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18 ASIAN URBAN FUTURES

While students of urban growth and form in the West have long enjoyed the benefit of well-established bodies of theoretical and empirical knowledge, comparable studies in the developing world lag behind what often seems like an uncontrollable speed of events. With the prospect already looming of more Asian megacities of 20 to 30 million population early in the next century, the statistics are frightening in themselves.[1] The difficulty for planners and other decision makers, however, lies not just with the rate or even the vast scale of urban development, but with the lack of appropriate models equivalent to Western theoretical tools which might help to make sense of these extraordinary phenomena, and, hopefully, to prescribe solutions to the enormous problems they raise.[2] The temptation in these circumstances for developing world theorists to reach for Western urban models to explain or prescribe for essentially different historical or contemporary situations, coupled with the widespread lack of open or critical debate of current urban programmes, only worsens matters.

Any conscious effort by Asian urbanists to break out of this impasse and create an alternative approach to planning and design born of their own cultures and histories, if only in part, is therefore to be greatly welcomed. The following discussion traces and compares the principal ideas and urban projects of four Asian architect-planners, one Indian, one Malaysian and two Singaporeans, who in their different ways are all striving for appropriate solutions to some of the most intractable problems in their regions. All but one are better known outside their own countries for their architecture than for their urban works, yet their collective contribution is vital to the debate on development planning and urbanization. All of them take as their starting points the colonial histories of the cities in which they live and practise, which have long since outgrown their historical structures and boundaries. All find inspiration to a greater or lesser extent in ecological models of sustainable development, and in the multicultural history and diversity of their respective regions. All also attempt to confront the huge scale of urban population growth in Asia and the consequent problems of high densities and inadequate infrastructures. Aside from recognition of these common origins and problems, however, there are considerable differences as well as similarities in approach, according to the respective interests of each thinker, and the economic and cultural resources available within his area of focus. Neither can any of their models be

18.1.
Hong Kong. Shortage of building land and population migrations from mainland China helped create Asia's most dense megacity. Photo: Chris Abel.

described as purely indigenous or Asian, but are rather a composite of Western and Eastern ideas and values, reflecting a continuous process of cross-cultural exchange carried over from earlier periods. This in itself suggests a rejection of simplistic solutions and a willingness to deal with the world as it is, in contrast to some of the more extreme ideological positions which have characterized urban planning and design in the past.

CHARLES CORREA AND THE NEW BOMBAY PLAN

Social and structural imbalances

A renowned architect and RIBA Gold Medal winner, Charles Correa has been engaged in the planning of the Bombay city region since the early 1960s, involving some of the most severe problems of urban development and social inequality in Asia. His ideas and projects are therefore especially relevant to the less developed and underdeveloped regions of South Asia, and also to parts of East Asia, such as mainland China and both the Indonesian and Philippine archipelagos.[3]

For Correa, the most urgent problems to be resolved centre on the social and structural imbalances resulting from the migration to the cities of the rural poor in search of work, whose population daily swells the squatter settlements surrounding the older and more affluent urban centres. Like John Turner and other advocates of the urban poor,[4] Correa sees positive as well as negative aspects in their epic struggle for survival, and in their attempts to create a better life for themselves and their families out of the most extreme conditions of hardship and minimal resources. He also acknowledges their contribution in relieving socio-economic pressures on the countryside, which can no longer sustain the population growth.

Nevertheless, while demographic adjustments from rural-based to industrialized economies may be inevitable, they place an unbearable strain on older cities and their outmoded infrastructures, which are unable to cope with the massive influx of population. Taking a broader view, the only viable long-term solution, Correa reasons, is a national policy of rural regeneration through land reform and economic support for villages to help stem and control the outward tide, coupled with urban and industrial decentralization aimed at shifting the burden of economic growth toward the newer, and more numerous, medium sized cities. These would soak up as much rural–urban migration as possible within their own regions, diverting it away from the larger overcrowded cities. He concedes that progress in India on the first, politically sensitive policy, with its echoes of Gandhi's earlier call for similar reforms at the village level, is slow.[5] The latter shift, however, thanks to government incentives, is already happening throughout India, where cities of 100,000 to 1 million are now growing faster than the older metropolitan centres. Nevertheless, while redistributing much of the national pressure for growth, it still leaves the larger cities with the accumulated problems of decades of uncontrolled expansion and extreme contrasts between urban rich and poor.

Founded by the British owned East India Company as a trading post in the seventeenth century, Bombay is typical of these older, former colonial cities. Now India's main financial centre, most of the commercial growth and new workplaces have been concentrated along with the government and other colonial-era buildings in the original harbour breakwater. As the city has expanded northwards along the two main railway lines and roads leading into the centre, so have the distances between it and the newer residential suburbs and main squatter areas increased, creating a barely passable bottleneck as rich and poor struggle daily into work. Unable to afford any kind of accommodation within the city itself or to find any closer shelter, countless casual workers choose instead to sleep near to their workplace wherever they can, on streets or stairways or any other available nook or cranny.

A matter of density

Correa argues that the provision of additional squatter areas, even with local infrastructure support – the so-called 'sites and services' approach supported by many activists[6] – does little good if the new sites are located, as they generally tend to be, on vacant land remote from employment centres or public transport. Individual factories set up close by also bring little benefit, and invariably take advantage of the squatters' lack of choice by offering unacceptable wages and conditions. Raising densities even further along the lines of Hong Kong or Singapore was also out of the question, since the cost of subsidizing high rise dwellings for the poor on the scale needed was beyond the means of India's relatively less developed economy. Rejecting the Western Modernist orthodoxy of the times, he concluded there was no architectural 'fix' for Bombay's or India's problems. The solution would have to be found elsewhere:

For too long have we struggled for answers when from the beginning the question has been wrongly formulated in the first place. The problem of housing the vast majority of our people is not one of miracle building materials or construction technologies; it is primarily a matter of density, of re-establishing land-use allocations.[7]

Polycentred city

Correa deduced that the best strategy for Bombay was to establish a completely new city on undeveloped land where new centres of employment and residential areas could grow together in tandem. By the early Sixties a new industrial belt and second port was already well established on the other side of the harbour bay, joined by new bridge and rail links to the old city. In 1964 Correa and two colleagues, Pravina Meta and Shirish Patel, proposed consolidating these and other developments by restructuring Bombay and diverting further commercial growth across the water into a second, new city centre. Other centres of work and residential neighborhoods would be built on land to be purchased by the government, creating a 'polycentred city' stretching right around the bay. In 1970 the government accepted their proposals, setting aside 55,000
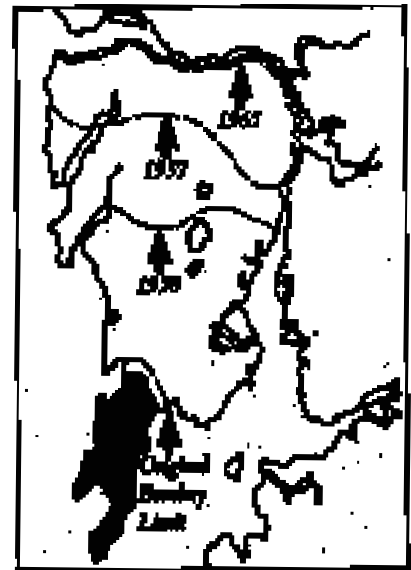

18.2.
Bombay. Location plan showing historical expansion of municipal boundaries. From Correa, 1989.

acres for the new city, to be called New Bombay, and asked Correa to assist in its planning and design.

