Indigenous landscape urbanism: 
Sri Lanka’s reservoir & tank system

Kelly Shannon / Department of Architecture, Urbanism and Planning, KU Leuven 
Samitha Manawadu / Department of Architecture, University of Moratuwa

Abstract
In Sri Lanka, the relation of urbanization to landscape has a long-standing tradition. The earliest Singhalese settlements – in the so-called Dry Zone of the flat coastal lowlands surrounding the central highlands – were structured in conjunction with an ingenious tank (man-made reservoir) and irrigation system, linking habitation to cultivation and sacred spaces to topography. The productive (agricultural), reflective (religious) and engineering (flood/drought control) aspects of the tank system were interdependent and worked hand-in-hand with urbanization. Over the years, these systems have fallen into disrepair. The article will develop an argument that the term ‘landscape urbanism’ has actually been standard practice for several millennia in various parts of the world. In this regard, Sri Lanka and other South (and Southeast) Asian contexts can undoubtedly benefit from the landscape urbanism discourse while their traditional organization of agricultural agglomerations can imbue the discussion with a perspective which is less formal and aesthetic and more grounded in necessity and survival tactics.

Introduction
Ancient Water-based Civilizations – Indigenous Landscape Urbanism
Landscape urbanism is often heralded as the saviour of the built professions, as the new-ism with concerns that are congruent with the politically correct, ecological biases and priorities of the developed, Western world. Much of the contemporary discourse on landscape urbanism – and the projects aligned with this emerging field – focus upon the challenges posed by post-industrial urban voids. The recovery of brownfield sites and the reintroduction of natural processes and habitats are key issues linked to landscape urbanism. At the same time, it is arguable that such projects are more landscape architecture – as opposed to landscape urbanism. Often, the urbanism component is lacking.

This paper will develop an argument that landscape urbanism – understood as structuring landscapes to guide their occupation, use and urbanization – is not new, but has indeed been in practice for several millennia. It argues that there is an ancient, indigenous landscape urbanism whereby an integral system of urbanization is tied to the logics of landscapes. More specifically, it investigates territories structured by water resource management and the relationship of such landscapes to urbanization.

Water equals power. The capture, storage and distribution of water inextricably bind physical and social processes into a thorny relationship between nature and society. The inevitable politicization and commodification of a ‘common’ natural resource requires centralized institutions of power and reliance on technology to conquer natural forces. Throughout history, the complex cultural and power-related dimensions of water have reflected ways in which society is organized. There are a number of ancient civilizations in which water resource management significantly structured urbanity. Different cultures developed ingenious methods of dealing with water, often simultaneously addressing pragmatism, urbanism and symbolism. Innovative hydrological engineering logics, an understanding of topography and seasonal weather patterns had profound implications for the form, growth (and demise) and vitality of human settlements from the stone cisterns and channels of Machu Picchu to the ‘karez’ irrigation of China’s Turpan Basin and Rome’s aqueducts.

The historical geography of urban water control in South and South-east Asia reveals highly structured rural and urban systems that are physically and symbolically linked to both irrigation techniques and cultural/religious relationships with water bodies. The region boasts numerous
waterscapes - man-made landscapes - that operate on a territorial scale. Waterworks are huge infrastructure projects that supported innovative and thriving civilizations. Their history became etched into the technical, socio-cultural and ecological structures of the water system. The South / Southeast Asian monsoon belt became synonymous with the rice belt due to the inhabitants’ hydraulic ingenuity.

Numerous scholars and historians have commented that a civilization based on rice implies a system of sophisticated hydraulic control, which in turn requires strict civic, social and political discipline (Spate and Learmonth 1967; Hanks 1974; Bray 1986). Historically, paddy civilizations directed the region’s rural economy and the village represented the essential unit of identity and organization within which agricultural and other activities occurred; rice cultures of the region stressed the moral worth of an agrarian way of life. The structures and ritual of everyday life in predominately agrarian societies revolved around an elaborate cosmologically oriented mythology in which the dualistic elements of mountain and sea, winged beings and water beings, mountain dwellers and plains people provided the core themes. To this day, many of the region’s ceremonies, festivals and art forms are related to the worship of spirits of the land and water and ancestors that have something to do with rice. The agricultural settlements were isolated, inward-looking, compact, often protected by walls and gates, and self-sufficient (Shannon 2004:55).

