal workers such as construction labourers, drivers or vendors.

The distant location of their house did not bring about nearby work opportunities. Residents had to travel a distance of 25-35 kms on an average to travel to their place of work (Coelho, Mahadevia and Williams, 2020). Connectivity to public transport was poor, with fewer bus routes and insufficient trip frequencies in comparison to demand. Buses were overcrowded during peak hours. The monthly bus pass had become more expensive recently. This spiked the overall transport costs for a household and as a result, many women dropped out of work. Some of the residents had to rely on private or paratransit due to the low public transport connectivity. Almost all of the private vehicles' ownership and usage was by men. Many children still travelled to their schools in the city centre, but a few shifted to nearby schools or dropped out of school altogether (Coelho, Mahadevia and Williams, 2020).

There were no urban amenities such as shopping markets, cinemas, internet centers in the neighbourhood. The communities felt a sense of isolation and a lack of social cohesion. Women felt less safe to walk in the new neighbourhood and had to be dependent on a family member to go outside the colony (Coelho, Mahadevia and Williams, 2020). This study also presents some contradictions in terms of the environment. Even though a lot of these evictions were to plan for climate adaptation projects, the houses

had to be built on an ecologically sensitive marshland, which would be susceptible to flood risks and meant that the eco-sensitive marshland had to be re-titled as 'waste land' (Coelho, Mahadevia and Williams, 2020). However, evidence shows the important ecosystem benefits provided by urban marshlands such as Pallikaranai in flood retention, carbon sequestration and biodiversity maintenance.

This case points to how the lack of people-centred planning can lead to undesirable outcomes across sectors. We see how inclusion is key to realising many of the SDGs, such as poverty eradication (SDG1), quality education (SDG4), gender equality (SDG 5) and decent work (SDG8). The case also illustrates the need for integrated cross-sectoral planning, as vectors of housing, services, transport, environment and spatial planning overlap in cities and each cannot be planned in isolation.

Section 3: Urbanization of the pandemic

COVID-19 has created an opportunity for many city governments to rethink a sustainable urban future. Many cities have responded to the pandemic with innovative responses that could have beneficial outcomes for long term social-ecological transformations. Some of these measures include setting up relief systems and community food banks for the poor, encouraging urban agriculture, investing in active transport, recognising the importance of open green spaces and pushing for urban livelihood schemes. Notwithstanding these opportunities, the challenges posed by the pandemic are numerous.

Cities have been central hotspots of viral transmission with an estimated 95 of all transmissions with dire consequences for the economic and social fabric of urban lives (Bhalla, 2020). "Leaving no one behind" will have to be prioritized in recovery responses in urban areas, as the share of the "new poor" is predicted to mostly increase in urban areas, especially affecting groups such as women, workers in the service sector and informal workers (Nguyen et al., 2020). The nature of informality in Asian cities is that income is earned on a daily basis and therefore earnings are insecure – the economic impact of COVID-19 has led to increased precarity. For instance, millions of livelihoods are at risk in cities such as Bali where small enterprises and informal workers relied entirely on the tourism sector (The Bali Sun, 2020). Municipal finance has shrunk in many cities due to delays in local and property tax payments, but with increased pressure for local response and shifted priorities in light of the pandemic. For instance, the municipality of Dalaguete in the Philippines had additional responsibilities such as providing food packs to those affected, recruiting frontline workers, procuring medicines and protective equipment, and identifying local facilities for accommodating COVID-19 patients (Abatayo, 2020). National governments have also seen increased spending demand to support the pandemic response and economic recovery.

The inequalities created by our economic and political systems prior to the pandemic has been exposed as a result of the present crisis. Unequal social and health infrastructure provision and finance allocation to neighbourhoods within the city has compounded vulnerabilities to the pandemic, like in the case of informal settlements in Mumbai (Kamath et al., 2020). Migrant workers and wage labourers have suffered due to precarious work contracts, pay delays and lack of a support system, in addition to being exposed to increased risk of infection due to poor living conditions, like in the case of Singapore (Tan, 2020), or ongoing work in unsafe conditions. We now turn to look at the impacts of the pandemic on the three key sectors:

Built environment: High levels of overcrowding in informal and cheaper accommodation options, and high density in informal settlements, means physical distancing is impossible. Lack of provision of water and sanitation facilities in informal settlements also makes hand washing difficult, either because the infrastructure is not there or because water comes at a high cost. This has highlighted the need for improved data collection in urban settings, in particular in informal settlements where municipalities often have little information about the number of residents, or in informal employment, where certain people may work in high-risk occupations. This data can help identify vulnerable population groups within them, such as those with pre-existing conditions, who are not only more susceptible to COVID-19 but also to the impacts of climate change, such as heat stress or vector-borne disease. Enumeration and mapping processes can create a valuable database to help target interventions, whether health-related or in the context of disaster response (Carcellar, Co and Hipolito, 2011). Additionally, the pandemic has reinforced the need for moving beyond narrow technical solutions to housing problems towards transformative processes of "critical engagement with the institutional structures and processes that create and sustain inequalities" (French et al., 2020).

COVID-19 has also highlighted the essential role played by open space in cities, from pavement space to green parks, especially for those who live in cramped buildings with no balcony or other outdoor space. Research has demonstrated the important public health role of parks (alongside their environmental benefits such as urban cooling, which in turn minimises the need for artificial cooling through air-conditioning) and urban nature as a source of mental and physical resilience (Samuelsson et al., 2020). Yet many Asian cities are critically lacking in accessible green space, for example Bangkok has only 6.79 square metres of green space per capita (based on official population figures, which may be higher in reality), below the World Health Organization's recommendation of nine square metres per capita. In contrast, Singapore has billed itself as a garden city and boasts 66 square metres of green space per capita, with a 50 per cent increase in green space coverage since 1986 (Gwendolyn, 2018).

Transport: As a result of the pandemic, many cities globally have expanded their active transport infrastructure, through prioritising open and accessible public spaces, earmarking additional pedestrian-only zones, constructing or delineating makeshift cycle lanes and busways. As urban residents avoided crowded public transport, some turned to cycling and walking, and certain cities responded by widening pavements

and cycleways through temporary measures - in many cases, these temporary measures are being made permanent. However, in many Asian cities, this period served to highlight the continuing difficulties faced by pedestrians, with poor pavement infrastructure, lack of tree cover, and prioritisation of private cars.

Nevertheless, as there increasingly seems to be a connection between vulnerability to COVID-19 and air pollution, cities pushing to reduce private car use can garner public health benefits. In Seoul, there has been efforts to reduce the number and width of car lanes, to make space for pedestrians and shared transportation facilities (Hwa-seop, 2020). Citizens have taken up active modes of transport like cycling during the pandemic, as observed through the case of increased cycle sales in Indian cities. As a response, the central government body for planning urban development had advised all local governments to plan in the short and long run for improving cycling infrastructure (Kaveri, 2020).

While these are a few examples of positive developments, COVID-19 also presented its challenges in terms of use of public transport. Trust in public transport systems has reduced due to the risk associated with crowding and contamination. The revenue of public bus systems has been severely hit, with a reduction of up to 90 per cent ridership in the case of India. Buses will have to adopt safety measures such as labelling physical distancing, and provide contactless ticketing systems, to create a sense of trust in public transport users, and avoid an increase in private car use, with consequent increases in GHG emissions. Some public transport systems might need stimulus to recover revenue losses and cover unpaid staff salaries, road and toll tax waivers and to provide safety and hygiene mechanisms. A large number of people in Asian cities use informal transport in addition to public transport, and so similar measures and stimulus should be considered in COVID-19 recovery policies (Calnek-Sugin and Heeckt, 2020).

Public Participation: Prohibition of public gatherings has impeded public participation in traditional settings. This has led to many government bodies across the world adapting to virtual meetings, online platforms and publishing web recordings of meetings and decisions taken, moving towards more transparent forms of governing cities (Visser and Chigwata, 2020). In some instances, instead of facilitating public hearing forums following safety protocols, COVID-19 has been used as an opportunity to push for contentious projects without adequate participation (Benjakat, 2020).

Asian cities will have to take into consideration the access and convenience of participants in their respective contexts to make use and engage with online or other innovative platforms. Therefore, a mix of traditional and virtual forms of public participation may be adopted in cities to ensure that the poor, disabled, elderly and illiterate can engage in participation mechanisms. There was also a rise in citizen-led and community responses in raising public awareness and providing relief to those who lost earnings due to the pandemic (Acuto et al., 2020). In many cities, the private sector consisting of start-up companies, responded by developing open data tools and increasing transparency of COVID-19 data. Continuing to build momentum in public participation channels and expanding the capacity of private actors to engage in pressurising governments for a social-ecological transformation is key in empowering the public.