   Correa's primary aim was that all sectors of the population should prosper from the development, a concern that was carried over both into the structure plan and into his model housing projects. A committed advocate of low rise high density settlements, Correa argues that, aside from the additional costs of high rise housing in construction materials and maintenance, the amount of land saved over that taken up by terraced housing and other compact forms was, contrary to common belief, relatively small.[8] More than that, traditional Asian building types such as the dual function shophouses of East Asia and elsewhere allowed for a richer mixture of functions and the kind of small-scale economic activities vital to the poorer sectors, as well as to the life and character of the city. A hierarchy of public transport and urban nodes was devised, with low rise but dense settlements strung out like strings of beads along bus lines. These feed in turn into the Mass Rapid Transit system connecting up the main nodes, which stretch out linear fashion in three directions along the coasts and waterways of the bay, joining together at the new commercial centre. The principal urban activities and workplaces are gathered around these transport interchanges, bringing them within easy reach of the entire population.

Egalitarian programme

The egalitarian nature of Correa's social programme comes most clearly into focus, however, in his model 'incremental' housing complex for mixed income groups at Belapur, a district of New Bombay close to the main centre, completed in the mid-Eighties.[9] One of Correa's main criticisms of high rise housing patterns is that they entrench existing class and income barriers, separating people by land-use and space as well as differences in wealth. At Belapur Correa mixed different plot sizes together in low rise high density clusters so that people of widely
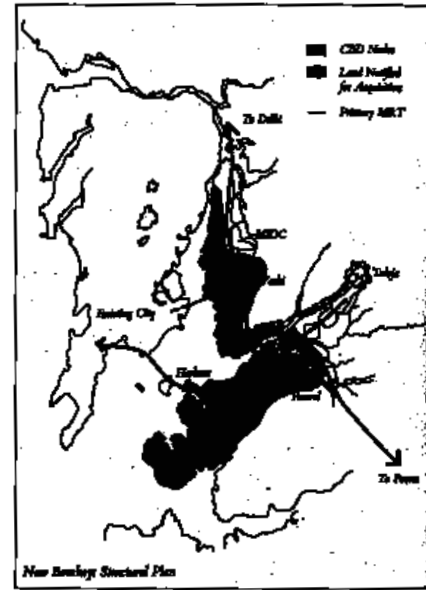
18.3.
New Bombay. Structural plan. From Correa, 1989.
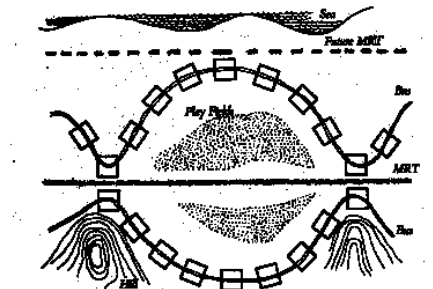
18.4.
New Bombay. Concept diagram showing integrated pattern of settlements and public transport systems. From Correa, 1989.

18.5.
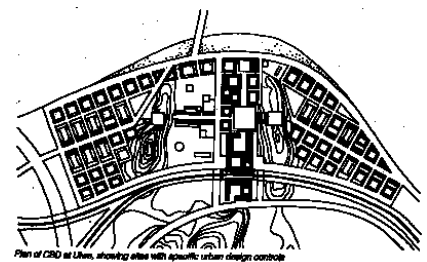'Incremental' housing at Belapur, New Bombay. Architect: Charles Correa.

disparate income groups would be able to build their own houses, each according to their individual means and desires, yet living side by side, much as they do in traditional housing clusters all over the world. For the detailed design, Correa took as his model the courtyard houses of the villages of South India, with their multifunctional, 'open-to-sky' spaces. Protected boundary conditions between each plot ensure privacy and allow each dwelling to grow independently of its neighbors. A hierarchy of shared open spaces from small to larger clusters helps to create a sense of place and to locate each dwelling within the larger settlement. The same hierachy of spaces provides opportunities for social intercourse at different levels of the community, connecting all the way up through the transport interchanges and larger urban nodes to the main city centres.

In 1991, the State Government Corporation in charge of developing New Bombay asked Correa to produce a detailed land-use plan and urban design guidelines for the new city centre at Ulwe, together with 1000 demonstration housing units for a wide range of anticipated income groups. Embracing the full breadth of environmental issues, from management of the rainfall catchment areas to detailed studies of the Central Business District, the project logically completes Correa's model of sustainable urban development. As with his incremental housing strategy, the medium sized city blocks forming the CBD are broken down into various sized plots and elements, offering both large and small investors equal opportunities to develop their own sections independently of their neighbours. Comprehensive but flexible design guidelines based on regional urban patterns ensure overall unity of the development, including covered arcades along the main street fronts. Moderate height limits and wide gaps in between block segments also encourage air movement across the interior courts; an important consideration in Bombay's subtropical climate. By the mid-Nineties New Bombay had grown into a thriving city of over a million population, less than the target figure of 2 million (the government has not yet moved to the new city as Correa had hoped it would) but already attracting growth away from the old city.

18.6a.
New Bombay. Plan of city centre at Ulwe. From Correa, 1996.

18.6b.
City centre at Ulwe. Block typologies allow for both small and large investors. From Correa, 1996.

KEN YEANG AND THE BIOCLIMATIC CITY

Vernacular models

Best known as the innovative designer of the 'tropical skyscraper' as a distinctive building form, Ken Yeang's urban theories spring from the same 'bioclimatic' principles as those which shape his architecture.[10] Settlement patterns, like individual buildings, he contends, should be accommodated to the natural landscape and biosphere and respond to the local climate and its cycles. Inspired by the tropical vernacular architecture of his native Malaysia, Yeang has generally avoided any direct imitation of local forms, abstracting the relevant lessons for climate control and adapting traditional techniques for modern needs and building types. To these original sources he has added progressively elaborate analytical methods of building performance and energy efficiency to deal with increasingly complex and varied building programmes.[11]
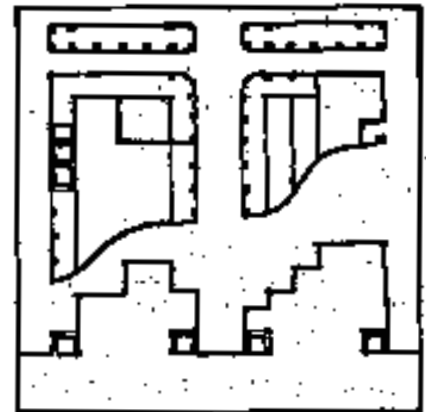
18.7.
Bioclimatic skyscraper. New HQ for Malaysia's UMNO political party is situated amongst terraced shophouses in Georgetown, Penang Island. Architect: Hamzah and Yeang.

Like Correa, Yeang's early thinking on urban design was strongly influenced by the compact urban patterns and covered ways of the shophouses of Kuala Lumpur and other Asian cities and towns. For similar reasons he also generally favours high urban densities, since they make for more efficient transport systems and infrastructures and therefore less energy use. Unlike Correa, however, Yeang has few reservations about the tower type, recognizing the commercial as well as other pressures in favour of the tall buildings his practice focuses on. Nevertheless, while accepting the type in principle, he is strongly critical of conventional design approaches to tall structures in Malaysia which ignore locality, and in the wasteful land-use patterns they generally create. Usually set well back from the streetfront in large plots formerly occupied by colonial villas, they contribute nothing to the streetside, which is further broken up by numerous access roads and separate parking lots. What is needed, he argues, is a way of integrating modern tall buildings into a denser and more diverse urban pattern, which would restore the streetwalks to the pedestrian. In his writings on the 'tropical verandah city', he abstracts the traditional idea of the covered shophouse arcade or 'verandahway', ingeniously converting it into an 'urban organizing principle', linking buildings together through a system of arcaded pedestrian pathways. Noting, like Correa, that former colonial building types employed the same principle of covered walkways at street level, he suggests the new verandahways would provide both shelter from the tropical sun and rainstorms and a unifying urban element at street level to tie together all the buildings of different shapes and sizes immediately behind. The same covered ways could be used to access public parking structures, which could be discreetly tucked away above and below ground within the general building mass. Thus infrastructure, climate control and urban aesthetics could be resolved with the same device, providing all the attractions of a busy streetlife that the original shophouse arcades provided and enhancing the tropical character of the city.