Not surprisingly, productive landscapes of the region were often closely related to sacred landscapes. In Bali, for example, the ritual calendar and the agricultural calendar are tightly connected, and the irrigation network has a significant spatial, functional and symbolic relationship with a corresponding network of water temples (Lansing 1991). Irrigation systems and hydraulic control necessitated hierarchical government while, at the same time, the endless search for harmony between earth, heaven and man led to the creation of sacred sites and cities within the landscape. Sacred cities were premised upon the extensive agrarian civilizations of the region. They were the administrative, military and cultural centres of empires, exacting tribute from conquered territories. Trade was also carried out in these cities, although this was not the major source of wealth and power. Sacred cities tended to favour inland locations. The morphology of the sacred city, home of the god-king, was a representation of cosmological beliefs and adhered to practices of auspicious siting vis-à-vis geomancy. Societies of the sacred city were structured in the image of a hierarchical cosmic order, and the distribution of power and the social structure were reflected in the gradation of social prestige from the centre to the periphery; a number of such cities were influenced by the Chinese walled city form.

The classical cultures of ‘Greater India,’ in particular, developed a number of such cities. For example Anuradha Mathur and Dilip Da Cunha have revealed in their book Deccan Traverses: The Making of Bangalore’s Terrain that the landscape was an initiator of settlement. The lower Deccan Plateau, a triangle of the South Indian peninsula, was structured by a system of tanks that exploited the territory’s dendritic drainage pattern. The tanks were man-made lakes that served as water reservoirs during dry seasons. ‘The land of a thousand tanks’ – a land where the Great Trigonometric Survey of India was initiated – made a strong link between urbanization and water management. The interdependent system was begun by King Kempegowda I and included a number of traditional structures including the pettah (indigenous mud- and bamboo-walled city), agrahara (school for priests) and tota (gardens with strong social hierarchies) – all in relation to bunds, tanks and sluices. ‘Contrary to the engineer’s view there is no dominant watercourse in the land of a thousand tanks. Instead there are many possible series reaching back from the ‘thousandth tank’ on the tableland via tenacious connections that are more political than physical, dependent on managed sluices more than natural sources’ (Mathur and Da Cunha 2006:105). The land was marked with property lines, and criss-crossed in a complex enterprise that regulated a land of flows.

Figure 1 The ‘land of a thousand tanks,’ east of Bangalore. [courtesy of Mathur and Da Cunha 2006:105].

Figure 2 Anghor Wat and environs.
and overflows using tanks and bunds (fig. 1); contemporary development (beginning with the British East India Company) has led to the rapid disappearance of the water-based relation of urbanization of the territory.

In Southeast Asia, the land-based Khmer Empire built one of the region’s most renowned sacred landscapes in the midst of productive paddy in the fertile alluvial plain. The legendary Hindu city of Angkor (AD 802-1432), covering nearly 20,000 hectares in north-western Cambodia, serves as an exemplary site, renowned not only for its unrivalled architectural monuments but also its complex irrigation system – connecting the Angkor plain to the Kulen Hills in the north and to the great lake, the annually flooding Tonle Sap (connected to the rhythms of the Mekong River), in the south (fig. 2).

The Khmers’ development of a carefully engineered network of canals, dams and barays (artificial reservoirs connected to the natural river regime made by embankments or dykes that were a means of both irrigation and transport) and tracteang (excavated ponds for collecting rainwater used by Khmer households for drinking, bathing, watering animals, small-scale hydro-agriculture etc.) – coupled with the inherent richness of the fertile region north of the Tonle Sap (Great Lake) brought bountiful rice harvests, which in turn enabled Kings Jayavarman and Indravarman to build and expand their kingdom. The barays functioned as great catchment basins and could store water during the torrential monsoons to be used for irrigation in the dry season. The East Baray (completed in 890) is a monumental artificial lake, fed by the Siem Reap River, measuring 1.8 km by 7.5 km; its earthen retaining walls are 4.5m high. Over the course of a century, as the East Baray gradually silted up with sand, it was periodically renovated by raising its banks, and new, smaller, barays were constructed to supplement the water supply. The enormous West Baray was supplemented later by the diversion of the Siem Reap River around the East Baray and into excavated canals. The last great baray at Angkor was the Jayatataka. By the mid-13th century, the baray system had exhausted itself, as the process of siltation outpaced the ability of the Khmer to raise the height of reservoir walls.

