

# Built Environment And Its Futures



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***Editorial***

Faculty of Architecture Research Unit (FARU) of the University of Moratuwa commenced its Annual Research symposium in 2007. Strength of the symposium had been the presentation of 25 short research papers that introduced the on-going research at the faculty. The presenters were the academic staff of the faculty and the panellists were academics and professionals. The most significant result was the decision to make FARU conference an annual event.

Taking a step forward, FARU organized a refereed Research Conference in 2008 with the theme of Built Environment and Its Futures. The conference received a good response from academics, practitioners, and from the industry: (no) research papers were presented in parallel sessions with the participation of the industry showing a high enthusiasm. The depth of the conference was such that it also received many international responses.

Theme of the Second FARU Research Conference emerged from the opinions of the members of FARU, with the aims of establishing the faculty as the centre of excellence in the field of built environment. New concepts, coined by Asian and Western academics that are being tested by the faculty members were presented by the competent academics. As it is the case, the faculty

members showed that the Moratuwa is in fact taking a huge leap towards establishing itself as the best university of the island. The emergence and spread of modernity, place-responsive architecture, conservation, ergonomics, and global culture, and for the first time, disaster-related research topics were presented by architects, quantity surveyors and town planners. FARU, having published the research abstracts, takes another major step by publishing full papers after they were further refereed by a panel of international referees. This volume comprises of the papers that were received by FARU to-date.

FARU intends to acknowledge the support received from all parties, and especially from the keynote speaker, Deshabandu Architect Planner Surath Wickramasinghe. FARU also fondly remembers the services rendered by all academic and non-academic staff of the faculty.

Prof. Harsha Munasinghe  
Director, FARU

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## **A STUDY OF THE SPATIAL FORM OF KALUTARA TOWN, SRI LANKA; AS A UNIQUE HISTORIC PROCESS**

C.C. Abenayake & Jagath Munasinghe

### **Abstract**

Contemporary urban planning practice often conceptualize of urban areas as static entities which could be planned towards certain end states, and devoid of social, economic, and political context, within which the spatial form is produced and reproduced. There have been many scholarly attempts to fill in this gap. The main argument put forward in this study is that the spatial form of an urban area is not a static neutral entity, as mostly seen in planning, but a dynamic process that

keeps evolving with many forces emerging from both local and global context. In addition to deliberate planning efforts, the spatial form could be changed and organized by number of external and internal agents associated with it. In view of that, this study reformulated the already known story of the evolution of Kalutara town as a historic process, intending to explain spatial form as an evolving phenomenon.

*Keywords: Social Process, Planning practice, Objective positioning, Agents*

## Introduction

Contemporary town planning practices in Sri Lanka, similar to that of many other parts of the world, reflect two main limitations. The first is the planners' conceptualization of urban areas as static entities which could be planned towards certain end states. This conceptualization ignores the dynamics of urban space and the evolutionary nature of the spatial form. The second limitation is the so called 'objective' approaches adopted to understand urban areas compartmentalizing its contents into several empirical domains. Because of this approach the plans prepared in recent past presented urban areas as mere physical, social, economic and other entities that were culturally and politically neutral and devoid of a context. The consequences of these limitations are evident mostly at the stage of implementation, where the plans are subject to enormous pressures imposed by different forces surging from the very contexts, for which they have been prepared. In view of this situation, deviating from the common understanding seen in present day urban planning practice, this paper supports the view that the spatial extent of an urban area, usually termed the 'spatial form', is a continuous evolving process rather than a static end state: a number of internal and external agents, over and above deliberate planning attempts, are instrumental in continuing this process. In order to illustrate this view, the paper discusses the process, in which Kalutara: a small town located at the west coast of Sri Lanka, has evolved into its

present form over last three centuries, adapting, contesting and negotiating a number of socio-political moves that had affected the whole of Sri Lanka within the said period.

## Background

Scholarly attempts to understand spatial forms through social processes are not new in urban planning and related fields. In early attempts, Ruskin (1853) initiated a new line of thinking towards the city with his work on *Stones of Venice*, where he implied the built environment of the city as a resemblance of elements gifted to the city throughout its growth. Inspired by the modern trends in Biology, mainly the Darwinian theories, Patrick Geddes (1947) introduced a new means of conceptualizing cities within the metaphor of a biological matter. According to Geddes, cities similar to biological matters are in a process of evolution responding to stimuli from both internal body and external environment. In the same direction, but not necessarily with the biological metaphor, Morris (1979) brought in a new perception, looking at the city's built environment as a historic legacy that is reflected in its apparent physical elements. This new direction of thinking was furthered by Mumford (1961), Doxiadis (1968), Rossi (1984), and Kostof (1991). Commonly, all of these works profound the thinking that the spatial form of every city could be well understood only by relating to the historic process through which

they have been evolving into their present state.

Making a new turn in urban studies, Lefebvre (1929) enlightened urban scholarship by highlighting the 'production of space' by different agents of 'urban' and the politics involved in producing space. Lefebvre heightened the fact that urban space that we all experience was not a neutral entity, rather it had not only been produced, but it had also been commoditized through political processes. Lefebvre's work inspired a chain of new literature that has emerged over last two decades. Harvey's (1974) work on political economy of spatial relations and the social reproduction facilitated by planning and designing the built environment, Smith's (1993) conform of a specialist politics on the production of geographical scale, specialist politics on the production of geographical scale, Low's (2000) work on politics that shapes the public space and the spaces that shaped the political and cultural practices, Yeoh's (2003) readings of the contested spaces produced by colonials and the colonized and Hosagrahar's (2000) inquiry into culturally produced 'modernity' in indigenous societies with the influence of colonial powers and its reflections in the built environments, are a few worth indicating.

Despite the growing interest throughout the world in this area of studies, similar attempts are rare in Sri Lankan context. Among the few work, a series of studies by Perera (1998, 1999, 2002), which has provided an extensive

account on colonial and post colonial national space production processes of Colombo centered Ceylon, renamed Sri Lanka, has indicated an entry to this new domain of literature in Sri Lanka. These works illustrated the agency of colonials, the colonized, native elite and post colonial hegemonies in making and remaking of the built environment of the island at different stages of its evolution. However, Perera's work has focused mainly upon Colombo, which he profound the centre of colonial power and post colonial social relations and through which Ceylon and later Sri Lanka has been reconstructed, than otherwise. At the same time, his work pays more attention to architectural legacy of the built environment. Though is not a limitation, the space formation in other urban areas in the periphery and at the locality level is not discussed adequately in his work. In a recent study, Munasinghe (2007) attempted to explain small towns of Sri Lanka as self organizing processes that have been evolving through transactions between internal and external agents. This study was a generalized account of all small towns along main arteries of Sri Lanka. Bandara & Munasinghe (2007) examined the evolution of Colombo, focusing upon the transformation of different spatial segments in an identical sequence of land use changes, as a function of changing street network configuration. However, beside the diversity in scope and new methods of inquiry, relatively fewer numbers indicate a need for more studies to fill the void apparent in urban studies literature in Sri Lanka. This

study is placed in such a context to contribute towards that purpose, and it reads the changing configuration of the spatial form of a particular urban area: Kalutara town, throughout its evolution over last three centuries.

The reading is based on a series of maps that represented sequential changes in the spatial extent of Kalutara town throughout its evolution, in the light of socio-political events occurred at different times in history. The

maps are constructed on the information revealed through historic records, formal and informal interviews with people who witnessed the changes in the past, and pictorial illustrations such as photographs, paintings and sketches. The consecutive changes in the spatial extent, expressed in maps, are the matters of observation. These changes are scrutinized referring to the corresponding historical events within the period of each pair of consecutive maps.