18.8.
The verandahway as 'urban organizing principle'. Plan and sectional diagram. From Yeang, 1986.

As well as drawing inspiration from vernacular building, Yeang also refers to the metaphor of the 'tropical urban garden' in suggesting how nature can be introduced into the heart of Southeast Asian cities in a way which both further strengthens their tropical identity and helps modify the microclimate. The Western approach to urban landscaping in dense cities, he notes, focuses attention on the use of reserved open spaces such as squares and parks. While Yeang encourages the development of suitably planted open spaces and any natural features, he proposes that Asian designers should go further and take full advantage of the fast-growing and luxuriant tropical vegetation, making use of every terrace and roof space to create a continuous urban greenery. This would help shade buildings, soak up greenhouse gases, and generally raise human spirits, complementing the role of more conventional parks and squares.

Living organism

The development of Yeang's ideas on urban design has gone hand-in-hand with the evolution of his built and unbuilt high rise projects. For the last decade, beginning with the landmark Menara Mesiniaga Building,[12]

his tower designs for the tropics – now including Vietnam and other countries in the region – have become a virtual microcosm of the 'bioclimatic city': experimental platforms and metaphors for ideas with wider urban implications. Thus the ever larger, well planted 'skycourts' all his towers feature now take on the function and character of public or semi-public open spaces – urban meeting places in the sky equivalent to earth-bound squares – breaking up the building mass and providing accessible recreational spaces for the occupants. Describing his tower project for Hanoi, Yeang even likens the external scenic lifts taking passengers up and down between heavily planted terraces to travellers along one of that city's French-style boulevards. On a more practical level, Yeang has extended the use of similar techniques of climate and wind control which he has used to cool and ventilate his individual towers, to do the same for the spaces between buildings at street level, so that several structures act dynamically in consort to modify the urban micro-climate. Using cybernetic terminology, he envisions the future bioclimatic city as a living organism, a 'wind channelling and cooling apparatus' serving the needs of its occupants the way the human body behaves:

The bioclimatic city reacts like the human body to changes in its environment. As the body maintains its organic stability, for example by cooling via its extremities and by its homeostatic systems, so can the tropical city employ cooling layers and use the principles of homeostasis to maintain levels of comfort.[13]

Architects' duties are similarly defined and enlarged, encompassing not just the internal comfort conditions of their own buildings, but also the environmental effects they have on surrounding structures and spaces:

In the bioclimatic city, the role of the architect is to identify and design new structures, devices and spaces to protect and enhance climatically the local urban environment, meeting criteria to improve existing layers

18.9.
Bioclimatic City. Project for redevelopment of Jahor Baru, 'JB 2005'. Architect: Hamzah and Yeang. From Hamzah and Yeang, 1994.
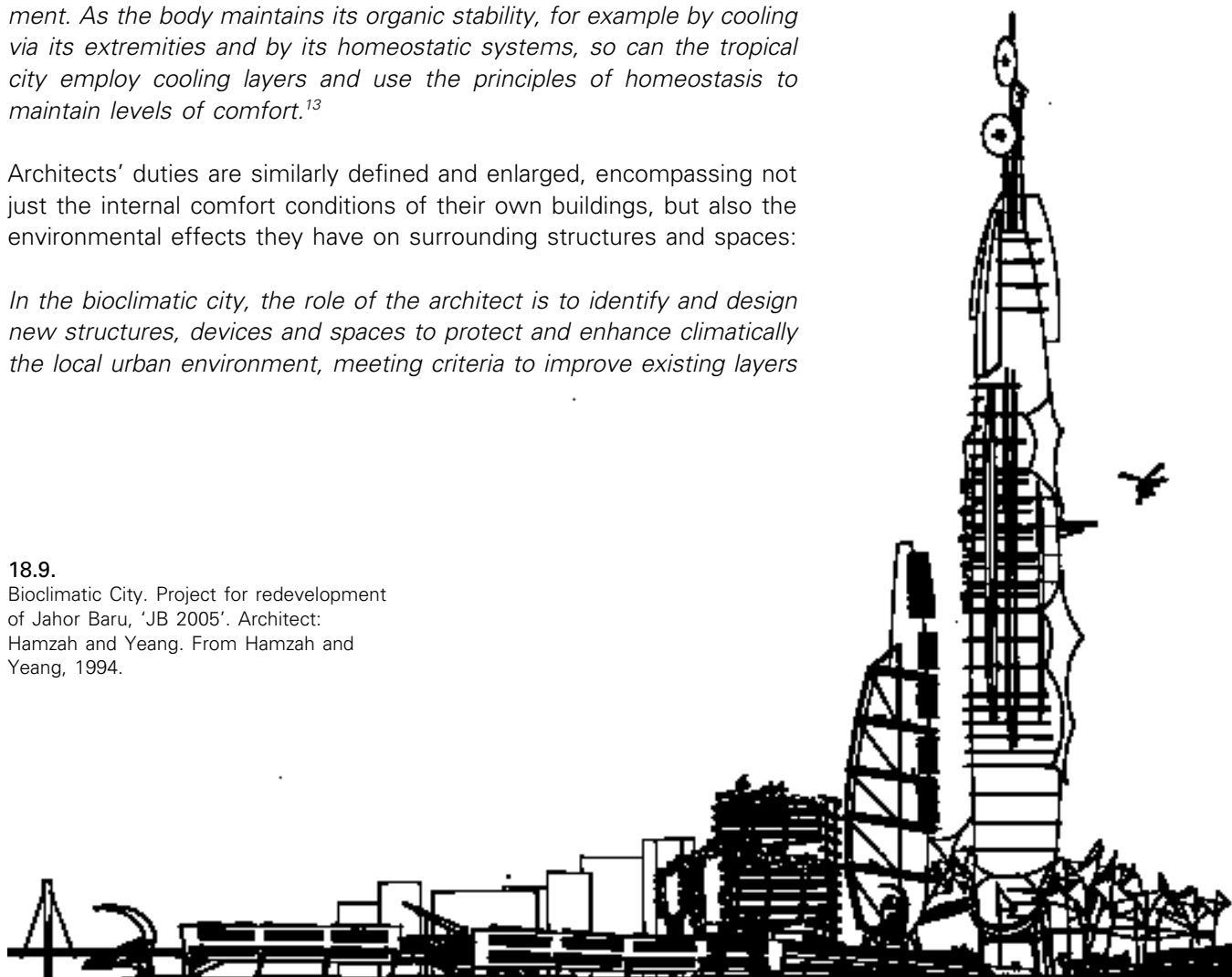
of bioclimatic control. Thus additional layers are assigned a co-ordinated form according to the city's needs as it grows and changes, allowing a three-dimensional superimposition and layering to take place over exist-ing layers, cooling and shading the living organism of the city.[14]

In his most recent urban design projects, Yeang's buildings present a Gaudiesque collection of large and smaller tower forms, freely hung with shading tensile canopies or bound with spiralling terraces and walkways, broken here and there by completely open levels revealing the skeletal structure within. The more Yeang explores the relations between build-ings and climate, the more they seem to take on the exotic character of the tropical nature they respond to.

TAY KHENG SOON AND THE TROPICAL MEGACITY

Outspoken critic

A native Singaporean and articulate critic of his country's orthodox planning methods and approaches to urban design, Tay Kheng Soon[15] sees little gain in the developing world's continued reliance on Western concepts and consultants:

Today we have new industrial estates, public housing estates, and free-trade-zones, but they are modified from their northern models. There were adaptations in the developing countries but no basic review. Thus today we have megacities in the tropics but have yet to realize the potentials of tropical living in cities because there has not been any basic review of the inherited town-planning doctrines and concepts...nothing intrinsic has come out of city planning in the tropics thus far.[16]

Tay's outspokeness earned him early notoriety with the conservative Singapore authorities. Discouraged as a young architect from exploring alternatives to the state's high-rise housing strategies, Tay moved to Kuala Lumpur in 1974 where he found the official response more sympa-thetic to his ideas. There he designed and built two experimental low rise high density housing projects for low income groups, demonstrat-ing, as Correa was doing elsewhere, that compact housing could be provided at considerably less cost than comparable high rise solutions. In what was to become a typical pattern, Tay's designs necessitated major changes to the colonial era building regulations, which were then still based on conventional British practice.