A series of Temple Mountains were built (sometimes as islands within the barays) to honour gods and ancestors, serve as mausoleums for the various kings and display the Khmer Empire’s omnipotence. The largest, most famous and intact monument is Angkor Wat (the city which is a temple), the expression of Khmer art at its zenith. It is believed that the king, priests, army and bureaucrats that ruled the empire lived within the mounds and walls of the various temple/monuments. The surrounding area comprised densely packed villages separated by paddy and vegetable plots (similar to all the other land-based agricultural settlements in the region). The paddy structure, often described as a characteristically ‘Angkorian field system’, is cardinaly aligned and more-or-less rectilinear. In its heyday the settlement is estimated to have covered an area of over 1,000 km² and may have supported a population approaching 750,000. Its sub-

![Figure 3a The topography of the island creates a dry zone & a wet zone.](image-url)
sequent decline represents one of the great demographic collapses in the history of urbanism. By the later 16th century, the hydraulic system had fallen into disuse, most of the religious monuments were abandoned to the jungle, and the population had declined to insignificance.

The inextricable links between irrigation and settlement (settlement was typically on discrete elevated mounds adjacent to the trapeangs or on the banks of channels) and sacred spaces resulted from the mystic cult of the 'god-king' and an ingenious and eminently practical irrigation system. The Khmer's downfall remains a mystery, although several scholars maintain that they were ill-equipped for their important role as intermediaries in the large-scale seaborne trade between China, India and the West. Even so, the surviving relics testify to its inventiveness. It is interesting to compare the strictly geometrical and architectonic ordering of Angkor's former splendour to Sri Lanka's system of tanks following the natural contours. In an abstract sense, one can find congruence between Angkor and the landscape tradition of France, while the informal and more romantic settings (with tree covered bunds) of Sri Lanka's irrigation reflects the landscape tradition of Britain (Swan 1966).

Sri Lanka's Ingenious Tank System - Comprehensive River Basin DevelopmentSri Lanka's physical geography, topography and climate combined to produce an historic need for large-scale irrigation networks. This island nation, a compact territory of central highlands surrounded by coastal lowlands, has a drainage system that extends radially from the mountains towards the sea. The highlands are themselves a complex landscape system with an array of basins, plateaus, high plains, and mountain ridges that intercept moisture from the seasonal monsoons. The soil composition (with significant areas of hardpan) is such that water percolation and retention is restricted, accentuating runoff. The southwest monsoon, affecting one quadrant of the island, delivers 5,000 mm of precipitation each year and defines the country's 'Wet Zone'; in contrast, the northern and eastern plains (which slope down gradually from the central core to the sea) receive rain only from the short, northeast winter monsoon and have a relatively low annual rainfall of less than 1,000 mm - the 'Dry Zone' (fig. 3).

The country's first planned settlements date from 1000 BC and were, surprisingly, located in the inhospitable Dry Zone, where watercourses are seasonal. Consequently, the region suffers from a scarcity of water for most of the year, but despite all these unfavourable conditions, the Sri Lankans' ingeniously constructed water retention reservoirs made life in the Dry Zone supportable. The construction of small storage reservoirs in the narrow linear valleys characteristic of the landscape later evolved into a comprehensive system of planned river basin development. Potentially irrigable land in Sri Lanka was either in narrow ribbons in tributary valleys (where dam sites where possible but difficult because of relatively low water flows) or on the coastal plains (where land was abundant but dam sites were scarce) (fig. 4). Therefore, different methods were developed to
address specific problems. The exact period and the mode of technology transfer for construction of man-made reservoirs is not known.

Nevertheless, it is believed that large-scale irrigation networks began crisscrossing the parched landscape as early as the 1st century AD. The increasing sophistication of irrigation technologies enabled Sri Lanka's early settlers to extend the water networks throughout the Dry Zone by the 6th century AD; subsequent centuries saw even more remarkable developments in Sri Lankan irrigation. By the end of the 8th century irrigation systems had enabled the islanders to open extensive tracts of land to cultivation. Sri Lanka's engineers utilized the waters of the Mahaweli Ganga and other rivers flowing down to the plains from the mountains of the Wet Zone. In the narrow valleys, small dams (easily constructed and maintained by the local population) were built in their hundreds along the tributaries of main rivers and streams and sequences of reservoirs were linked by the drainage from fields upstream (fig. 5). The larger dams, with broad bases able to withstand heavy pressure, also regulated the flow of the main river and streams with valves, a discovery by Sri Lankan engineers which antedated equivalent European inventions by 1,500 years (Foster 1969:93). Larger reservoirs were required in the downstream course of rivers to deal with the force of flooding and to irrigate the plains (fig. 6). Surveyors developed topographic levelling skills that made it possible to construct canals more than 30 km in length, and these structures (acting as controlled inlets) together with masonry weirs made the larger reservoirs manageable. Eventually, entire river basins were modified by independent systems of large and small reservoirs, redirected streams and canals. The reservoirs were built with corvee labour and 'inspectors of reservoirs' supervised the distribution of water from the channels to the paddy fields, collected water duties from landowners and penalized unauthorized use of reservoir water. Additionally, a strict schedule was enforced on cultivators to ensure that all lands fed by certain channels were ploughed and ready for irrigation when the water was diverted into specific channels (Swan 1966:28).