Section 4: Challenges and opportunities for social-ecological transformations

The previous sections have highlighted the need for considering social issues alongside ecological ones while transforming three key sectors, and entry-points for achieving these changes in Asian cities. We also recognise that the process can face barriers, as highlighted in Figure 2, but there are ways to overcome these, starting by integrating climate change and sustainability into development decision-making. This integration requires mainstreaming of climate change and social justice considerations at all levels of decision-making, from the national government down to municipal authorities - a process that can be time-consuming and requires political commitment. Various frameworks for mainstreaming climate change exist, but the key elements for successful mainstreaming include having the necessary data and information, financial instruments, co-ordination mechanisms, and leadership (Mogelgaard et al., 2018). An overarching national act can help to spur this on, such as the Philippines' Climate Change Act, by providing the necessary legal framework. Alongside this can go international commitments to achieving climate change targets and the SDGs, providing an impetus for change.

Another factor is to have the necessary partnerships for change, but while it is pressing to build multi-level and multisectoral partnerships to work towards social-ecological transformations, this is a challenging task. Urban areas are complex spaces with "multiple actors shape the framing, purpose, and implementation of policy and practice" (Friend et al., 2014, p. 9). While the messy process of policymaking can be a barrier to advancing low-carbon transitions, Asian cities also present opportunities in terms of increased participation and leadership in the area of urban climate action as populations become increasingly aware and concerned of environmental problems from air pollution to climate change.

Figure 2 Challenges and opportunities for social-ecological transformation in three key sectors

Key sectors	**Challenges for social-ecological transformation**	**Opportunities for social-ecological transformation**
Built environment	Affordability of land and housing leads the poor to live in informal settlements without adequate services	Integrating affordable energy efficiency and passive cooling designs into upgrading of informal housing, or construction of public housing
	Urban sprawl and development of suburban gated housing estates with housing designs not suited to local climate, destruction of green spaces and permeability	Mandating minimum energy efficiency standards, building material standards, and design standards, for the construction sector
	Perception that infrastructure needs to be 'hard' concrete to be effective	Application of nature-based solutions and sustainable urban drainage solutions to absorb GHG, provide co-benefits for climate adaptation, human health and well-being
Transport	Growth in passenger and freight activity in Asia due to increased motorisation	Commitment by governments to invest in mass transit systems and high degree of innovation in the transport industry
	Horizontal expansion of cities and urban sprawl, both planned and demand-led	High density urban development that can support mass transit infrastructure
	Aspirations for car ownership as a status symbol	Importance of active transport recognised during the pandemic
	Barriers for women in occupying public spaces and lack of friendly transport infrastructure for the disabled and elderly	Increased pressure from public to combat urban air pollution

Key sectors	Challenges for social-ecological transformation	Opportunities for social-ecological transformation
Public Participation	Decisions influenced by powerful and wealthy who tend to emit disproportionately more than the poor	Embedded legislations for participation in urban planning and public projects
	Prioritising different actors such as real estate actors, businesses, NGOs and the poor and their varied interests	Strong presence of civil society actors, and environmental NGOs
	Lack of trust in procedural justice and participatory mechanisms	Increased environmental awareness amongst youth
	Unequal representation of poor and marginalised groups in civil society groups	Participatory and gender-responsive budgeting and public planning forums, citizen-led virtual forums to increase awareness and campaigns

However, there is lack of policy integration in disaggregating national level commitments to the urban or even regional level. This points to the lack of data on emissions at city level, except when some cities voluntarily choose to disclose their emission information. There are also methodological and administrative challenges in calculating city level emissions - especially in cities that are large urban agglomerations carrying millions of populations and daily commuting workers, cities with a large number of tourists, or those that have concentrated industrial activities or are regional transport hubs. Partnerships of global cities such as C40 Cities have been instrumental in improving data transparency and catalysing cities with common goals towards climate action. At the same time, the local government and citizens need to ensure that the global scale of experimentation in the field of sustainable urban development do not compound differentiated vulnerabilities and uneven participation of stakeholders in the project cities.