Alternative strategies

More than a decade later, having returned to Singapore to establish his present office, Akitek Tengarra, Tay found himself attacking official policy from a different viewpoint. By the mid-Eighties the population of the small island state had grown to 2.6 million and was forcast to grow to 3.2 million by 2015. Anticipating a possible still larger increase of 1 million over the same period, Tay argued that if the government persisted in its established policy of distributing population expansions

around the island in yet more new towns, the result would be irreparable harm to what was left of the natural environment. Reversing his earlier stance on housing densities, he argued in favour of a radical policy of raising densities in existing urban centres, especially in Singapore city itself, concentrating the increase on available undeveloped land and at the same time reducing the need for additional infrastructure.

Whilst he was sharpening his thoughts on urban strategy, Tay built a number of building projects with a distinctly urban character, using his architecture, like Yeang, to explore broader ideas on the built environment. He had also become concerned over the same period at the official calls, particularly in neighbouring Malaysia, for a national architectural identity, seeing them as a politically motivated and potentially divisive stamp of a singular ethnic identity upon what was essentially a multicultural region. Like Yeang, he argued instead for a modern architecture rooted in the tropical environment itself, which all Southeast Asians shared. In his larger projects of the time, like the Institute of Technical Education at Bishan[17] and the Serangoon Gardens Country Club, Tay exploited the balmy climate, turning the spaces in between the separate elements into open gardens or naturally ventilated, covered meeting places. Other climate-control devices were developed over the same years in what Tay has described as his personal search for a 'tropical design language', eventually leading him back along the same path towards his urban projects and concerns.

Urban workshop

In 1988 Tay ran an urban workshop on The Intelligent Tropical City with Robert Powell, an architecture teacher at the National University of Singapore. Two years earlier Tay had participated in the international competition at Kawasaki in Japan for an Advanced Information City, a theme and project which he saw as highly relevant to Singapore, which was then already heavily investing in information technology. The student workshop was an attempt at bringing together Tay's responses

18.10.
Project for The Intelligent Tropical City. Concept sketch. From Tay, 1989.
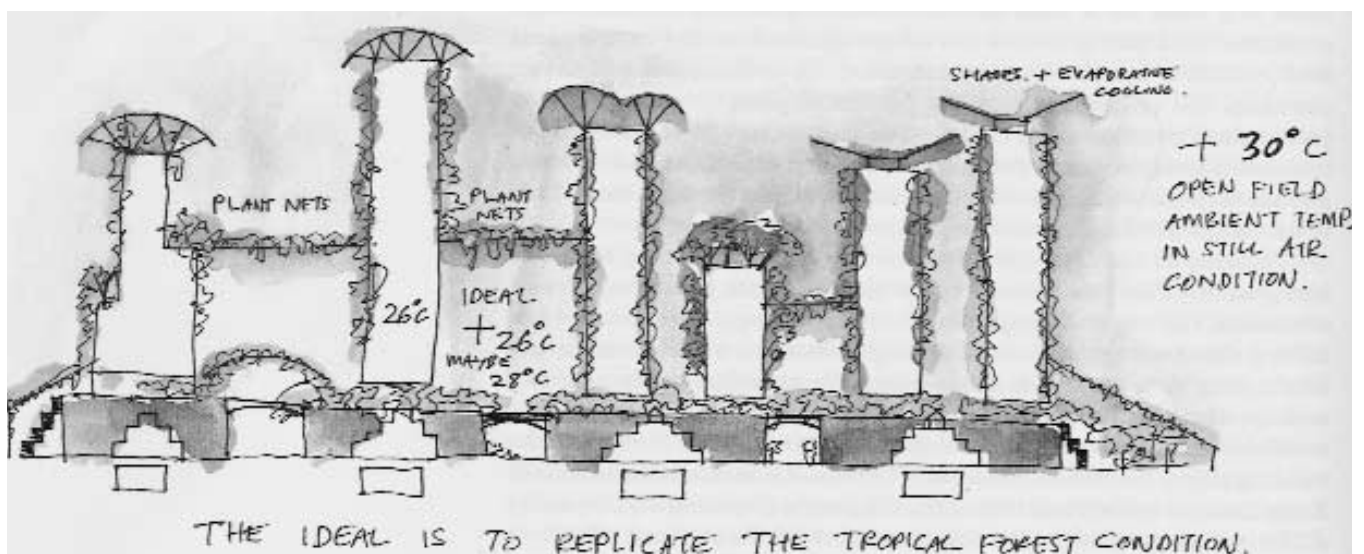
to these developments, together with his ideas on Singapore's expansion and the specific problems of urban design in the tropics.

The workshop team proposed developing the reclaimed land adjacent to Singapore's Marina Bay into a high density, mixed use city sector, housing half the expected population increase of 1 million. At a gross plot ratio of 12.5:1, the density of building and the pattern of vertical stratification into different functions strongly resembles that of Hong Kong, a relatively chaotic model previously eschewed by Singapore's planners.[18] Much like that megacity, Tay envisages the project as a kind of 'giant shophouse', with the inhabitants all living in residential towers directly over the lower commercial and civic activities. Constrained by Singapore's strict zoning laws – boundaries Tay was reluctant to cross – the functional mix excluded the kinds of IT industries Tay would have liked to have. He proposed instead that specific IT-oriented departments of the university be re-sited to the new district, along the lines of the IT campus city proposed at Kawasaki. Aside from the sheer density, the most striking aspect of the project is the handling of the different levels and their interconnections. 'Plant nets' between the towers would shade the lower levels and streets below, while the roofs of the bottom structures would be connected together by bridges, creating another level of open public spaces to serve the communities living above. Solar and rainwater collectors suspended from the tower tops would provide more shade as well as energy and evaporative cooling systems would be used to further lower the temperatures inside and outside the buildings below. The entire complex, claims Tay, could be likened to the upper canopies and layered micro-climatic structure of a tropical forest.

Test of reality

A year later, in a significant move to open up the planning process to the private sector, the Urban Redevelopment Authority (URA) invited Tay to draw up a scheme for the development of 72 hectares in the Kampong Bugis district, situated at the confluence of two rivers close to the city centre. Tay treated the exercise as an opportunity to put the ideas coming out of the workshop to the test of reality, considerably modifying them in the process. Aside from the more detailed and varied building studies, now liberally hung with vertical landscaping, the major evolution in the new project is in the reduction in building density to an overall plot ratio of 4.5:1, still higher than the 2.8:1 net density required

18.11.
Project for redevelopment of Kampong Bugis district, Singapore. Section. Architect: Akitek Tengarra.
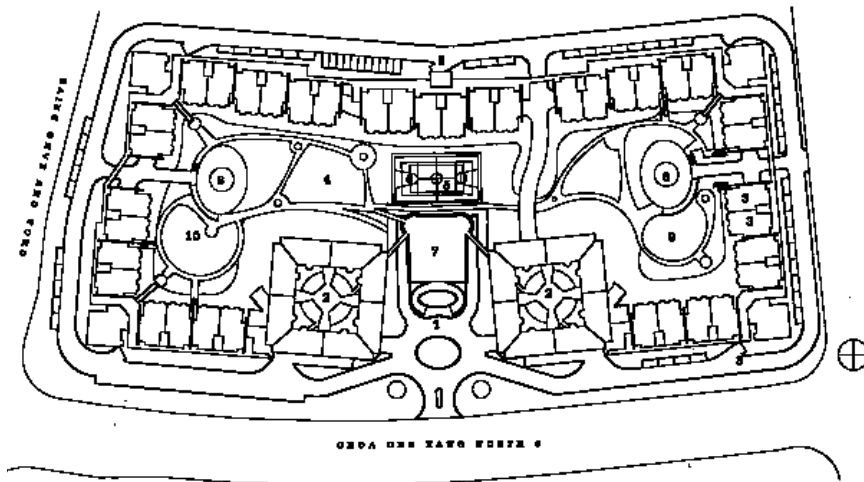
Housing complex for HDB at Choa Chu Kang, Singapore. Plan. Architect: Akitek Tengarra.