Royal Kingdoms & Irrigation Civilizations – A Sophisticated Relationship between Built Form & Natural Landscape

Against this backdrop of technological and agricultural growth, two important centres of Sinhalese civilization rose in the irrigated plains of the Dry Zone. Anuradhapura, in the centre of the northern plain, and Polonnaruwa, further to the southeast near the Mahaweli Ganga, were successive capital cities of the Sinhalese kingdom. Archaeological discoveries and research of these sites yield evidence of a sophisticated relationship between agricultural and reservoir systems, built form and the natural landscape of ancient settlements. With the passage of time, interventions resulted in a transformation of natural environment into a landscaped built environment in which the most dominant features were the reservoirs, the temple and the settlement itself.

As in other regions of South Asia, it usually took the strong hand of a ruler to unify settlements and create infrastructures such as irrigation works. Indeed, it was the ambition of good rulers to build canals and tanks, whereby great value was attached to irrigation works by the people (Dikshit 1986:127). In Sri Lanka it was Prince Pandukabhaya who unified several agrarian societies located around Anuradhapura (the land of an aristocratic estate in the midst of a rural area) and became the first king of Anuradhapura (the first royal capital of the country, from the 4th-5th century BC) in 377 BC. As with the majority of settlements in the Dry Zone of Sri Lanka, Anuradhapura / Anuradhapura was located on the banks of a major river according to the great chronicles of the country, such as the Mahavamsa and Culavamsa. It was founded in 623 BC on the left bank of the Kadamba Nadi, the river nowadays known as Malwatuoya. This is significant deviation from the Aryans' concepts of city planning, which lead to founding new settlements on the right bank of a river. Like most of the rivers in the Dry Zone, Malwatuoya also carries water for less than two months a year, during the rainy season. In some regions monsoon failure means that there is no water at all. Pandukabhaya constructed a reservoir, Abhayavapi (known today as Basawak-kulam) and enlarged a natu-
eral pond in the vicinity of the royal palace, from which water was obtained for his coronation ceremony. Thereafter a series of reservoirs were constructed concentrically around the regal inner city, fortified with a wooden fence and protected by a moat. Important agricultural and religious structures of the migrant Aryans' faith were placed near four entrance gates facing the cardinal directions. Other religious institutions were sited in the north and north-western sectors of the city. By the 5th century, Sri Lankans had perfected their water resources engineering skills. The landscape of the city was inseparable from its larger territory as rural waterway links connected it physically to city reservoirs (fig. 7). Spill water from one reservoir was collected at a reservoir lower down and this system was repeated over and over again to form a regional network of canals and reservoirs, thus enabling the reutilisation of water a number of times before being discharged into a watercourse to the sea.

Major changes in the built environment of Anuradhapura took place during the middle of the third century BC following the introduction of Buddhism, which had a twofold impact on its physical environment. The first was the emergence of a monumental architecture of colossal monastic buildings and the second was the expansion of the reservoir system to support their habitation. They were interdependent but interrelated, and altered the city structure fundamentally. Immediately after the introduction of Buddhism, the pleasure gardens of the kings in the southern suburbs of the regal city were converted into a monastic complex called Mahavihar. According to Sri Lankan Buddhist principles of city planning, all Buddhist monasteries had to be sited outside the city walls and isolated in forests.

As neither the river nor the existing reservoirs could serve the area, in 247 BC a large new reservoir, Thissavapi, was constructed and engulfed a previous smaller reservoir (Jayavapi). Monastic developments compelled the kings of Anuradhapura to continuously develop the intricate system of reservoirs and canals to store and transport water between the various facilities of the city. By the beginning of the Christian era there were five substantial reservoirs (Anuradhapuri, Gaminivapi, Abhayavapi, Thissavapi, and Nuvaravapi) serving Anuradhapura, along with an ever-growing number of canals which fed a chain of several small and medium-sized reservoirs to sustain the local population.

After a royal feud in which a prince killed his father, King Kassapa abandoned Anuradhapura and declared himself God King. He ruled for just 16 years (468-476 AD), but in that period built a monumental new capital (fig. 8). Sigiriya (Lion Mountain) was a physical expression of power, with the royal complexes sitting atop a 180-m high, 2-ha rock rising imposingly from the plains. Terraced platforms differentiated the upper palace city from a lower city of other facilities including council chambers, pavilions, meeting rooms etc. The complex was fortified with two layers of ramparts and a moat fed from the artificial reservoir adjoining the city.
complex. The city had an ingenious system of water management; the upper city was supplied by a large number of small reservoirs and the lower city from artificial ponds connected by canals. Water cisterns provided drinking water and the runoff from the elevated complex ran though a boulder garden before being released by sluices into a concentric series of ponds. A ceremonial water axis accentuated the sacred landscape, while its defensive aspect was a consequence of the natural setting.