Many local governments in Asia are understaffed and underfinanced. The difference in budgetary allocations between primary and secondary cities are huge. For instance, Bangkok receives 12 times the budgetary allocations from central government of Thailand than Khon Kaen province, which is the fourth largest province in the country (Taweesaengsakulthai et al., 2019). Most urbanites reside in small and medium towns (UNESCAP and UN-HABITAT, 2010; Bazaz et al., 2018). In addition to reducing the emissions in megacities, financing climate mainstreaming in these smaller human settlements will also be necessary. One way of strengthening commitment and leadership of local governments is for national governments to strengthen and support knowledge sharing networks and fostering regional partnerships for social-ecological transformations. Most urbanites reside in small and medium towns (UNESCAP and UN-HABITAT, 2010; Bazaz et al., 2018).

The level of decentralisation may determine the extent to which local authorities can take their own measures, including their ability to generate revenues locally, but having a climate champion within the local administration can be essential to driving forward the agenda. An example is late Mayor Park of Seoul who championed climate action in the city, launching a climate strategy known as the 'Promise of Seoul' which was developed through an extensive consultation process of residents, NGOs and experts, and who also mobilised local leaders globally to act on climate change (ICLEI, 2020). Campaigns such as 'net zero targets' at an institutional or city level can help to raise awareness of current levels of emissions through inventories, and thus inform a plan of action.

There are however many challenges to changing the behaviour of individuals within cities that require potentially politically unpopular decisions. This is especially apparent with regard to private car use: without disincentivising the use of private cars by increasing their cost (through higher tax on car ownership, higher petrol prices, more expensive and restricted parking options or congestion charging, to name a few options) it is very difficult to change people's habits, though a public discussion about the costs of economic, social and environmental costs of congestion can help. Lessons from London for example included discussion of 'integrated transport' rather than of reducing car use, and taking a multi-pronged approach, from congestion charging alongside improved planning for alternative transport modes (Mackett, 2012). Holding public referendums on whether to implement congestion charging may cause it to fail, unless the referendum is held after the scheme

has already been trialled for a number of months, as in the case of Sweden (Mackett, 2012).

Initiating long-term relationships and carrying out public participation in an engaged manner, that ensures all population groups are included in a meaningful way, is an important function of local governments. Collaborative ways of finding solutions might be undesirable to some groups, and an awareness that lobbying might lead to sub-optimal results for long-term social-ecological transformations in Asian cities. Often as a result, environmental activism or green infrastructure planning has had undesirable consequences for the most marginalised and this has resulted in an increasing divergence between affordable housing, environmental justice, nature conservation and labour rights movements. However, there should be a recognition that the demands of the poor for affordable housing or public transportation are also low-carbon demands and important development priorities. Therefore, a focus is needed on building these partnerships and extending solidarity across sectoral goals and organisations towards a common goal of reaching the 1.5°C target alongside, and not at the expense of, the Sustainable Development Goals.

One of the challenges will be for governments to pressurise industry transitions, especially in contexts where there is a high degree of power or dependence on the private sector for steering development in the region. Many of the polluting industries are located in the urban periphery or smaller and less well-resourced cities, where sufficient safeguards or enforcement to ensure human and environmental health may be limited. However, with increasing public awareness and pressure, businesses are increasingly switching to sustainable practices. Rather than shifting polluting industries to peripheries as the city expands, long-term solutions will include promoting sustainable consumption, thereby eventually reducing the need for total energy and resources.

There are also easier 'wins' for cities in the earlier stages of a low-carbon transition, where there may be more financially palatable options for local authorities than in a later stage of the transition (Gouldson et al., 2015, p. 104). A case study of Kolkata identified 'economically attractive' measures that could reduce the city's energy expenditure by 8.5 per cent and its GHG emissions by 20.7 per cent, with the investments in the city paying for themselves over 6.2 years, for example (Colenbrander et al., 2017, p. 154). For this transition to be sustained, there is a need for a process of institutional learning, whereby climate change planning is mainstreamed across all elements of urban development, from urban planning to housing and transport provision, and a change of perception towards a low-carbon transition between an opportunity rather than a threat, for urban decision-makers and residents alike (Gouldson et al., 2015). However, this also needs to consider the unintended social impacts of low-emission urban development, such as the livelihoods of those who rely on waste picking if a city transitions to waste-to-energy (Colenbrander et al., 2017).

Section 5: The case for a social-ecological transformation in urban areas

No single actor can individually achieve emissions-reductions targets - there is a need for collective responsibility and public awareness and for this, policy frameworks are an essential starting point. Greener human settlements and transport can actively contribute to social-ecological transformations in Asian cities, and we have identified some synergistic solutions that can help achieve both environmental and social justice in the city. They have important co-benefits for employment, health and well-being and have the possibility to cut down a large percentage of urban emissions (Coalition for Urban Transitions, 2019). These sectors must remain a priority with urban planners and policymakers to reduce urban level emissions, and combined with broader public participation, can help achieve a social-ecological transformation.