1   Entrance court
2   18-storey blocks
3   Perimeter housing
4   Landscaped open space
5   Basketball court
6   Community pavilion
7   Viewing deck
8   Perimeter access road
9   Children's play area
10 Fitness area

of Singapore's new towns, but relatively modest compared to the earlier proposals. The resulting impression is of a still crowded, but vibrant and livable tropical metropole befitting Singapore's status and location in the region. Nevertheless, for all its attractions and Tay's efforts to render his ideas into practical proposals, the planning authorities finally deemed the scheme too radical, deciding in favour of a conventional, low rise high density scheme by Singapore's own state professionals.

More recently, Tay gained a small but potentially important victory for his ideas with his competition-winning housing complex for the Singapore Housing and Development Board (HDB) at Choa Chu Kang, completed in 1997. Despite presenting the highest tender, Tay's scheme was praised for its innovative manipulation of block depth and morphology, allowing an increase in the plot ratio from the required minimum of 2.8:1 to 3:1. Similar modest but effective design approaches, argues Tay, could be used to raise the figure still more to 3.5:1, which if generally adopted as the rule would significantly increase housing densities in Singapore without detriment to environmental quality. Current projects abroad, including masterplans in China and low income housing in the Philippines, offer further challenging tests for Tay's ideas in new and more varied contexts.

LIU THAI KER AND THE CONSTELLATION CITY

Singapore experience

The most experienced planner in the group, Liu Thai Ker has played a key role in shaping the physical development and urban character of Singapore. As head of the HDB from 1969–89, Liu oversaw the building of over half a million dwelling units in one of East Asia's largest and longest-running state housing programmes. The following three years he led the URA, where he spearheaded major revisions to the Singapore Concept Plan, the state's blueprint for the future. Since then he has continued to exert an influence over regional development from private practice with Raglan Squire and Partners (RSP), one of Singapore's oldest firms, and is consultant planner to Beijing and many other cities throughout China and Asia.[19]

Responding to criticism of Singapore's earlier uniform high rise housing and derivative planning policies, Liu points to the increasing variety of architecture and urban design in Singapore's new towns, in which private firms like Tay's now play an increasing role.[20] These and other changes have helped the new towns evolve from glorified housing estates modelled on European lines to relatively self-contained and diversified small cities of up to 300,000 population. Partly influenced by his Singapore experience and partly by his new responsibilities in China and elsewhere, a wider evolution is also apparent in Liu's thinking on urban structure, now increasingly focused on the special problems of Asia's megacities. For Liu, as for Correa, the way ahead for Asian planners lies in a radical restructuring of large cities, breaking up existing conglomerations centred on historic cores and decentralizing future growth points and CBDs to create what he calls the 'constellation city'. While recognizing the economic and cultural benefits of very large urban concentrations and the range of choices they afford, Liu argues that, above a certain size – he tentatively suggests around 3 million – difficulties of access and other problems outweigh the advantages to the point where an acceptable quality of life, and even basic urban functions, are no longer sustainable. The limiting figure is only an approximation, and even well-planned and smaller Singapore, he contends, has its problems:

Despite the gallant efforts by the government to provide excellent public transportation and road networks as well as to discourage private car ownership; despite efforts to decentralize CBD functions into the outlying areas, road traffic congestion in the central area continues to intensify.[21]

As Liu admits, despite raising the population of Singapore's new towns and offering numerous incentives to decentralize, increasing numbers of

commercial and other workers apparently still prefer to wade through all the obstacles to do business in the original city, if not to live there. The implication is that, while there may be a maximum size to any conurbation limiting the quality of life, there is a no less important lower limit of size below which it becomes difficult if not impossible to attract commercial and other functions vital to the economic well-being of a city.

Clusters of cities

It might be thought that such observations support Tay's proposed strategy of reversing the process of decentralization and increasing densities within the city boundaries. However, Liu draws a different conclusion: 'In hindsight, the decentralization efforts could have been bolder'.[22] If anything, he implies, Singapore's planners should have gone for fewer and larger new urban centres, offering sufficient and diverse attractions to compete more successfully with the main city.

   With a current total population of 3 million and a maximum desirable population set out in the Concept Plan of 4 million at year 'X' (meaning whatever year that figure is achieved in, whether 40 or 80 years hence), Liu comments that Singapore 'can hardly call itself a megacity'.[23] Nevertheless, he believes the city state, with its multiple urban nodes all connected up by its efficient Mass Rapid Transit system, offers valuable lessons for larger conurbations. While the nodes themselves might be presently undersized, the basic idea of linked centres was, and is, he suggests, the right solution. Looking to the future, the new Concept Plan drawn up by Liu projects a more concentrated system of larger regional urban centres of half a million to 800,000 population each, virtually turning Singapore into a model constellation city, albeit a smaller-scale one than Liu envisages elsewhere.[24] Based on these lessons, he posits a more general lower

18.14.
Concept Plan, Singapore. Diagrammatic plan showing 'constellation' of regional centres distributed along MRT system. From Urban Redevelopment Authority, 1991.

population limit for a self-sufficient urban centre at 1.5 million, within a linked system of like centres:

The ideal situation is to enjoy the benefits of megacities without the associated problems...One possibility to realize this is to organize a major metropolis into a constellation city. Such a city is comprised of a cluster of self-sufficient cities of 1.5 to 3 million people, spaced (at least) 30–50 kilometres but not more than 100 kilometres apart from one another. Each city functions independently on a day to day basis, and yet related to one another in terms of special cultural, scientific and commercial synergy. All the cities can have more or less equal status, or one of them can be dominant, depending on the historical background...[25]

Liu points to the cluster of small and medium sized cities in the western part of Germany which includes Bonn, Cologne, Düsseldorf and Frankfurt, as a relevant example of urban structuring. While each has its own separate identity, a dense and efficient network of autobahns and commuter trains enables them to function essentially as one urban unit. Why not, Liu asks, take advantage of today's rapid rail and other transportation systems and create similar clusters of cities? Asian megacities, he adds, already contain many competing commercial nodes, though distributed in such a way that they often undermine each other. However, if the commercial centres were to be located in a more rational fashion and properly sized accordingly, then they could work together instead as a system, each complementing the other in a network of related functions. If each city was also separated from the others by green belts and the distances between them were kept within the recommended limits, then access could be further enhanced to every centre and to nature at the same time. Such an urban structure, Liu suggests, would offer all the economic and cultural advantages that very large conurbations normally have, but in a more harmonious and sustainable way.