### The Evolution of Kalutara Town

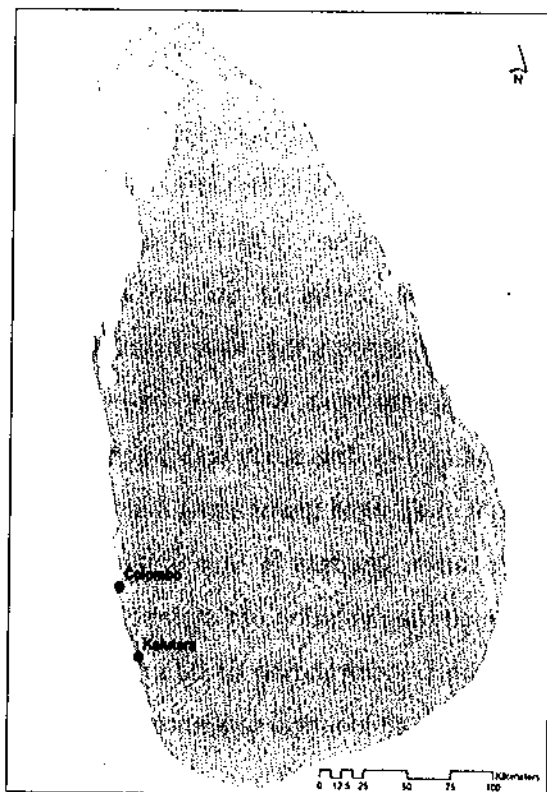


Figure 1: Location of the Kalutara

Kalutara, located forty kilometers south of Colombo in the coast, is the administrative centre of Kalutara district and for planning

purposes it has been recognized as a second order urban centre in Colombo Metropolitan Region (CMRSP, 1999). In addition to the administrative functions, it plays a vital role as a thriving commercial centre. Tourism is one of the booming industries in Kalutara which attract many local and foreign tourists for its natural serenity and the religious significance. The built environment of Kalutara town has endured many changes within last four centuries at different phases of its urban history. In the pre-colonial period, Kalutara was a small village with two isolated clusters of fishing communities, located at the northern and southern edges of the estuary. The third settlement cluster emerged at Kalutara-south with the location of Portuguese fortress on the hillock by the river. The fortress had developed into a town centre under Dutch ruling into which the access was



possible through canal, sea routes, river, & footpaths. At the early British period with the construction of the cart road leading to Galle from Colombo, the spatial form configured into two clusters; with administrative activities at the vicinity of the fortress and commercial activities at the ferry. Boutiques and other service outlets were set-up in a linier pattern along the cart road near the ferry. The construction of the new steel bridge brought in unprecedented changes to the spatial form. Commercial and administrative activities and elite houses along the old road were gradually shifted to the new road leading to the bridge, again in a linier form, mainly at Kalutara-south. Later, when the coastal railway was introduced, two more small clusters of buildings and activities emerged along the station roads at Katukurunda and Kalutara north. While the Galle road concentrating urban activities, there was a set of local roads that connected peripheral areas into main road at different locations. Residential units were apparent along them. In the post Independence period, Kalutara north and Katukurunda sub centres were stretching along the main Galle road,

and the growth of the urban area led to formulate a continuous concentration along the main artery. In addition to that, Kalutara north sub centre extended to the main artery from station road. Old road and Horana road, constructed later, concentrated new developments of residential units. Two concentrations were apparent at the coasts of Kalutara-north, which was occupied mainly by poor residents and at Kalutara south, occupied by the moor community. A dispersed pattern of buildings was observed in the lands between main road and the Dutch canal. At present, the buildings and activities are concentrated in a linier pattern along the Galle road, gradually spreading in to Nagoda road. Although the changes in spatial form could be summarized in the above manner, these changes are not merely physical and instantaneous as they are apparent to be. Rather, they were geared by many forces, both internal and external, through their agents in a continuous process. At each step of the process essences of the socio-cultural, economic, and political stances were manifested in the form of the built environment.

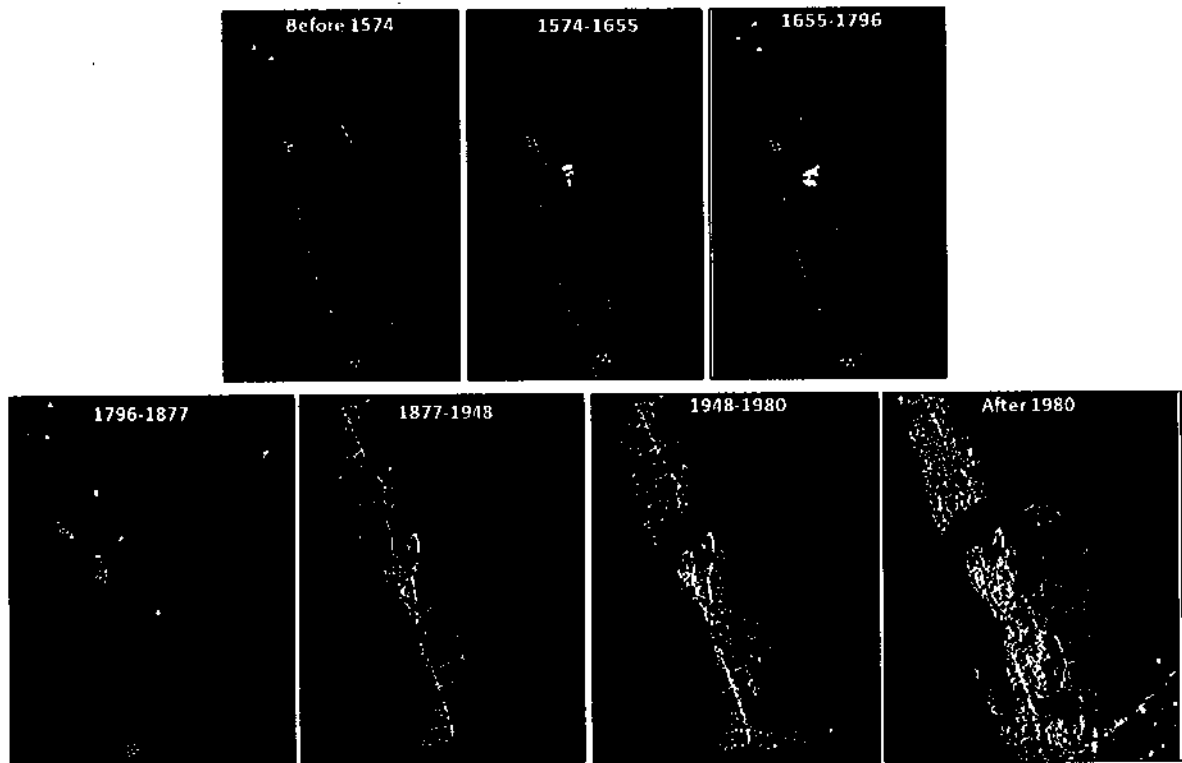


Figure 2: Evolutionary Process of Kalutara as Township

The next section of this paper reads this socio-political process highlighting the events where necessary.

### Reading the Evolution

The coastal belt of Sri Lanka was marked with narrow foot paths that linked Magama provincial Kingdom to the rest of the country. Kings constructed transit temples on the way to facilitate Buddhist monks who travelled along the route. Travelers crossed the rivers either in ferries or on natural sand dunes. Smaller clusters of fishing families were settled near the lagoons and estuaries. Towards the fifteenth century Moor traders established small sea ports along the coast at the estuaries to exchange goods. *Kalutara-Totamuna* was one of these exchange points, which traded goods coming from *Sabaragamuwa* to the coast along *Kalu Ganga* (river).

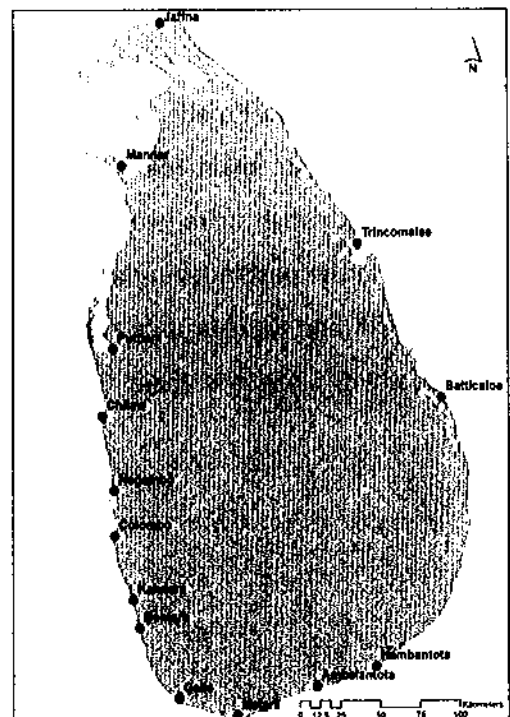
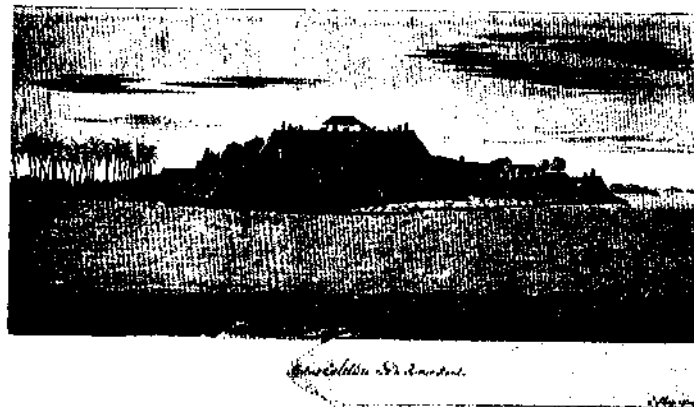