Polonnaruwa was another regal city, which flourished following a series of Singhalese struggles with invading Tamils. Parakrama Bahu the Great (1157-1186 AD) had a keen awareness that the prosperity of his kingdom depended ultimately on the efficient working of the irrigation system, as evidenced in a speech to his ministers: "In a country like this not even the least quantity of rainwater should be allowed to flow into the ocean without profiting man ... Let there be not any left anywhere in my kingdom a piece of land, though it be of the smallest dimensions, that does not yield some benefit to man." (quoted in Swain 1966:78). The city was sited to the east of a colossal artificial reservoir called Parakrama Samudra (Sea of Parakrama). The reservoir had a 13-km bund with an average height of 12 m and engulfed two small reservoirs from the 3rd and 5th centuries. Nothing of this scale was built again until Sri Lanka gained her independence from the British in 1948. The city of Polonnaruwa received waters from the reservoir through channels that penetrated the concentric fortifications, demarcating an inner royal city and outer city (aristocratic residences and ancillary facilities).

All the capital cities had royal pleasure gardens and, in fact, it is primarily the relics of these that are scattered around the landscape today (fig. 9). The gardens (and parks of the cities) replicated, in miniature, the entire tank system, with ponds, tanks, canals, dykes and barriers linked to associated monastic and secular buildings. A large number of these gardens linked the Buddhist monasteries to the city and nearby forests. They were also linked to the commanding position of the village temple, or stupa. The Singhalese concept of Gamai Dagoba (the village and the Buddhist stupa) elevated the stupa as a dominant feature above the flat low-lying landscape (fig. 10). The reflective and recreational aspects accentuate the majesty of the territory. Ponds constructed within the gardens and the canals built to connect them exemplify the artistic, architectural and craft skills and the engineering ingenuity of Sri Lankans. Ponds were made with carved stone and linked to chambers of cut granite (fig. 11). Mastery of masonry construction was displayed in the remains of the old structures such as sluices, pavilions and other buildings (fig. 12). Miniature versions of the gentle gradient canals, occasionally built with bricks, and stone monolithic sluices symbolise the larger reservoir system of the region (fig. 13).
Intermediate and Wet Zone Reservoirs - Symbolic Landscapes

The Singhalese were forced to abandon the Dry Zone at the end of the 12th century after two centuries of destruction wrought by warfare with India and Burma and violent interregnum wars over problems of dynastic succession (Foster 1969, 98). A significant change in the relationship between landscape and urbanism can be seen in regal cities after the 14th century, during which they were founded in the intermediate or in the Wet Zone region. The reservoir system remained an integral element of the built environment, but its role and function were drastically altered; they were no longer needed to store water for daily usage but constructed merely for aesthetic and defensive reasons. Therefore most of the regal cities (such as Kuruwewela, Yapahuwa and Panduwasnuwara in the northwest) in the intermediate climatic zone were built with moderate artificial reservoirs, which were in most cases fed from the perennial watercourses.

The remnants of the reservoir system even a played a role in the founding of the last royal capital of Sri Lanka, Kandy. The city is situated on a plateau of the central hills, surrounded by high mountain ranges, in the hinterland heart of the Wet Zone. It was first chosen as a royal city at the beginning of the 15th century but was immediately abandoned in favour of nearby Gampola. Gampola in its turn was abandoned after several decades and the capital transferred to Kotte, close to Colombo. However, when Kotte came under frequent attack from invading European colonial powers the capital functions returned to the city of Kandy in the latter part of the 16th century. The capital was located beside a mountain covered with thick forest, and in combination with an artificial reservoir constructed by blocking a perennial stream through the nearby paddy fields. Unlike the reservoirs in the dry zone, Kandy’s reservoirs always had an abundant supply of water. A significant aspect of Kandy was the religious/cosmological connotations of the reservoir. The 17th-century Temple of the Tooth (enshrining the omnipotent Tooth Relic of Lord Buddha) was the symbolic centre of the city and the reservoir system was managed to ensure its importance.