TOWARD THE DEVELOPMENT CITY

Dominant force for change

What is striking about all these diverse ideas and projects is the extent to which the four thinkers confidently embrace a scale and complexity of human development which would have daunted earlier generations of architects and planners, from West or East. Another Asian intellectual, the Thai architect Sumet Jumsai, even goes so far as to suggest that the megacity, problems and all, is a defining product or aspect of contemporary Asian culture, and the ingenuity with which commuters and dwellers alike cope with their situation is as much a positive indication of indigenous creativity as anything which calls for drastic solution.[26] Jumsai's view may be a benign one, but megacities – what they are and what they foretell of the urban future – are unquestionably the dominant force for change in Asia, and the ideas and approaches of all four architect-planners are shaped by this overwhelming fact, no less
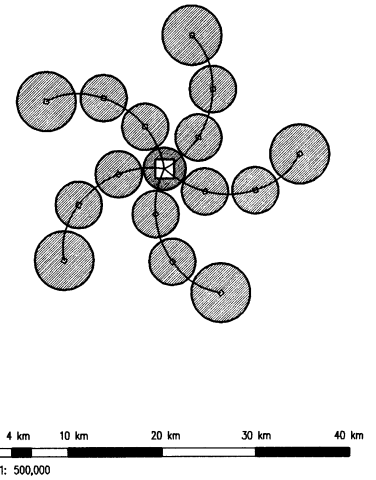
18.15a.
Constellation City. Diagram showing city of 2.5–4 million people consisting of new towns of 150,000–400,000 people. Concept drawing by Liu Thai Ker.
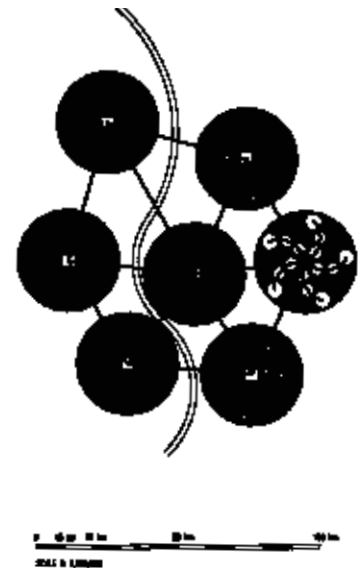
18.15b.
Constellation City. Diagram showing city of 12–20 million people consisting of smaller cities of 2.5–4 million people. Concept drawing by Liu Thai Ker.

than the thinking of Western architect-planners was shaped earlier by the unavoidable fact of mass ownership of the automobile, and the uncontrollable popular choices that entailed.

The convergence of any of these leading environmentalists around common solutions, if only at the most general levels of planning, is therefore of some importance. An endemic feature of the development of Asian cities, both large and small, is the way growth invariably – Singapore excepted – precedes infrastructure, which then has to be inserted at a later date at considerable extra cost. The emphasis Correa and Liu place upon the necessity for integrated heterarchies[27] of public transportation and urban form is the structural bedrock upon which all else they propose stands. Tightly linked by road, rail, bus, bridge and ferry, Old Bombay and New Bombay could well be described as a constellation city, albeit an imbalanced one, as many future constellations are likely to be. Tay has also proposed his own inter-regional constellation, similarly linked across both water and land, by which the city of Singapore would be networked together with those of neighbouring Johore state on the southern tip of Malaysia, and Riau province in Sumatra on the north western end of the Indonesian archipelago.[28] Current political and economic differences between all three states, aggravated by the recent financial crisis, make any imminent integration of this sort highly implausible. In the longer run, however, Tay's proposed strategy contains much good sense and portends the likely pattern of future regional co-operation and development.

Parallel urban cultures

Nevertheless, whilst there is broad agreement on strategy, there are considerable differences in urban form and detail. Given the confusions


18.16.
Dispersed high rise city. Kuala Lumpur CBD in background. View from top of 310 metre high Telekom Tower during construction (see Fig. 18.19). Photo: Chris Abel.

and competing influences of post-colonial development, this can only be expected. Yeang, for example, identifies several types of Asian cities, each with its own morphology: 'ancient cities' like Beijing and Tokyo which have been modernized; 'post-colonial cities' like Kuala Lumpur and Singapore whose morphology was shaped by their colonial past; 'non-colonized cities' like Bangkok; 'dormitory cities' like Petaling Jaya ('PJ') in Malaysia and Saitama in Japan; 'instant cities' or 'new towns' like Shenzhen in China; and 'transitional cities', which includes squatter settlements and other non-formal habitations. Finally, he lists the media-based 'virtual cities', comprised of telecommunications systems, which can exist anywhere in the world.[29]

Useful as they are, such typologies obscure an even more complex reality, which is that Asia's megacities generally include most of these urban types within the same area, each tied to the others in overlapping and ambiguous ways and each offering its own parallel urban culture, distinct from but not separate from all the rest. The wildly varying shape of the most recent developments and projects only confuses matters still further. Malaysia's new federal capital, Putrajaya, is consciously planned as a modern garden city, while its new parliament centre – astonishingly for such a symbolic venture – mimics the historic colonial buildings in Kuala Lumpur. Part of Malaysia's ambitious plan for a Multimedia Supercorridor or 'cybercity' stretching between the capital and the new international airport 50 kilometres away, Putrajaya's function and location also qualify it as a key hub in the future virtual city, which is designed to qualify the country as a major player in the global IT industry.[30] The relatively spontaneous clusters of commercial and apartment buildings around the outer fringes of most Asian cities are even more difficult to categorize. Neither low rise low density garden city, nor high rise high density CBD – both Western concepts in origin – these unevenly distributed settlements are more accurately described as components of a 'dispersed high rise city',[31] an altogether different urban form, reflecting both market forces and the chaotic energy of Asia's urbanization process. In the futuristic category, there is 'KL Linear City', otherwise known as 'Giga World', also in Kuala Lumpur, an Archigram-inspired megastructure project bestriding the capital's main river.[32] Postponed for now and probably doomed by the recent financial crisis, the imaginative scheme adds yet another, if questionable, prototypical city form to Asian planners' and architects' growing repertoire. Last but not least, there are Sir Norman Foster's 840 metre high Millennium Tower project for Tokyo, and its smaller variant, the 'M' Tower, also shelved for now.[33] The more Asia's megacities grow, the more likely it seems that vertical townships like these will move off the computer screen into reality.

Given the profusion of urban histories and of both old and new models, the attention given by all four architect-planners to climate and ecology as a primary shaper of urban form offers the prospect of both a unifying and relatively neutral theme which conveniently bridges potentially fractious issues of ethnic and cultural identity. There is also general agreement on the need for firm but flexible urban design guidelines of one kind or another, ensuring, in the case of Yeang's schema, the control of the urban microclimate in addition to enhancement of the streetsides. Whilst these are positive results in themselves, no definitive model of
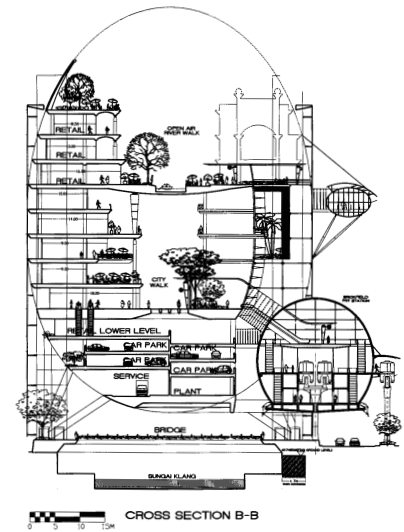
18.17.
KL Linear City, Kuala Lumpur. Section of main structure spanning Klang River. From Original Scope Sdn. Bhd., 1996.
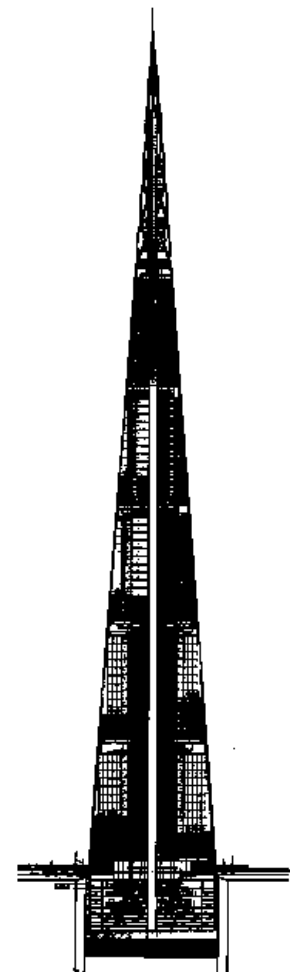
18.18.
Millennium Tower project, Tokyo. Section. Architect: Foster and Partners.

the tropical city as such has yet been presented, raising the question whether 'one model fits all' is feasible or even desirable, even for specific climatic regions. What is offered instead at this stage are important fragments, such as the reinterpretation of the verandahway as a key element of urban design, of an incomplete vision. There are also serious contradictions amongst the proposals, some easily resolved, some less so. It is doubtful, for example, that any useful purpose is served by complicating an already uncertain concept with the description '*intelligent* tropical city' – meaning that IT has somehow shaped the concept if not the form – when the same description is used for such totally different urban designs as an ultra high density scheme for Singapore and Malaysia's low density cybercity.