Figure 3: Portuguese Bases of Sri Lanka

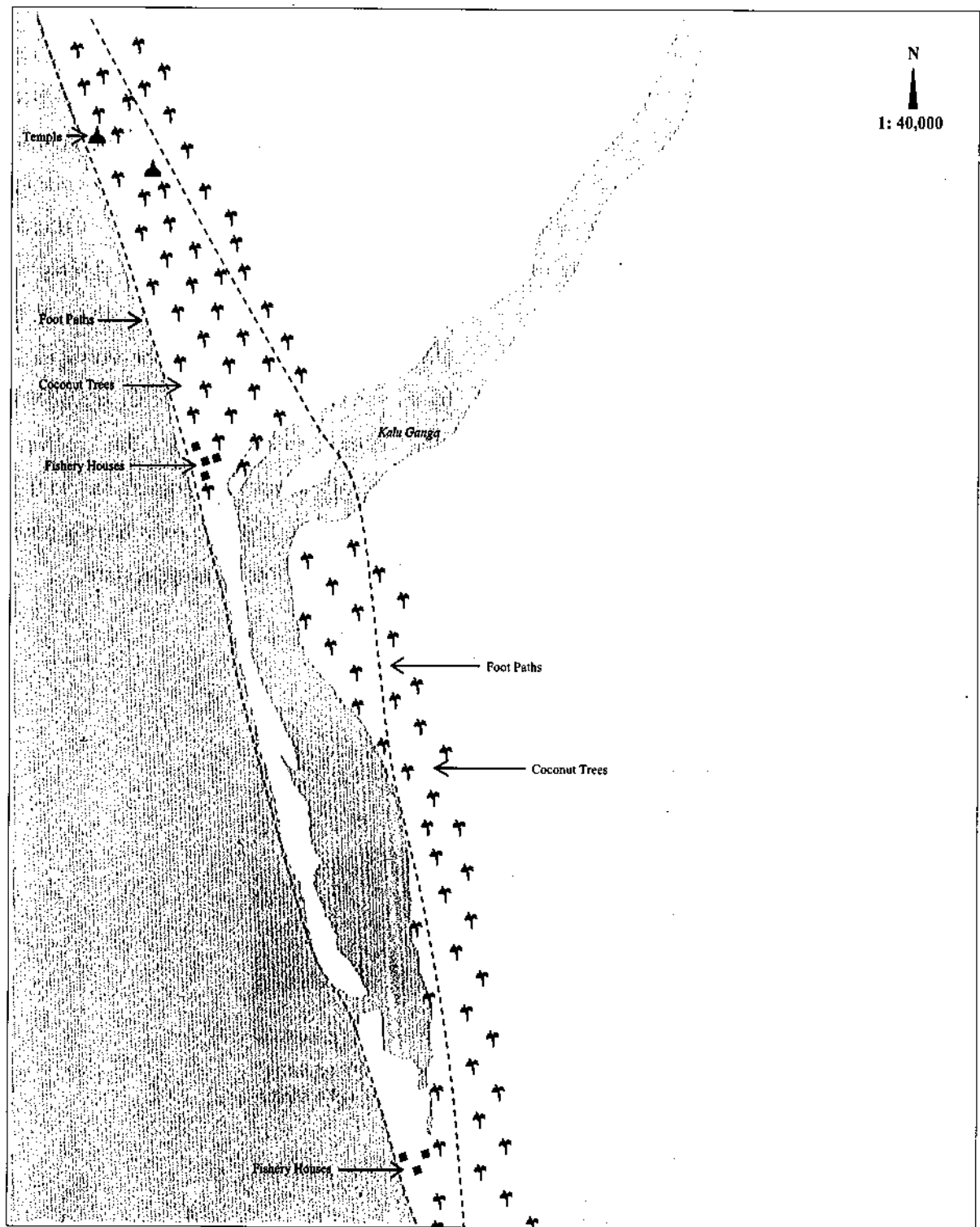
Portuguese captured Moor's trading and established a fortress at the location of the port in 1505. It must be noted that Colombo was preferred as the main base in the island that had linked to Goa in India, and *Calt(ch)ura* (Kalutara) was one of several sub bases linked to Colombo. *Calt(ch)ura* was selected as a base because of its capacity to optimize military potential supported by the natural setting. The hillock at the south bank of the estuary with direct access from inland waterway and the sea port was an ideal setting for a defensive base. The fort was the first element of Portuguese *Calt(ch)ura*. At a later stage, Portuguese men who got married to native women settled in a separate enclave

adjacent to the fort. Gradually the Portuguese activities began to spread around. In 1574 they erected a building near fortress for Franciscan Church, which was patronized also by the Christianized local fishing communities. When local religious institutions, mainly Buddhist acted against the Catholic propagations, Portuguese ravaged all temples in the vicinity. Accordingly, the built environment was altered by the Portuguese by introducing new elements that served for their needs and changing the natives' environments. It was Portuguese who laid the foundation of the structure on which Kalutara town has evolved into its present state.



*Figure 4: Kalutara fort decided optimizing the military potential of the natural setting on a hillock at the estuary with direct access from inland waterway and port.*

Map 1: Kalutara in Pre-Colonial Period (Before 1574)

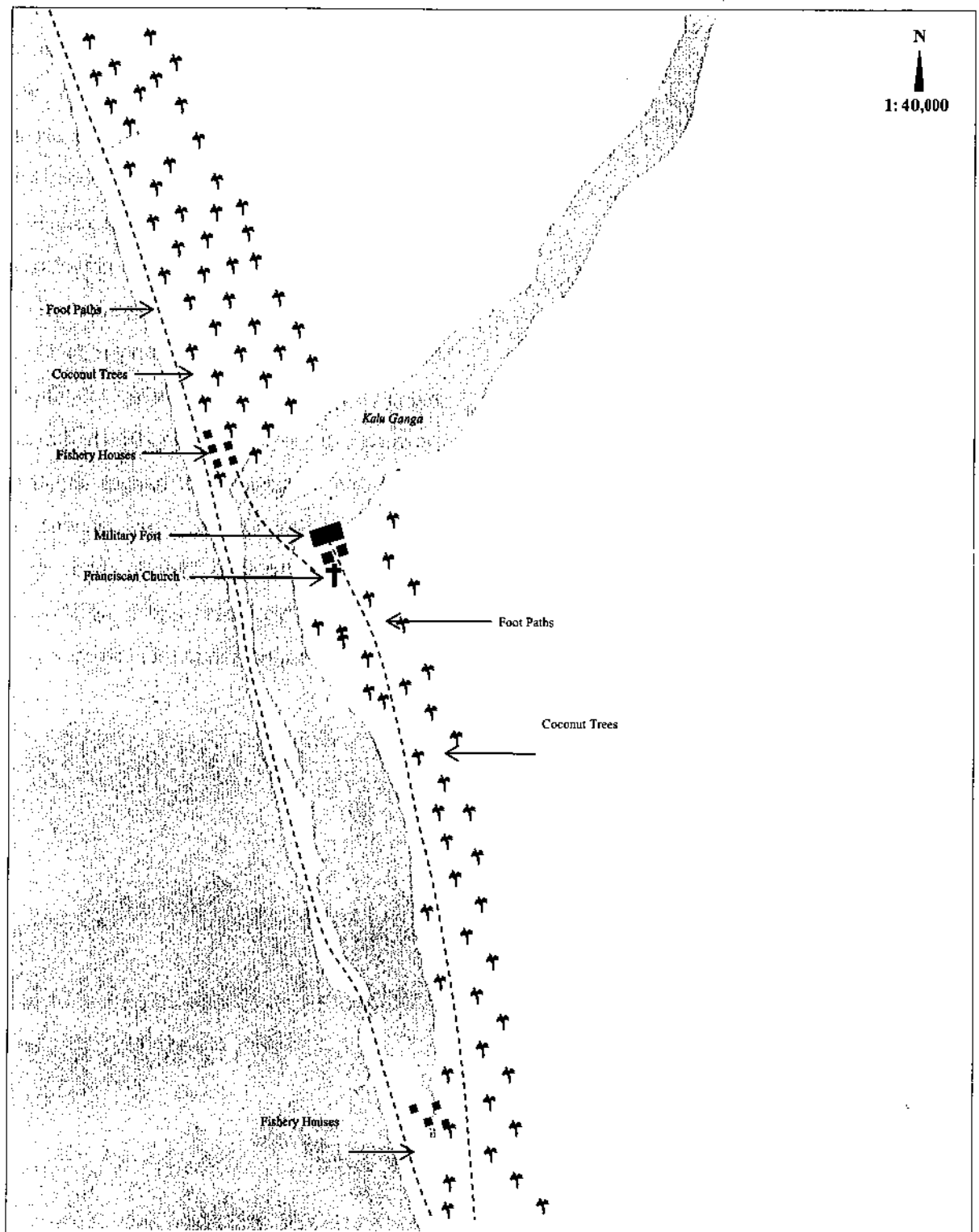


Source: Author's construction based on...