An overarching challenge in actualising green transitions in Asian cities is ensuring that those groups that will be negatively impacted by climate policies are not made worse off through these processes and that ecological justice does not come at the expense of social justice (Colenbrander et al., 2017). Urban growth at unprecedented scales has led to a push for infrastructure projects that are the aspirations of the voting majority at the expense of the marginalised minority groups (Padawangi, 2018). Greening infrastructure projects will need to critically assess social, ecological and economic dimensions at its production, use and post-use stages. Some issues to consider include the existing use and ownership of land, sustainable and responsible use of resources, ecosystem benefits created, quantity and quality of jobs created, access of amenities to those on low incomes, women, children, elderly and the disabled, but also less apparent factors such as long-term impacts on neighbourhood gentrification and equitable distribution of green spaces across city neighbourhoods. Civil society and academic institutions play an important role to look at offering solutions that can benefit both environmental improvements and social equity, instead of pitting one cause over the other.

Having safe, clean and affordable transport and housing are important not only as ends in themselves, but also as an important means of achieving other development goals such as accessing educational opportunities (SDG 4), gender equality (SDG 5), shifting to clean energy (Goal 7), accessing decent jobs (SDG 8), developing quality infrastructure (SDG 9), building sustainable human settlements (SDG 11) and for speeding up climate action (SDG 13). Therefore, in addition to planning sector-wise emission reductions, a systemic climate mainstreaming in urban and national level policies is required to keep global warming below 1.5°C above pre-industrial levels. This will include inter-sectoral planning in all sectors in addition to building and transport sectors, inter-governmental co-ordination and business co-operation. As the effects of climate warming above 1.5°C will have severe impacts in many sectors, planning will also need to ensure that the health, food, water and biodiversity systems can withstand future shocks and stresses.

In a world where the richest 10 per cent are responsible for nearly half the emissions (Kartha et al., 2020), much of the benefits of growth have been accrued by the rich and so, it becomes essential to tie in the causes of social justice and sustainability. Asian cities often present powerful images of the inequality we experience as a result of unsustainable and uneven patterns of growth today. It is, therefore, important for cities to take bold action to redistribute carbon inequality through planning and policy. We have presented soft and hard solutions in implementing this. For instance in the realm of transport, this could imply a range of measures such as disinvesting in highways, incentivising voluntary energy efficiency, strengthening public transportation to levying congestion taxes. In the housing sector, this could mean mandating minimum standards of ventilation and insulation which not only reduce emissions but reduce the energy costs faced by poorer households (Laurent, 2020).

Finally, there is need to reflect on the systematic drivers that lead to unsustainable modes of consumption and resource extraction on the planet at the individual and societal level. The present societal crisis caused by COVID-19 is an indication of the likely disparities we shall see as climate change impacts become more severe, from physical disasters to health crises caused by heat stress or vector-borne diseases. COVID-19 has highlighted urban disparities but also has presented an advance opportunity to check unsustainable and uneven patterns of development in cities, recognising the finite limits of the planet and to realise equitable distribution of resources. Cities are known to dump solid waste in peripheral land, pollute rivers for downstream use and cause air pollution risks beyond municipal boundaries. Currently, urban land cover is increasing at twice the rate of urban population (Bazaz et al., 2018), therefore, we need to look at softer solutions that make use of existing technology and investments, such as retrofitting existing buildings for energy efficiency rather than building greenfield eco- and smart cities, which despite their name require huge

amounts of natural resources. Research has shown that using already existing and widely available technological solutions can cut emissions by 90 per cent in cities (Coalition for Urban Transitions, 2019). Solutions that address structural drivers of climate change will integrate urban growth with the needs, risks, resources and capacity of the overall region. They will maintain equitable development between urban and rural areas, prevent rapid expansion of urban land, and curb urban-based extraction and pollution from impacting natural ecosystems and associated livelihoods. And for a true social-ecological transformation, we need to ensure this is done alongside, rather than at the expense of, considerations of planetary health, by putting people at the core of decision-making processes.

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Endnotes

[1] Figures sourced from UN statistics, available on the webpage: https://unstats.un.org/sdgs/report/2019/goal-11/ (Accessed 10th September, 2020)

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