Responses to climate

Similar questions are raised regarding the actual, as opposed to the assumed, effectiveness of proposed responses to climatic factors. For example, in his writings Tay cites research into the heat island or 'canyon effect' of Malaysian city centres, compared with lower temperatures in an open landscape and still cooler temperatures within the tropical forest. Given the still higher urban densities Tay favours it is doubtful whether evaporative cooling or any other proposed measures would be sufficient to counter such a large effect, which even at present densities produces differences between forest and city centre of as much as 8 to 10°C. Vertical landscaping, whilst attractive in theory, also carries severe maintenance and cost penalities[34] which also rule it out as a general solution, except possibly for the most wealthy clients and cities. In short, the ultra high density, high rise city and the *tropical* city, meaning one that is genuinely shaped by the climate, may be fundamentally incompatible concepts.

The clear influence of Lionel March's seminal studies on urban morphology[35] on most of these architect-planners' thinking – Liu Thai Ker being the sole exception – may be partly to blame here. March demonstrated that the same volume of structure may be provided by building around a site's perimeter in a low rise high density pattern as is normally provided by a single tower standing in the middle of the same site. However, in promoting the former historic European pattern, March gave no consideration at all to the impact of different climatic conditions upon the two building forms. While the enclosed, courtyard pattern is most effective in hot-arid climates, and to a lesser extent in temperate and subtropical regions, exactly the reverse is true of building in the hot-humid tropics, where the free-standing building, whether *kampong* house, villa or tower, is the better solution for continuous natural ventilation (the shophouse pattern admired by Correa and Yeang was imported by Chinese settlers into the tropics and is rarely more than two stories high, punctuated by ventilating yards[36]). For the same reasons, the higher the perimeter structure, which restricts air movement across the site, the more the climatic advantage goes to the free-standing tower.

Seen in this light, the sporadic clusters of towers which exemplify the dispersed high rise city may make better sense in the tropics, if only

from a purely climatic viewpoint, minimizing the heat island effect and maximizing the benefits of cooling air movements. Singapore's much criticized Modernist new towns, with their widely spaced high rise blocks interspersed by mature and easily maintained landscaping – what Liu also describes as 'the tropical garden city', or more poetically, 'the garden in the city and the city in the garden'[37] – may also be re-evaluated for similar reasons, as a sound if repetitive solution to a sustainable micro-climate in tropical cities. As much as Correa generally prefers the low rise high density solution in India for economic and social reasons, he allows that the tower type meets a given need for upper income housing and commerce and includes appropriate clusters in the city centre and subcentres in his New Bombay plan. He also made an early and significant contribution himself to bioclimatic high rise design with his 1983 Kanchanjunga Apartments in the old city, which remain an exemplar of the type. In addition to Yeang's work, other leading Southeast Asian architects such as Hijjas Kasturi and Jimmy Lim are also now pushing the frontiers of high rise design in their own region, creating completely new tower forms bedecked with large and open hanging gardens, which could only function properly in the tropics.

Fortunately, the debate over the relative climatic suitability and energy efficiency of one settlement pattern or building form over another looks set to be radically transformed, and much for the better, with the increasing use of the new battery of computer simulation techniques. Already in regular service by Yeang's practice, the availability of such relatively low cost procedures, which have even been used by architecture students elsewhere,[38] now obliges every practitioner or theorist to put his or her designs to a simulated test of performance before trying them out in the real world, when it is too late or too expensive to change anything. The same advances may also eventually produce more concrete and potentially fruitful interrelations between information technology and the future shape of the tropical city.

Economic and social focus

The four architect-planners differ most, however, in how each deals with the complex economic and social issues associated with Asia's megacities, and the special needs of different sectors of the population. Partly due perhaps to the different professional backgrounds of the four, a clear division exists between the broader concerns and works of the two most experienced planners, Correa and Liu, and the more architectural and design centred concerns and works of Yeang and Tay. While Yeang's earlier schemes for a verandah city suggest more accommodating urban patterns, his most recent and technologically advanced projects for the bioclimatic city, exciting as they are, convey a more exclusive image. It is difficult to see, for example, how lower income groups fit into either these projects or Tay's equally ambitious schemes, other than as commuters from more affordable residential areas. This may be acceptable for prosperous Singapore and Japan, but hardly presents a general model for the rest of Asia. By contrast, Correa's and Liu's proven record of urban planning indicates a more pragmatic approach to the provision of employment centres and affordable

18.19.
Telekom Tower, Kuala Lumpur. Model.
Architect: Hijjas Kasturi Associates.

18.20.
Computer simulation of wind-flow around UMNO tower. Architect: Hamzah and Yeang.

housing, without which no urban scheme is viable, 'green' or not. Both Correa and Liu also see planning and urban design primarily as engines of economic and social development, which the physical and spatial form of the city must ultimately serve. Both are also in broad agreement on macro-planning policies and decentralization strategies, using different terminologies – 'polycentred city' and 'constellation city' – for similar, if not identical solutions.

Significant differences, however, exist in Correa's and Liu's approaches elsewhere, most especially in their respective attitudes towards the mixing of activities and social groups and the alternative settlement patterns and building types each approach calls for. Whereas Singapore's strict, Western-style zoning and new town policies are generally designed to segregate workplaces from residential areas,[39] New Bombay's plan and settlement patterns are purposefully designed to mesh both together, wherever the scale and type of economic activity permits. Correa's complex land-use policies and incremental building schemes, for example, not only encourage social integration, but are also intended to generate employment in the informal or 'bazaar economy', which he sees as an essential component of the larger Asian urban economy, along with the more advanced commercial centres. For Correa, not only the transportation system and distribution of housing, commerce and industry, but also the pattern, fabric and maintenance of the city itself are treated as an integral part of the urban economy. The variety of building types, construction techniques and materials, are accordingly designed to maximize participation at the smallest scale of operation, down to the individual craftsman, entrepeneur or self-builder, and not just favour the largest construction firms, as is usually the case with official projects.

To appreciate the full scope and meaning of Correa's achievement it is useful to recall just how narrowly the scope for urban planning and design has previously been defined, most especially where borrowed Western models are involved. Commenting on Le Corbusier's plan for Chandigarh, the new capital of the Punjab whose 50th birthday was recently celebrated by architectural pilgrims from around the world, the British planner Peter Hall offers the following devasting observations:

The relationship between streets and buildings is totally European, and is laid down without regard for the fierce north-Indian climate or for Indian ways of life. There is a total failure to produce built forms that could aid social organization or social integration; the sections fail to function as neighborhoods. The city is heavily segregated by income and civil service rank, recalling La Ville contemporaine*; there are different densities for different social groups, resulting in a planned class segregation.*[40]

Given the now familiar preoccupation of Le Corbusier and other early Modernist architect-planners with formal and geometric concepts, the apparent 'blindness' of the Chandigarh plan to local social and cultural complexities, let alone the rigours of the Indian climate, no longer surprises. However, while ecological or bioclimatic models may address the latter blind spot, there is a danger, which both Yeang's and Tay's

schemes illustrate to some extent, that the bioclimatic or tropical city, like the 'city of monuments' Hall describes Chandigarh as, is a one-dimensional or one-theme model, no less blind than previous one-dimensional models to all the other economic, social and cultural factors which go to make up a living city.