- Brohier, R.L. (1948). *History of Kalutara. Silver jubilee souvenir-Urban council Kalutara Colombo, The associated printers, Ltd.*
- Fernando, M. (2003). *Kalutara. Kalutara South, Thejani publishers. pp. 1-44, 129-169.*
- Interviews with people



Map 2: Kalutara in Portuguese Period (1574-1655)



Source: Author's construction based on...

- Ramerini, R. (No date). *The Portuguese in Ceylon-The history of the first European power in Ceylon* [online]. Available from : <http://www.colonialvoyage.com/ceylonP.html> [Accessed 15<sup>th</sup> December 2007]
- Rev. Perera, S.G. *History of Kalutara, Kalutara in Portuguese times. Silver jubilee souvenir-Urban council Kalutara Colombo, The associated printers, Ltd.*
- *Maps-Portuguese ports of Ceylon*



Figure 5: Integrated canal network constructed by Dutch

Dutch (1655-1796) invaded Caltura fortress in 1655 and at that struggle, Portuguese army was supported by the Portuguese mixed natives, for which Dutch destroyed the houses of these communities and the Franciscan church building nearby soon after capturing the fort. Dutch governed the areas under their rule with a new order of law, now known

as Roman-Dutch law and established a court at a location close to the fort. They developed the fortress into a compact residential enclave. Since, Dutch administration was organized to harness the resources by access into different sources. Hence, transportation was improved by an intergraded canal system. They also introduced a walkable gravel road parallel to the coastline to Colombo, where the main base was located, mainly to facilitate military and administrative functions. However, unlike Portuguese, Dutch did not disturb the in social life of natives and their economy to that extent. They allowed re-erecting the temples which had been destroyed by Portuguese and natives' social systems were supported to reconstruct.

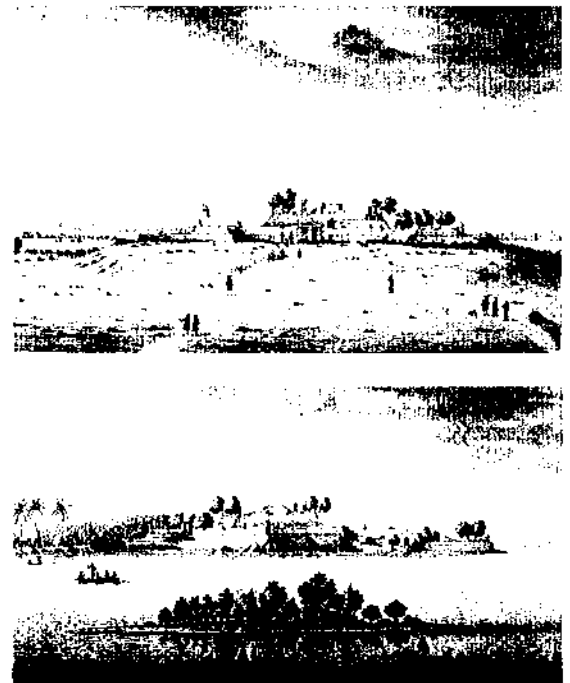
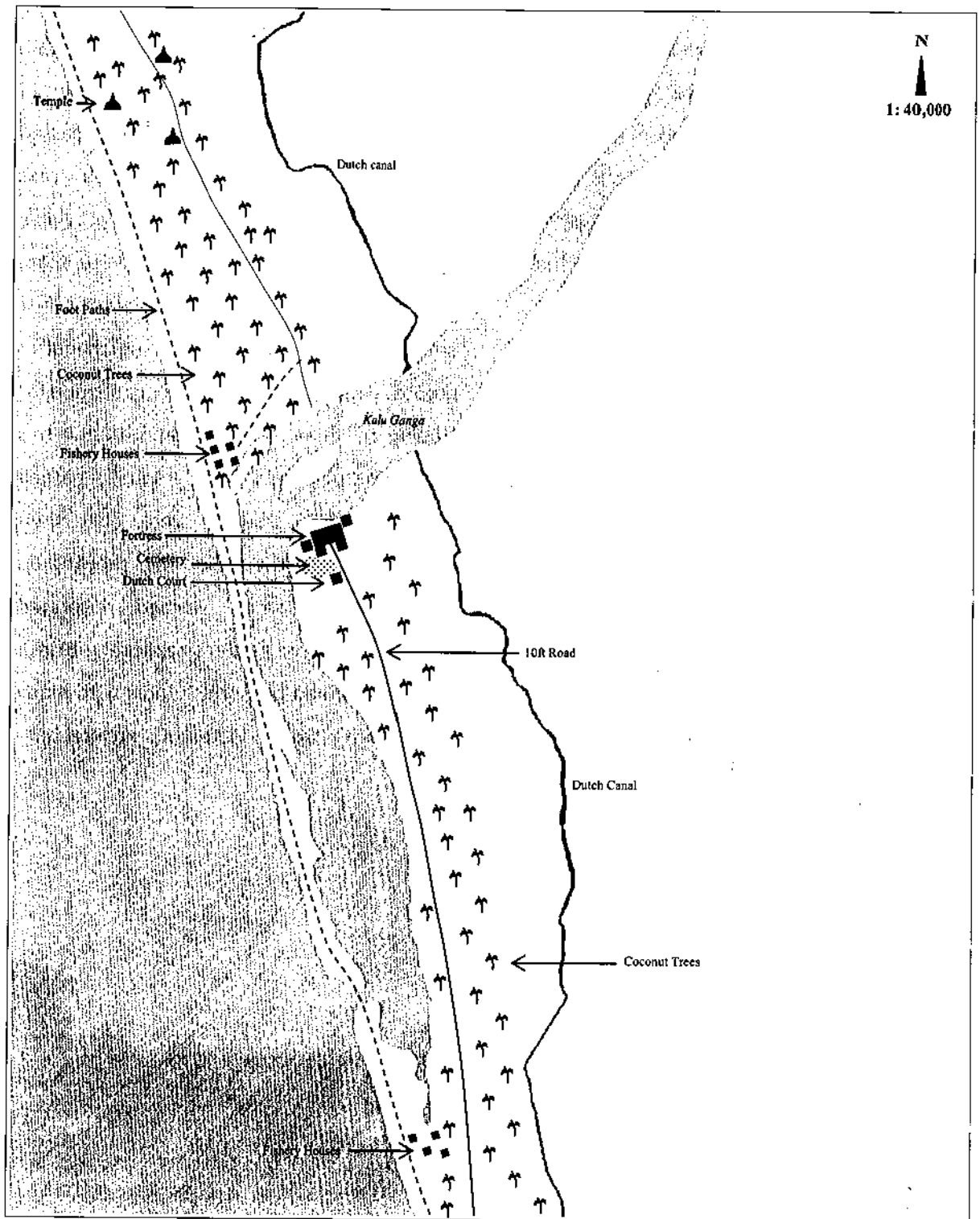


Figure 6: The fort Calleture; view

Map 3: Kalutara in Dutch Period (1655-1796)



Source: Author's construction based on....:

- De Silva, R.K. and Beumer, W.G.M. (1988) *Illustrations & views of Dutch Ceylon 1602-1796*. London, Serendib Publication. pp. 66, 67, 205-2.
- De Fonseka.com (No date). 'Diyambetalawa'-Early prints from the Rijksmuseum, Amsterdam. Available from : <http://www.defonseka.com>[Accessed 15<sup>th</sup> December 2007]
- Walter, D.G.F. (1971). In & Out of Kalutara Court: book 2. Kalutara, Kalutara Court.
- Sanjewa, S. (2006) *The Buddhist temples in Kalutara*. Kalutara, Divisional Secretariats Office.
- Interviews with people

The British started to develop a gravel road network in 1796 linking Colombo to rest of the areas of the country soon after their full occupation in 1815. Bullock carts were carrying tradable goods on those roads. In their few days long journey, bullock carts needed overnight resting places where water was available. The river crossings, where the carts needed to be crossed in a ferry, were obviously the preferred locations for this purpose. 'Kalugan tota' was one of the resting place along the gravel road, which is now known as Galle road running towards south of Colombo. At the same time, 'Paaru' (rafts), transported goods from upper catchment areas, such as Rathnapura to the coast along the river and they also stayed a night after a few days long journey. In the stay overnight, in addition to water, they were seeking for many other services such as food, liquor, enjoyment, etc. Catering to these needs of bullock cart men and the others, shacks were

put up near the ferry point and by the dawn of 20<sup>th</sup> century, *Kalutota* began to develop into a small service centre on the Galle road. People from interiors visited the center to trade goods and services. As the time passed many of the foot paths from peripheral areas were developed into gravel roads providing better access to the center. *Palatota* road, *Nagoda* road and *Horana* road were the first among them. Newly emerged merchandiser groups, who played the role of middlemen for trading activities, settled in and around this point. These groups, who gradually earned wealth through trading, were built their residences along the Galle road, showing up grandeur with white washed decorated facades with large gardens replicating British villas in Colombo and British India with many adaptations from Victorian architectural styles.