Paddy fields in the vicinity of the site were dredged and a small perennial watercourse was blocked to impound the dredged paddy fields with water. The reservoir was called Kirimunhoda (meaning the Milky Way, a significant feature of Buddhist philosophy). The Temple of the Tooth Relic was sited on a terrace, complemented by several other terraces at different levels, at the foot of the existing mountain. The reservoir set the stage for the cosmological meaning of the royal complex. To this day, the reservoir has an important role in Kandy, albeit more as a cultural landscape than for its practical use.
Colonization & Post-Independence Dry Zone Revival – Exploitative Landscapes

The symbiotic relationship that Sri Lanka’s early settlements had with the landscape was significantly transformed during the colonial era, when the landscape was restructured for pure economic gain. From the 17th century onwards coastal development overshadowed traditional inland settlement; initially, these settlements had also worked with the inherent logics of the coast and its estuaries. Fortressed cities were founded at strategic geographic locations, often at river mouths where water transport facilitated the movement of goods from the hinterlands to maritime trade routes. Subsequent Portuguese, Dutch and British colonizers neglected the ancient irrigation works, which fell further and further into decay. Sharecropping and reliance on traditional agriculture (and the irrigation systems that sustained it) was replaced by enhancing production of export crops (coffee, tea and rubber) which grew in the hills rather than the plains. In the last decades of British rule (from the 1920s), redevelopment of the Dry Zone began when it was realized that the nation’s population was unable to feed itself. Dams were repaired, old channels cleared and village tanks re-established. However, it was only following independence in 1948 that renewed efforts to revive agricultural production in the Dry Zone began in earnest. The emphasis shifted from restoring past works to creating new projects to effectively shape regional development. The Gal Oya Scheme, initiated in 1949 and touted by many (MacPadden 1954, Foster 1969) as Sri Lanka’s little TVA (referring to America’s Tennessee Valley Authority project), was the nation’s first project in large-scale national planning and self-assistance. The project also sought to expand its partially ruined irrigation system and to re-colonise an abandoned interior by redistributing the population. It embraced comprehensive river basin planning and provided cleared and improved land, housing and subsidies for the first few years to ‘colonists’ who settled the territory. The project included a large dam (which also provided electricity), technologically advanced systems of irrigation, light rural industries to process raw materials and educational and health services. Yet, as has been commented by geographer Gerard Foster, the totality of the project was financially unfeasible while, at the same time, the over-ambitious concept mistakenly relied on technology which was significantly different from ancient customs, which had used the river intelligently but did not seek to tame it (Foster 1969:100).

The Gal Oya Scheme was the precursor to an even more ambitious project: in 1965, the Mahaweli Development Project Master Plan was developed by the Irrigation Department of Sri Lanka with the assistance of the UNDP and FAO. It was, and remains, the single largest development project in the country. The project was to be implemented over a 30-year period starting in 1970, and to improve irrigation in the Dry Zone by exploiting the Mahaweli, the longest river (321 km) in the nation, which drains one sixth of the country, through the construction of a cascade of large dams. As has been proven by the nation’s ancient civilization, water resource management is at the critical intersection of socio-economic policy and political agendas (fig.14). The Mahaweli was partially diverted and new reservoirs built to supply new townships (many people had to be resettled from areas submerged by the new reservoirs). The form and location of settlements was predominantly determined by the irrigation system – lands not suitable for irrigation were allocated for habitation. In total, the project sought to settle 350,000 rural families (including 100,000 resettled), generate hydroelectric power and alleviate unemployment through the creation of cultivable (irrigated) land. Furthermore, the project was to address the control of floodwater, develop agriculture and livestock resources and establish industries based on the processing of agricultural products. By 2001, 467,584 ha had been developed and 128,557 families settled (Werelagama 2004:2). The project has been criticized for moving farmers to the new territories before the proper infrastructure was in place. It has also caused severe environmental degradation due to inadequate consideration of the processes of salination, siltation and erosion (Werelagama 2004). As in the earlier Gal Oya Scheme, its reliance on technology shows that the developers seem not to have learned the lessons from Sri Lanka’s more low-tech reservoir system, where, admittedly, physical labour for maintenance was more intensive.

It seems that the lessons of the past are the hardest to learn. In the case of Sri Lanka, the ingenious tank system perhaps holds the secret to a co-nundrum whose solution could offer ways of tackling contemporary water resource management problems. The traditional tank system is under threat as maintenance of the system is not kept up and there is abundant evidence of ad hoc adaptations, breaches and modifications to the hydraulic system. Each and every change within the great palimpsest of topographic variation constrains the flow of water at some point, increases the likelihood of flooding in certain areas, and deprives other areas of a reliable flow. On the other hand, threats arise from multiple sources, including upstream water allocation decisions which marginalise traditional tank systems in favour of seemingly more productive uses such as
‘modern’ large-scale irrigation and hydropower, as well as from siltation and sedimentation arising from unsustainable land use practices in upper catchments (as evidenced by the Mahaweli project).