This is not to underestimate the importance of ecological and climatic considerations, which grow more urgent by the day, or of Yeang's and Tay's architectural innovations. But if the ecological model is to be applied at the urban scale, then either it needs to be integrated with other more comprehensive models of development, or else it needs to be broadened itself to assimilate the same considerations.[41] It is in this respect that Correa's multi-dimensional approach is most effective. Correa's settlement patterns and selection of local building types are consciously devised with their economic and social impact in mind, no less than their suitability to Bombay's subtropical climate. Most important, in making purposeful and generous provision for the bazaar economy alongside other sectors – which now include Bombay's famous legions of software writers – Correa also implicity takes on board the structural parallelism or so-called 'dual economy' which distinguishes Asian cities from Western cities, with all of the cultural complexities and regional eccentricities which go with it.[42]

Unplanned and planned development

Correa's stress on the economic and social aspects of urban planning and design does not exclude the formal or symbolic aspects which have preoccupied, and still preoccupy, most other designers, but rather puts them into proper perspective. As an architect, Correa has produced superlative monumental buildings of great spatial intricacy and depth of meaning, as well as more humble structures; a depth of meaning, moreover, that arises directly out of his native Indian culture.[43] He has also demonstrated, at New Bagalkot township and elsewhere, that he can produce urban plans with multiple levels of symbolic interpretation, taking in both his social concerns as well as more abstract meanings. This and the clear focus on economic and social development – and equal opportunity moreover – sets his schema apart from either the spatial and formal models planners and urban designers are historically accustomed to, or any of the other new models they are in the process of learning to use.

Such considerations and priorities point towards a new model of city planning and design more directly suited to Asia's developing societies, which may appropriately be called the 'development city'. This model, which is based upon a positive strategy for equitable development, may be contrasted in summary with the main negative features of Asia's unplanned megacities, as follows:

The unplanned megacity
(i)   *...is typified by a lack of strategic and forward planning and mostly random patterns of growth.*
(ii) *...has large-scale, destructive and health-endangering effects on the natural environment and micro-climate.*
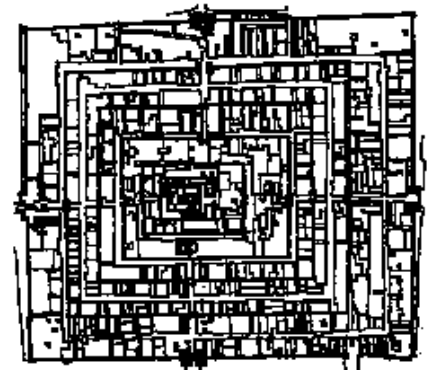
18.21a.
Plan of the ancient holy city of Srirangam, India. From Correa, 1996.
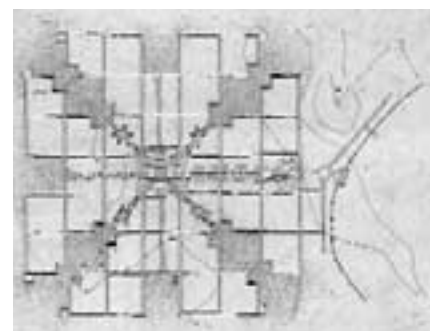
18.21b.
New Bagalkot, India. Plan of new township is oriented along four cardinal directions similar to metaphysical structure of Srirangam. From Correa, 1996.

(iii) ...is a wasteful user of human resources as well as land, energy, rainwater and other natural resources.

(iv) ...places most of its population out of reach with nature.

(v) ...is composed of several distinct and parallel urban forms and cultures, partly historical or traditional and partly modern, whose interconnections are arbitrary and limited.

(vi) ...has a hierarchical or radial structure and growth pattern, increasing pressures on the original centre and limiting direct communications between subcentres.

(vii) ...grows faster and far ahead of its infrastructure, which is always inadequate to its needs.

(viii) ...maximizes distances between residential and employment centres for the majority of the population, resulting in increased travel time and pressure on congested transportation systems.

(ix) ...forces its newest immigrants and lowest income groups to settle on the periphery, socially isolated and remote from the main employment centres.

(x) ...restricts social integration and segregates the general population by settlement patterns and housing types differentiated according to income and social class.

(xi) ...has an insufficient variety of building types with different price structures to meet population needs, restricting upward social and economic mobility.

(xii) ...restricts access to urban amenities due to lack of adequate and affordable public transportation.

(xiii) ...has several large and competing commercial centres which are unevenly located and poorly interconnected.

(xiv) ...concentrates building construction in the hands of the largest firms.

(xv) ...restricts small-scale commercial and other private initiatives by the lack of affordable space in the right places.

(xvi) ...has inadequate or poorly enforced urban design guidelines and building regulations.

(xvii)...is characterized by great extremes of wealth and poverty dictating access to employment, educational and cultural opportunities.

The planned 'development city'

(i) ...is typified by long-term planning and strategically controlled growth patterns.

(ii) ...has large but sustainable effects on the natural environment and micro-climate.

(iii) ...makes the most of human resources and is a large but efficient user of land, energy, rainwater and other natural resources.

(iv) ...distributes its population in such a manner that most are within easy reach of green belts.

(v) ...is composed of several distinct and parallel urban forms and cultures, partly historical or traditional and partly modern, whose interconnections are multiplied and diverse.

(vi) ...has a heterarchical structure and growth pattern comprising constellations of small and larger cities, with direct and efficient communications between city centres.

(vii) ...grows with its infrastructure, which is planned ahead of other activities.

(viii) ...minimizes distances between residential areas and employment centres, which are distributed evenly throughout the constellation, including local small-scale industries.

(ix) ...distributes its newest immigrants and lowest income groups evenly throughout the constellation through the use of positive land-use and housing policies.

(x) ...encourages social integration through the use of mixed settlement patterns and housing types, covering a wide range of income groups and social classes.

(xi) ...encourages upward social and economic mobility through incremental design strategies, from self-build housing to flexible apartment and commercial buildings.

(xii) ...facilitates access to urban amenities through evenly distributed and affordable systems of public transportation.

(xiii) ...has several large and evenly distributed commercial centres offering maximum consumer choice.

(xiv) ...encourages incremental building methods and low-cost construction techniques involving small firms and entrepeneurs.

(xv) ...facilitates small-scale commercial and other private initiatives through the use of mixed-use land policies and incremental block design.

(xvi) ...enforces sustainable urban design guidelines and building regulations to ensure efficient use of energy and natural resources and socially beneficial building patterns.

(xvii)...is characterized by equal employment, educational and cultural opportunities.

While the complete development city has yet to be built in its entirety, most of the above features have already been or are in the process of being implemented in one form or another, either in New Bombay or in Singapore if not elsewhere. Though the more extreme versions of laissez-faire development are rejected, neither does the model represent any kind of return to old style, rigid physical master-planning. The development city's heterarchical structure of well-connected and evenly distributed nodes and functions comprises an essentially flexible strategy for growth and change, encouraging individual and entrepeneurial initiatives and allowing for the unexpected but inevitable problems in the distribution of resources and functions. Similarly, the incremental design policies and guidelines which underpin much of the physical fabric of the city allow considerable room for participation and interpretation by both professionals and non-professionals. Most important of all, the strong focus on economic and social development suggests a radical and overdue break with the geometric and formal models which have diverted architect-planners in the past, offering lessons for megacities in other parts of the developing world as well as Asia. Having been on the receiving end of Western influence for so long, it would not be surprising if the innovative works and ideas of the four Asian urbanists discussed here were eventually seen to represent the beginnings

of a genuine non-Western school of urbanism, joining more familiar architectural initiatives.