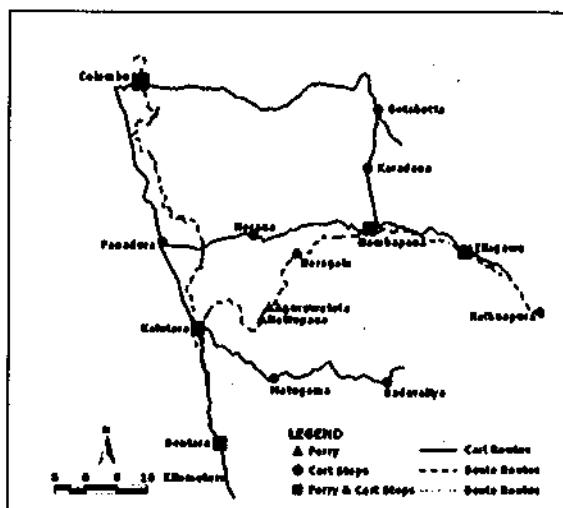


Figure 9: Inland trade routes operate at British Period

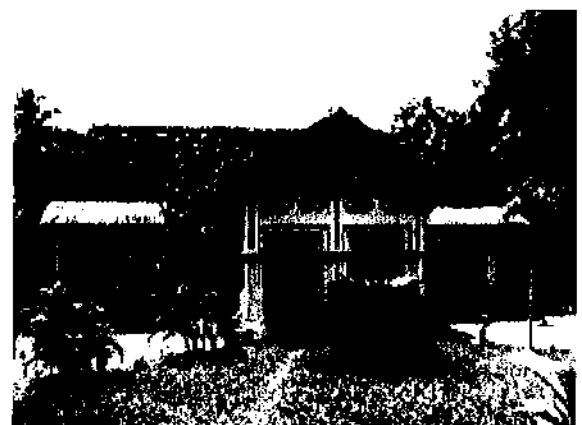
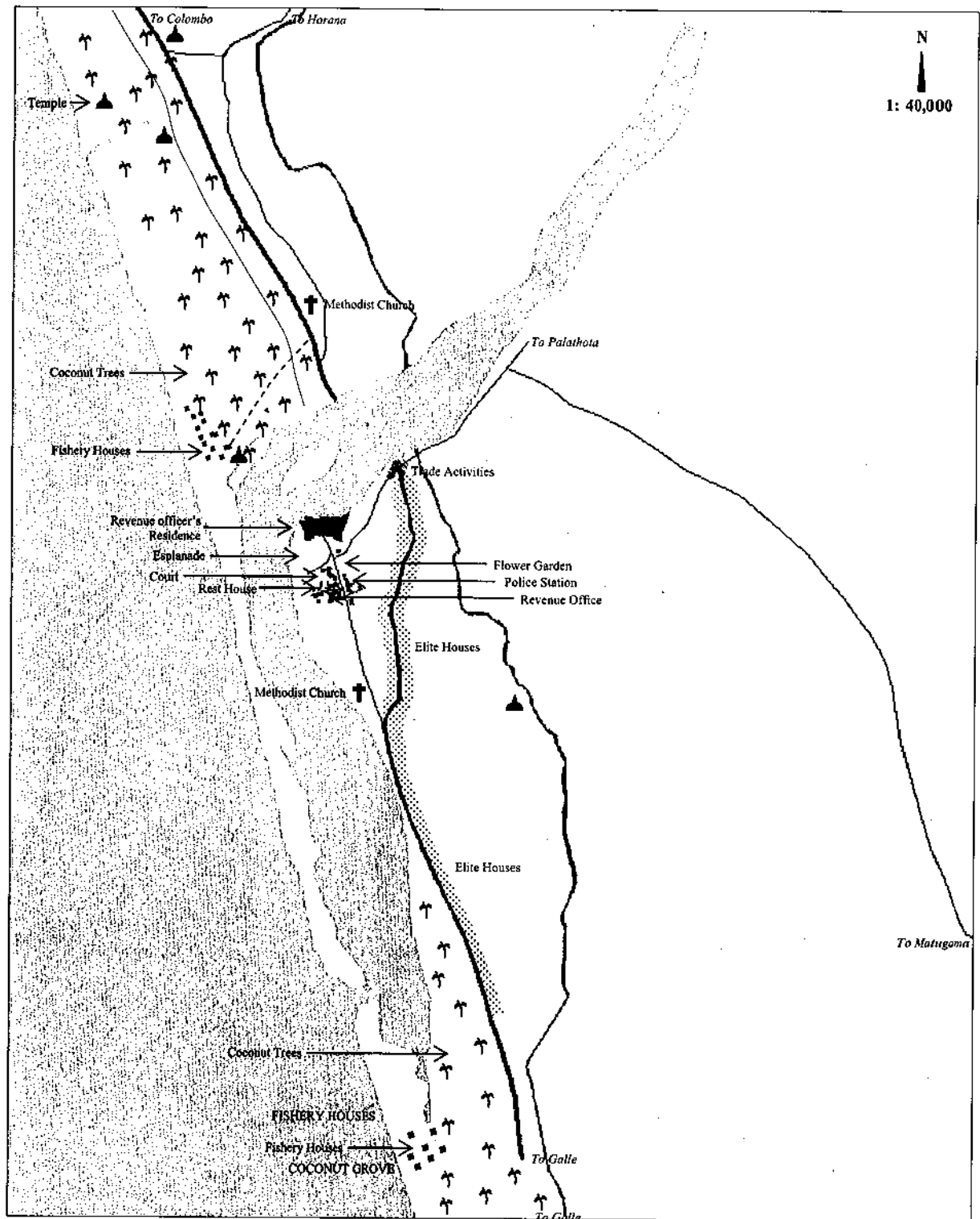


Figure 8: An elite house; Kalutara north



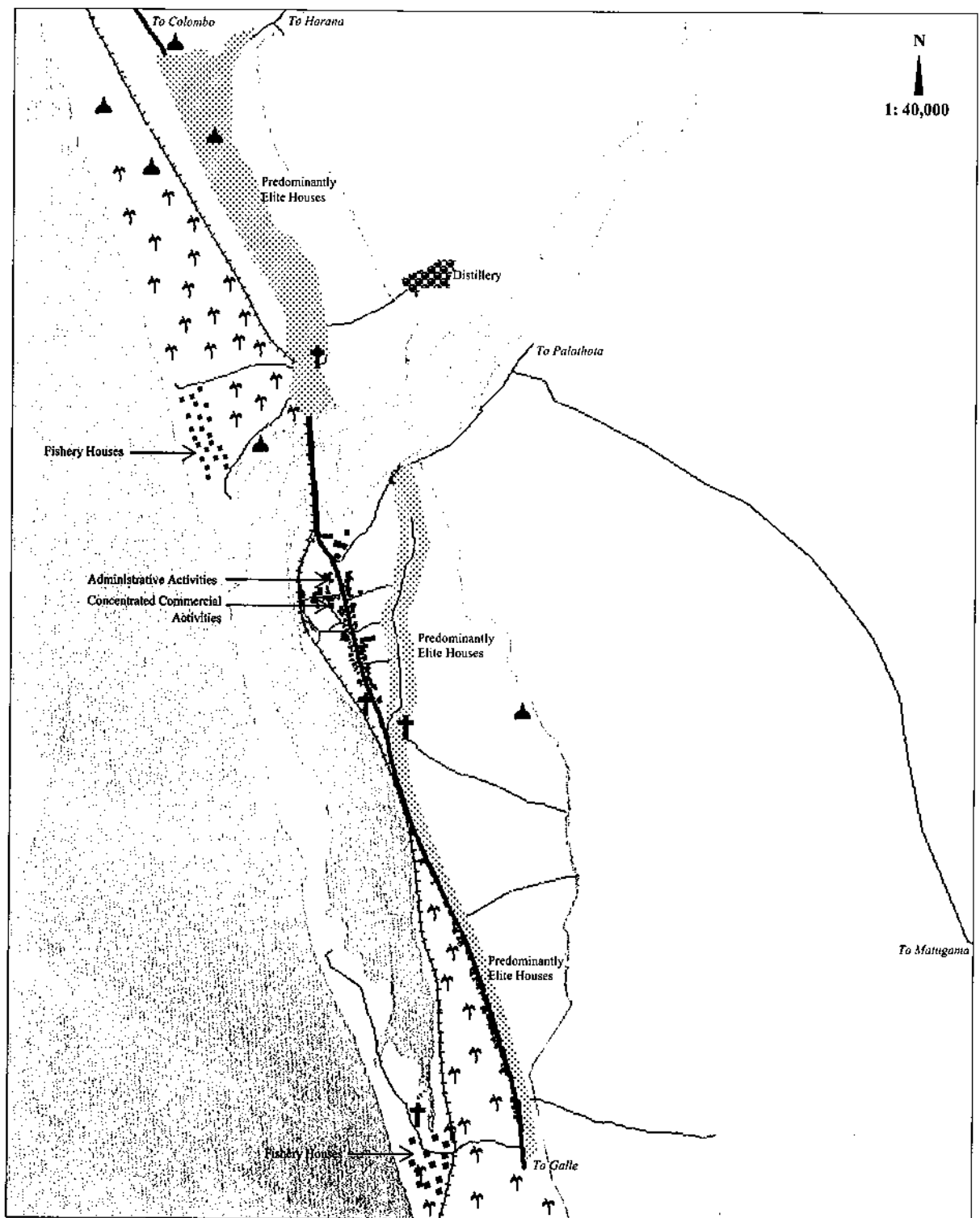
Map 4: Kalutara in Early British Period (1870)