At the same time, the tanks not only supply irrigation water but also constitute one of the richest sources of wetland biodiversity in the country. Where still maintained and operational, they provide domestic water supplies and play an important social role as meeting places. In Sri Lanka, as in other parts of South Asia, a strident call has been made by environmentalists to protect and restore tanks and tank beds. The tank had an indisputable logic at the time when agriculture was woven into city/village fabrics and the need for locally grown produce was as strong as the need for land.

And, to add fuel to the fire, in the past months the civil war that appears to be re-erupting in the north and east of the country has (re-)confirmed the strategic (military) importance of waterways. The Maavilaru Waterway (in the eastern Trincomalee district) was blockaded by Tamil rebels and civilians bore the brunt of the consequences. Obviously, the symbolism of controlling a basic resource was the aim of the Tigers in their bitter fight with government forces in the region (Anbarasan 2006). As is poignantly revealed, water flows are simultaneously physical and social and carry in their currents the embodiment of myriad social struggles and conflicts.
Before the Rhetoric - Sri Lanka’s Indigenous Landscape Urbanism

Despite the current state of the tank system and the political issues tied to it, Sri Lanka’s water management system holds valuable lessons – as do numerous other ‘indigenous’ traditions of landscape urbanism. The case of the ‘tank system’ in Sri Lanka is valuable in the contemporary discourse on landscape urbanism in that it reveals a no-nonsense approach to modifying the territory to accommodate habitation. The marriage of an agricultural/irrigation system (a productive landscape) with a settlement structure (including a sacred/Buddhist landscape) is also evident in other parts of Sri Lanka where dispersed inland settlements border large paddy patches or are nestled in the foothills of tea and rubber plantations – all under the lush canopy of tropical vegetation (fig. 15) – and denser coastal towns colonize prime sites such as beautiful bays and/or river mouths (fig. 16). The relationship of urbanization to water, topography, the productivity of landscapes and eco-systems is complemented by the innate attraction of settlement structures to infrastructure. The proximity to water is balanced by building on elevated terrain to avoid the hazards of riverine flooding, heavy monsoon rains, cyclones, sea erosion and storm surges.

As is evident in Sri Lanka, once upon a time, humanity was innately capable of adapting to its environment, through patient, pragmatic adjustment to circumstances with ‘low tech’ means and rational logics that worked with nature. In today’s world – where all is seemingly possible – environments can be created completely anew. Technology has allowed the logics of nature to be fundamentally (and often irreparably) altered. Money facilitates previously unimaginable engineering marvels. Humanity can now live anywhere – in deserts transformed into oases (Dubai), in protected lands below sea level (The Netherlands), in land-filled, low-lying river deltas (Pearl River Delta), etc. However, as is becoming increasingly evident, such developments have troubling consequences. The environmental/ecological sustainability of more and more territories is irrevocably threatened.

Today, if ‘landscape urbanism’ is going to substantially embed itself in the professions of the built environment, it must take a position in terms of reconciling landscape and urbanism – in the evolving relationship between and organization of territories and human settlements. Landscape urbanism need not merely retreat into post-modernist discourse whereby the metaphorical use of landscape is equated to process and indeterminacy. Indeed, landscapes are in a continual state of slow, predictable evolution. To a certain degree, nature is reliable, a source of continuity which is able to adapt to different imposed (and temporary) realities. Landscapes exist as tensions between the dynamic/stable and permanent/impermanent. The appeal of much writing on landscape urbanism lies in its abuse of post-modern rhetoric. If it is to be taken seriously, and as more than a fashionable and short-lived -ism, landscape urbanism has a responsibility to prove, through realized cases and projects, its relevance and urgency.

On the whole, the infrastructured landscapes of past eras figure much less in the writing and in built projects than one would expect. Instead, as evidenced by contemporary representation techniques, a picturesque, landscape beautification approach is still the hidden foundation upon which the discourse and projects are built, despite claims to the contrary. In general, landscapes of necessity and survival are left out of the discourse. At the same time, landscapes at work and infrastructures of productivity are rapidly being transformed by the global restructuring process and innovations in technology, communications and transport. Yet it is ancient logics and traditions – where the landscape and urbanization worked hand-in-hand – that can provide both a sustainable and intelligent way to deal with age-old problems and simultaneously offer a form of local resistance to otherwise homogenizing affects of globalization, technology and infrastructure upon the territory.