Source: Author's construction based on...

- James, E.T. (1895). *Ceylon-an account of the island physical, historical and topographical with notices of its natural history, antiquities and productions*. Thisara Prakashakayo Ltd, Dehiwala, Sri Lanka. pp. 650-651.
- Interviews with people

Map 5: Kalutara in Late British Period (1880)



Source: Author's construction based on....:

- Fernando, M. (2002). *Bank of Ceylon super grade branch- Kalutara 50<sup>th</sup> anniversary: 2002*. Sri Lanka, Bank of Ceylon.
- Fernando, M. (2003). *Kalutara*. Kalutara South, Thejani publishers. pp. 1-44, 129-169.
- Interview with peoples

The motor car that came into the road and other technological advances towards the end of nineteenth century necessitated bridges to cross river. *Kalutara* Bridge was constructed in 1878 across the river linking the small island at the middle of the river to shorten the span considering technical feasibility. The bullock carts were increasingly replaced by Lorries and other motor vehicles. They all now took the new route on the bridge across the river. The trading activities, who targeted the traffic passing by, got shifted from old road to new road. Since the area adjacent to the bridge had already occupied by administrative uses, trading activities located themselves on vacant lands immediately next to that. Structures were put up along either side of the new road in a linier arrangement.



*Figure10: Buildings beside the road in a linier arrangement*

By 1870s, British built a church building at the ferry road of *Kalutara* north. After the construction of new bridge, British

established the 'Holy Cross Church' at *Kalutara* south which became the prominent landmark on top of the hill. Later, they erected two more church buildings facing main road within town limits; symbolizing the power of Christianity.

Buddhist revival movement at 19<sup>th</sup> and 20<sup>th</sup> centuries had many impacts upon the changing process of the spatial form of the town. It had originated as a reactive force to the on going Christian missionary activities all over the island. The anti-Christian polemicists who had to pass *Kalutara* on their way to *Galle* with the support of local elites established a branch of '*Sinhala Jathika Sanvidhanaya*' in 1911. The activities of the organization were attracting many rich entrepreneurs of the area including the distillers, planters and other business owners. They had made generous contributions to uplift Buddhist temples in the area. As a result, many new temples emerged in the area as well as many existing temples flourished into rich built environments with all elements required for a complete ecclesiastical complex.

One of the first moves the organization launched in 1910 was to protect *Kalutara* *Bodhiya* when it was in danger to be fallen by the proposed railway bridge. After several exchanges with the Governor of Ceylon and in fail, with the King of British Empire at that time (George VI), the organization managed to get the railway shifted from its original

trace to save the Bo tree. Associated around this element of victory, which is now becoming famous Bodhi temple (Gangatillake Vihara) a Trust (*Bodhi Bharakara Mandalaya*) was established by the wealthy and influential Buddhist businessmen of the area. The strong Buddhist elements in the area had concerns over the prevalent image of Kalutara dominated by the landmark Holy Cross church building standing at the hillock towards the south of the town. It is said that the tower of the church building was seen from long distances, even to the vessels passing in the sea, because of its height in addition to the higher elevation of its location. The Bodhi trust, followed by many attempts, acquired the fortress nearby, and initiated a project of building a prominent landmark at the most strategic location of Kalutara.

With the advances in trade and commerce, and the expansion of the public administration system, more people compelled to commute between peripheral areas and Colombo. In order to provide advanced transportation system, railway expanded from Moratuwa to Kalutara in 1900.

Rail attracted many commuters and as a result, the station roads had higher pedestrian movements. Business activities harnessed the economic potential by putting up shops along the station roads. In addition to Kalutara South, Kalutara North and Katukurunda were also developed into commercial areas by 1915.

When commercial activities demanded land on either sides of the main street at Kalutara-south, elite houses got shifted to Kalutara-North and set back from the main road. As a result of that fishermen and other poor groups were further confined to the coast. The railway demarcated a strong edge between the poor and the wealthy. Thriving trade activities attracted Moor community to Kalutara and many coconut lands at Kalutara-South and Katukurunda along the Galle road were converted to Moor residences.

By this time, toddy tapping was a common activity along the south western coast and distillery was a booming industry in the area. In 1924 Government introduced measures to regulate distilleries. At this instance, there were 200 small-scale producers at Kalutara whose activities

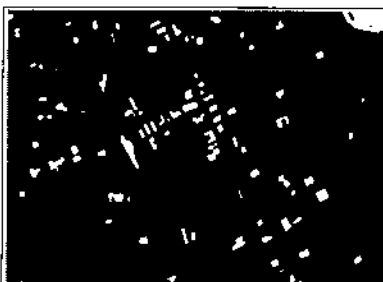


Figure 11: Station Road-  
Kalutara North



Figure 12: Station Road-  
Kalutara South



Figure 13: Station Road-  
Katukurunda



were carried out in spaces, less than the standards required by the regulations. As a solution, government provided lands to them along the Dutch canal where adequate space and water were available. This benefit was grabbed by local elites and established large scale distilleries on the given lands by attracting labor from small scale industries. New gravel roads were constructed to provide access to these industries from the main road. Thereby interior areas between Galle road and Dutch canals got access from a set of perpendicular roads. Gradually houses were put up on either side of the roads.

At the beginning of twentieth century, British considered these emerging commercial centers all over the island as suitable sites for decentralized administrative functions. Accordingly, in 1915 Kalutara town become a seat for a Government Agent. Local Board of Health which established at Kalutara in 1878 had upgraded into an Urban Council in 1923.

Consequently, the urban council took steps to develop the area into a state-of-art urbanity and some elements that British administrative planning norms necessitated in a contemporary British town such as the police station, court house, rest house, hospital (1926), town hall (1930), clock tower (1936),

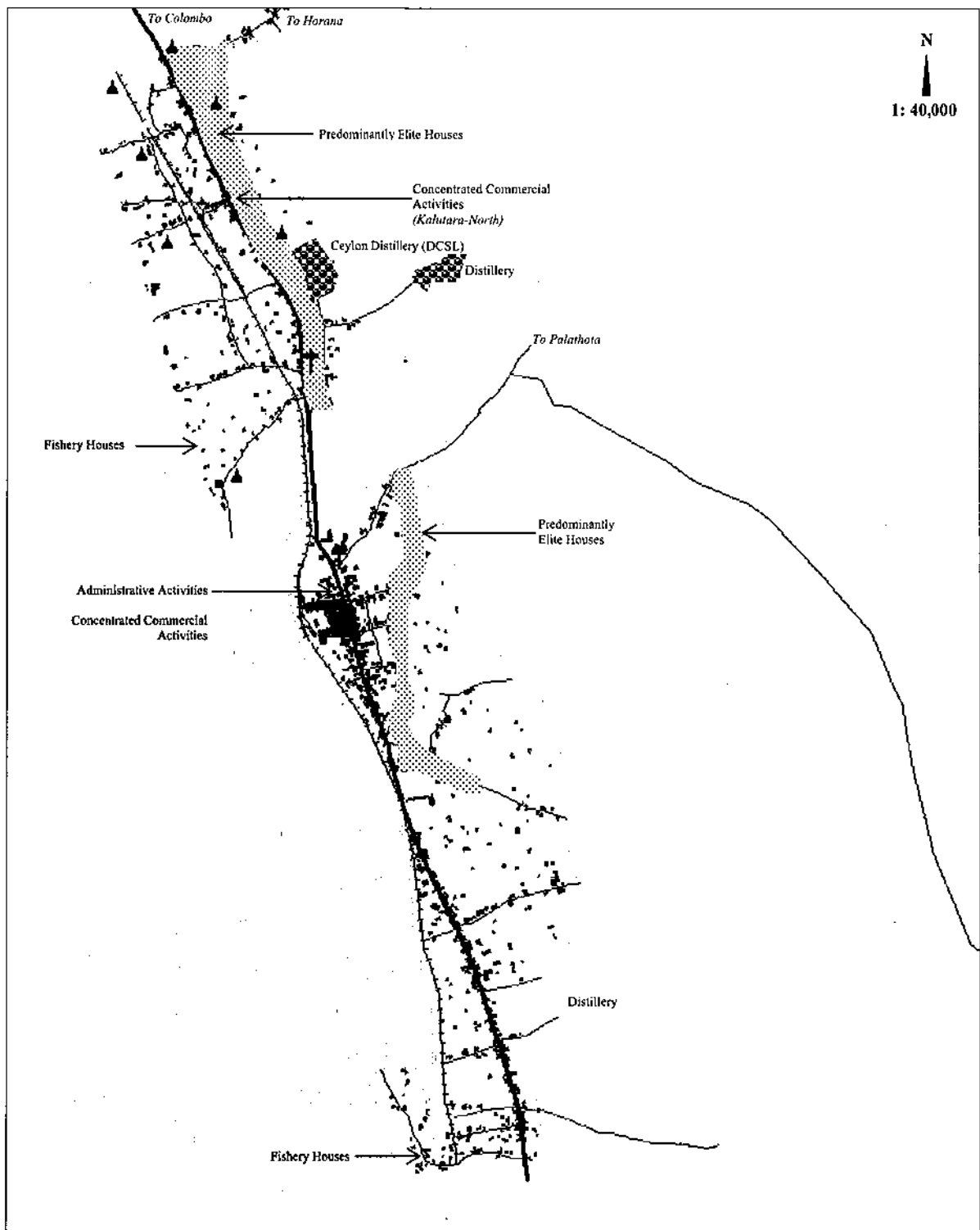
health office (1937), Public library(1938), etc were gradually established. Since there were no government lands available at the centre by then, the low-lying marshy land between the old and new Galle roads at Kalutara South was reclaimed to accommodate all these city elements. Parallel to those, urban utilities such as Electricity (1933) and pipe born water (1940) came in to serve the town. Since the reclamation of marshy land caused overflow of the river into built up areas, the irrigation department provided an engineering solution by a flood protection river bank development scheme. Housing and Town Improvement Ordinance (1915) and Urban Council Ordinance No. 61 of 1939 enforced within urban areas diagnosed, cadjan thatched old houses at the coast and poor worker's houses at the town as problems to an urban area. Hence, they all got relocated at Katukurunda and Kalutara north away from the main centre by 1922.

In this manner throughout British ruling, Kalutara's spatial form gradually got extended and several of the older elements of the built environment got replaced with new elements. Within this period it got the character of a contemporary colonial township within the British Empire.



Figure 14:  
Indigenous fishery  
houses at coast (left)  
and the new houses  
provided by the  
government

Map 6: Kalutara in Late British Period (1926)



Source: Author's construction based on...

- DeFonseka.com (No date). Diyambetalawa, Available from: <http://www.defonseka.com>[Accessed 15<sup>th</sup> December 2007]
- Fernando, M. (2002). Bank of Ceylon super grade branch- Kalutara 50<sup>th</sup> anniversary: 2002. Sri Lanka, Bank of Ceylon.
- James, S. (1993). Re collections of Ceylon. Colombo, Lake House bookshop. P. 11.
- Walter, D.G.F. (1971). In & Out of Kalutara Court: book 2. Kalutara, Kalutara Court.
- Weerasinghe, O. (1948). Housing schemes in Kalutara, Kalutara urban council silver Jubilee souvenir Colombo, The associated printers, Ltd.
- Woolf, B.S. (1914). How to see Ceylon. 5<sup>th</sup> ed. Colombo, Visidunu Publication. pp. 79-80.
- Town Survey sheet, 1926, Survey Department, Kalutara

At that time, Several Buddhist Schools such as Balika Vidyalaya , Kalutara Vidyalaya, Tissa College were Established with the contribution of local Buddhist elite. This has changed the existed domination of missionary schools such as Holy Cross College. Those Buddhist schools were located on lands where elite residents were located. Contemporary temperance movement which protest against the alcoholic liquor were supported by the *Sinhala Jathika Sanvidhanaya*. They made a huge pressure on distilleries. As a result distilleries had to close down and the industry had dramatically declined. Since then the land along Dutch canal, which had been used by distilleries were gradually converted to residential uses.

Increasing fleet of motor vehicles along the Galle road and the congestion apparent when they pass Kalutara became an issue towards 1930s. Increasing motor traffic could not befit the 'main street' which was not more than twenty feet wide, cohesively defined by commercial buildings abutting the intersections and occupied until such time by bullock carts and human interactions with not much of a trouble. Thus, in 1930 there came a proposal to widen it up to 'hundred feet'; perhaps, the numerological norm of British highway planning. This proposal, however, was not passively accepted by the political and social groups of the area and they had vehemently opposed it. Due to the protest, the project was held for thirty years without implementing. In a tug-of-war the project

however got completed in 1960 providing a motor vehicle friendly town which was never seen before in Sri Lanka. The praising of the project was mainly upon its facilitation of through traffic uninterrupted by town activities. The central carriageways were elevated to assure non interference of the local traffic and pedestrians throughout the passing of the town. Yet the continuing protests even after the construction, was of concern that the town got divided into two sections and the elevated road was making a barrier for inhabitants to use the town. The amicable solution brought in at the end was to have a few defined pedestrian crossings across the 'highway' that was originally meant for uninterrupted through traffic. The buildings that defined the old main street and demolished for the widening of it, were gradually emerging at the set back positions, redefining the new 'Broadway'. These new buildings were mostly flat facaded and free from elements protruding into the street due to planning controls, enforced in the form of street lines. At the same time, instead of more organic, humanly scaled and street sheltering characteristics seen in the former buildings, these new buildings were posing a dominating stand, striking order and reflected some ruling of the modern movement and international styles, that were influencing the architecture all over the world at that time.

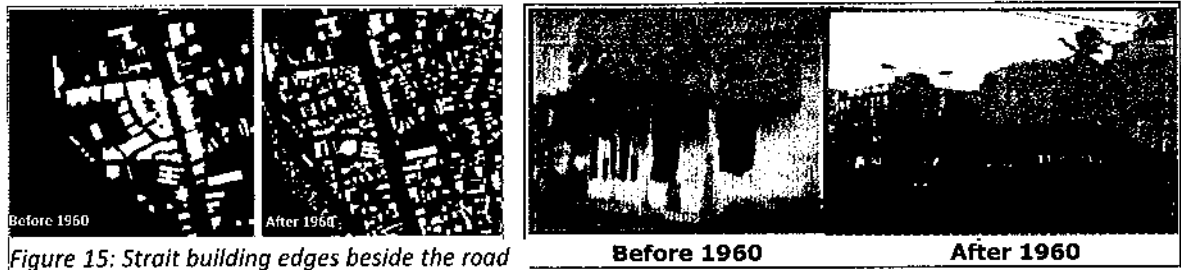


Figure 15: Strait building edges beside the road

When the linear development became intense along the Galle road, alternative directions of expansion were sort. Then popular 'satellite town' concept was resort by planning agencies and the decision was to shift the public institutions to Nagoda, a few kilometers interior of Kalutara town. Improvement made to Hill Street and Nagoda road to direct access to Nagoda. Trade-oriented Moor residents at Katukurunda provided necessary landscape for this. Accordingly, Kalutara town configured into linier spatial form along the Galle road and tended to grow along Nagoda road. National Health institution (1974), Teaching hospital, Katukurunda Air Force runner-way, Police training school were established on proposed administrative area at Nagoda. Many institutions have successfully shifted from the centre but it was difficult to move some government departments and political authorities. They have been located in a new building at Galle road in 1970s, which is yet the tallest building of the town seven stories in height, and reflect the influences of modern movement.