Across the globe, the largest investments being made are those of a territorial and (infra)structural scale. In Sri Lanka (and in many other developing countries) there remains an unequivocal belief in planning and the specific power to impose radical spatial configurations upon territory – beginning from the country’s first organized development of irrigation systems and continuing into the present-day practice of forming new satellite cities upon productive paddy land. These large-scale interventions offer the possibility to protect and enlarge the collective, public realm of rapidly urbanizing cities, while at the same time acting as supports for appropriation by unprogrammed activity, mobility/transport and as platforms for investment. A fundamental lesson from Sri Lanka resides in the notion that the primary morphology of the landscape can be manipulated at the infrastructural level of reasoning. In contexts where there remains a will to plan landscape, urbanism can operate at the level of (infra)structural and strategic planning.

Although landscape urbanism has eluded precise definition, it appears to be generally agreed that landscape urbanism is essentially rooted in a
belief in the intelligence and power of place—not so much in the conservative sense of Martin Heidegger’s and Christian Norberg-Schulz’s genius loci (Norberg-Schulz 1979) but more in Elia Zenghelis’ contemporary interpretation of uncovering existing logics of reality and finding the capacity of sites by distinguishing the junk from the potentials (Zenghelis 1993). Landscape urbanism could be an urbanism strategy that gives voice to the restorative and restorative social and cultural formation of territories—and the evocative power of landscapes. Landscape urbanism deals with sites too large and too complex for definitive, one-off solutions. The overlaying of ecological and urban strategies can offer a means by which projects may create new systems of interconnected networks that complement the existing structures.

In a landscape urbanism strategy, the site becomes the controlling instrument of the interface between culture and nature; site phenomena are generative devices for new forms and programmes. Integrating the principles of ecology’s positive feedback system results in landscape urbanism’s appreciation of and working with larger regional scales (watersheds, ecosystems, infrastructures, and settlement patterns). A dynamic interrelation of urban and rural works to create an urban countryside/rural metropolis. The form and character of landscape urbanism strategies derive from the social and cultural formation of the physical fabric.

A descriptive landscape urbanism could evolve from the careful reading of layered contested territories and designerly investigation of potentials. The existing logics of landscapes (including its historical layers and ad-hoc daily appropriations) could be reorganized at different scales and connected to new (infra)structures. Specific logics from the ‘junkyard’ of existing landscapes could be stressed and new interventions with structural capacities could reformulate reality. Landscape urbanism strategies could become powerful tools for negotiation between different actors and within the contested territories of 21st century cities.

Acknowledgements

Thanks to Janina Gosseye and Vivian D’Auria of KU Leuven and European Masters of Urbanism students (KU Leuven) Elisabeta Gjoklaj and Julian Tiranshishi for their (re)drawing of plans and diagrams.

References


Hanks, L. 1972 Rice and Man: Agricultural Ecology in Southeast Asia; Honolulu, University of Hawaii Press.


Biographical Notes

Kelly Shannon is an Associate Professor of Urbanism at KU Leuven, teaching urban design studios and a landscape urbanism seminar. She has been a visiting professor at the University of Colorado (Denver), ESAIQ (Barcelona) and AHO (Oslo). Her PhD (2004) was entitled ‘Rhetorics & Realities, Addressing Landscape Urbanism, Three Cities in Vietnam’ [University of Leuven]. Her research focuses on urban design and the relations of urbanization and landscape, with a particular focus on the transforming regions of the non-Western world. Interest in Sri Lanka’s reservoir system stems from design research in the country through the EU-sponsered programmes of Asia Link and Asia Urbs (2004-7).

Samitha Manawadu is Professor of Architecture and head of the Architecture Department at the University of Moratuwa, teaching and practicing architecture and conservation. He is Vice President of ICONOS Sri Lanka and Vice-President responsible for Asia and Pacific Regions. He was a recipient of Japanese Monbukagakusho Scholarship and the Japan Society for Promotion of Sciences Long-term Research Fellowship and Visiting Fellow at the Kyoto University. His doctorate thesis, ‘Study on the Relationship between Reservoir Systems and Living Environment as seen in the Cultural Triangle of Sri Lanka’ (University of Kyoto, Japan) dealt with architectural conservation and the revitalization of ancient living environments.

Contact

Kelly Shannon
KU Leuven
Department of Architecture, Urbanism and Planning
Kasteelpark Arenberg 1
B-3001 Heverlee, Belgium
kelly.shannon@asro.kuleuven.be

Samitha Manawadu
Department of Architecture
University of Moratuwa
Moratuwa, Sri Lanka
samitham@archi.mrt.ac.lk

Journal of Landscape Architecture / autumn 2007 17