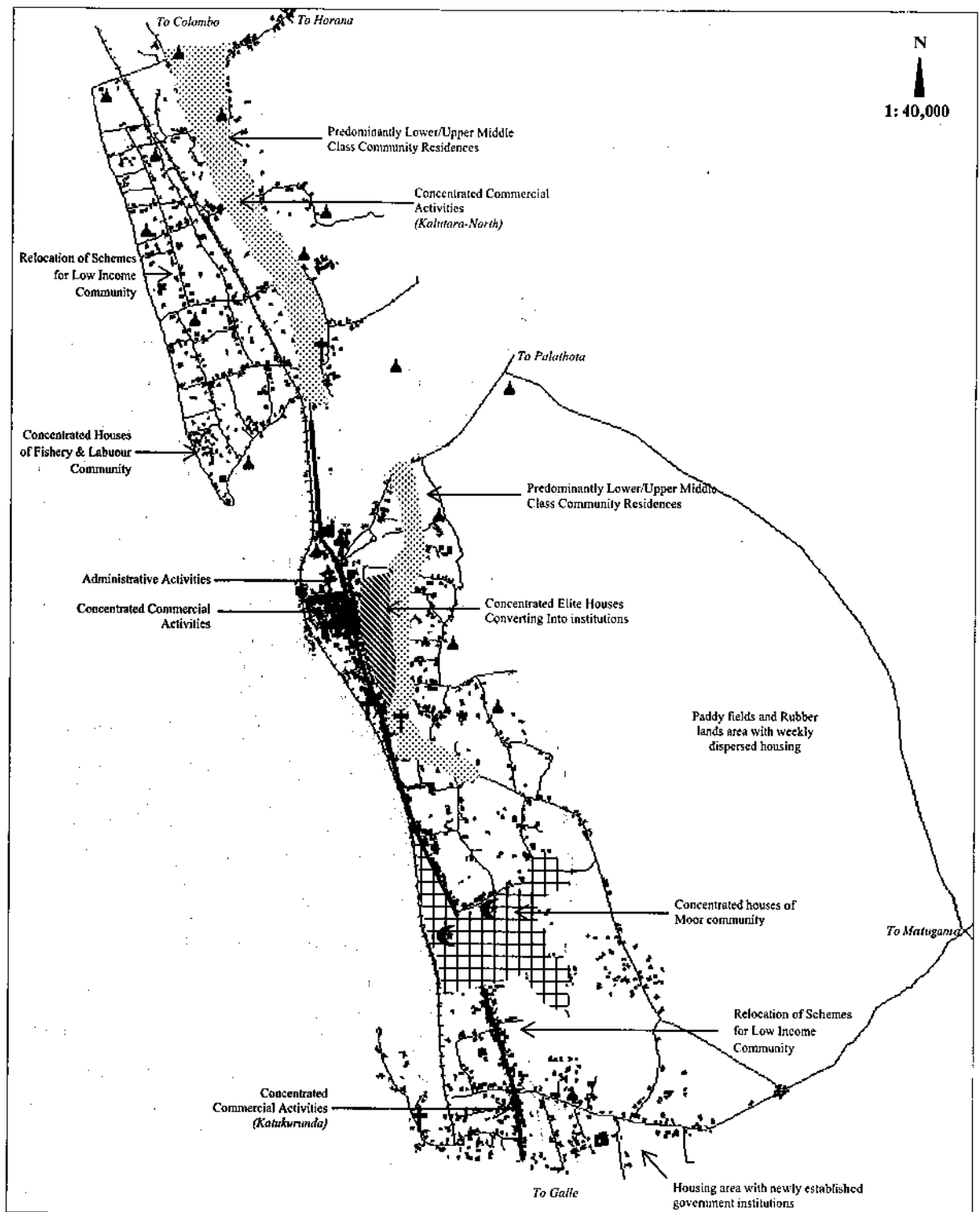


Figure 16: Kalutara-North coast; marine promenade

Sri Lanka had gained independence from British ruling in 1948 and the planning and improvement activities were transferred to the hands of local bureaucracy. Still, the visions had not yet shifted from British planning principles and norms. This was reflected at many instances of change. The native configured land use patterns of Kalutara-North coast was replaced by a 'planned' grid-iron road network, in order to regulate the use of land and to upkeep the urban character. A plan for the construction of marine promenade, similar to the Bondi Beach in Australia was proposed at this time. Administrative functions and public services located at the town centre were considered as an underutilization of land and made a decision to shift them to *Nagoda* a few kilometers interior of the town.



Map 7: Kalutara in Post Independence Period (1970)



Source: Author's construction based on...

- Bank of Ceylon super grade branch- Kalutara 50<sup>th</sup> anniversary: 2002. Sri Lanka, Bank of Ceylon.
- Fernando, M. (2002). Bank of Ceylon super grade branch - Kalutara 50<sup>th</sup> anniversary: 2002. Sri Lanka, Bank of Ceylon.
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- Kalutara urban council silver Jubilee souvenir (1948) Colombo, The associated printers, Ltd.
- Keble, W.T. (2004). Ceylon Beaten Track-1940. Colombo, Sooriya prakashakayo. pp.299-303.
- Town Survey sheet, 1970 Survey Department, Kalutara
- Topographic Map, 1:50000, 1980. Survey Department, Sri Lanka

After seventy years of enthusiastic work the Bodhi Trust erected the massive *stupa* at the upper terrace of the moderated fortress, now known as Kalutara Bodhi Maluwa, in 1980. This has changed the entire image of Kalutara, branding it as Buddhist town.



*Figure: Views of Kalutara Stupa & Holy Cross church from the coast*

Towards 1970s, tourism was promoted as a source of foreign income by the government of that time, and lands in Kalutara along the coastline and riverbanks were demanded by tourist resorts. Business demand on coastal lands for tourism made low-income settlements to be further marginalized and new generation to occupy the narrow strip of land between railway and lagoon, near the town centre.

Open economic policies of the government that came into power in 1977 effectuated a remarkable change in the socio-economic environment of the whole country. Service and manufacturing industries were promoted by the government on the belief that more GDP growth was achievable through those two sectors as against conventional agricultural sector. Thus, the urban areas, where service sector activities generally

concentrated, showed an unprecedented growth with more activities. Private sector was encouraged to invest on urban projects and the urban built environments underwent a tremendous change of character. State has taken initiatives for the development of infrastructure facilities in collaboration with foreign donor agencies.

Tamil groups were taking some share of businesses in Kalutara South from early days. They established a Hindu Kovil at the town when town was along the old main street. Parallel to that the migration of Moor community from adjacent areas such as Beruwala was also increased and gradually they began to compete for the economy of the place, which had been instrumental for Sinhalese Buddhist groups to influence socio-spatial relations in the area. When Tamil businesses evacuated the town in 1983, following to the communal riots, Moors acquired good part of the businesses in the town. They have enlarged the mosque in to a grand scale in late 1980s, which until such time was built at a smaller scale towards the south of the town. Because of its location and the scale it added a new landmark to the town.

Economic agents demanded lands from the centre, therefore many houses at old road converted to shops and institutions. The lands around the town were increasingly densely populated and more residential areas came in converting rubber and coconut plantations in the vicinity. Road development projects

undertaken by the government planned to upgrade the old cart track from Kalutara to Rathnapura (B8 road) providing access to peripheral areas. B8 road connected to Nagoda road at Nagoda junction. Gradually spatial form get elongated concentrated towards Nagoda road. Kalutara town that we

see today has a linear form which expands along the Galle road and Nagoda road, with a peak concentration of the centre, where bus station, railway station and other public activities located and the skyline peaks at the gigantic stupa located next to bridge.

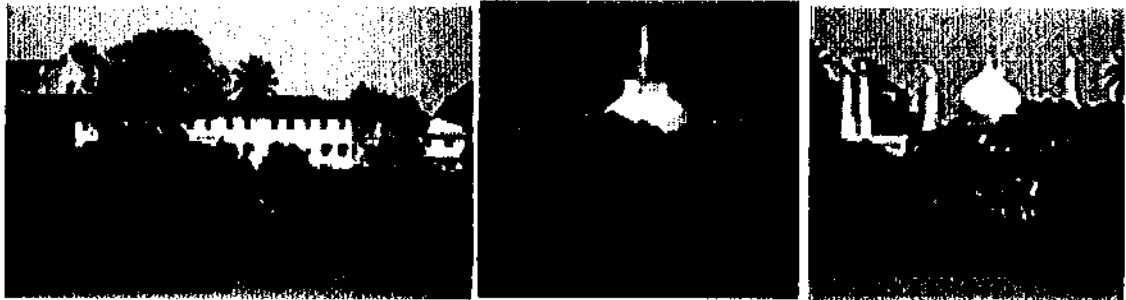
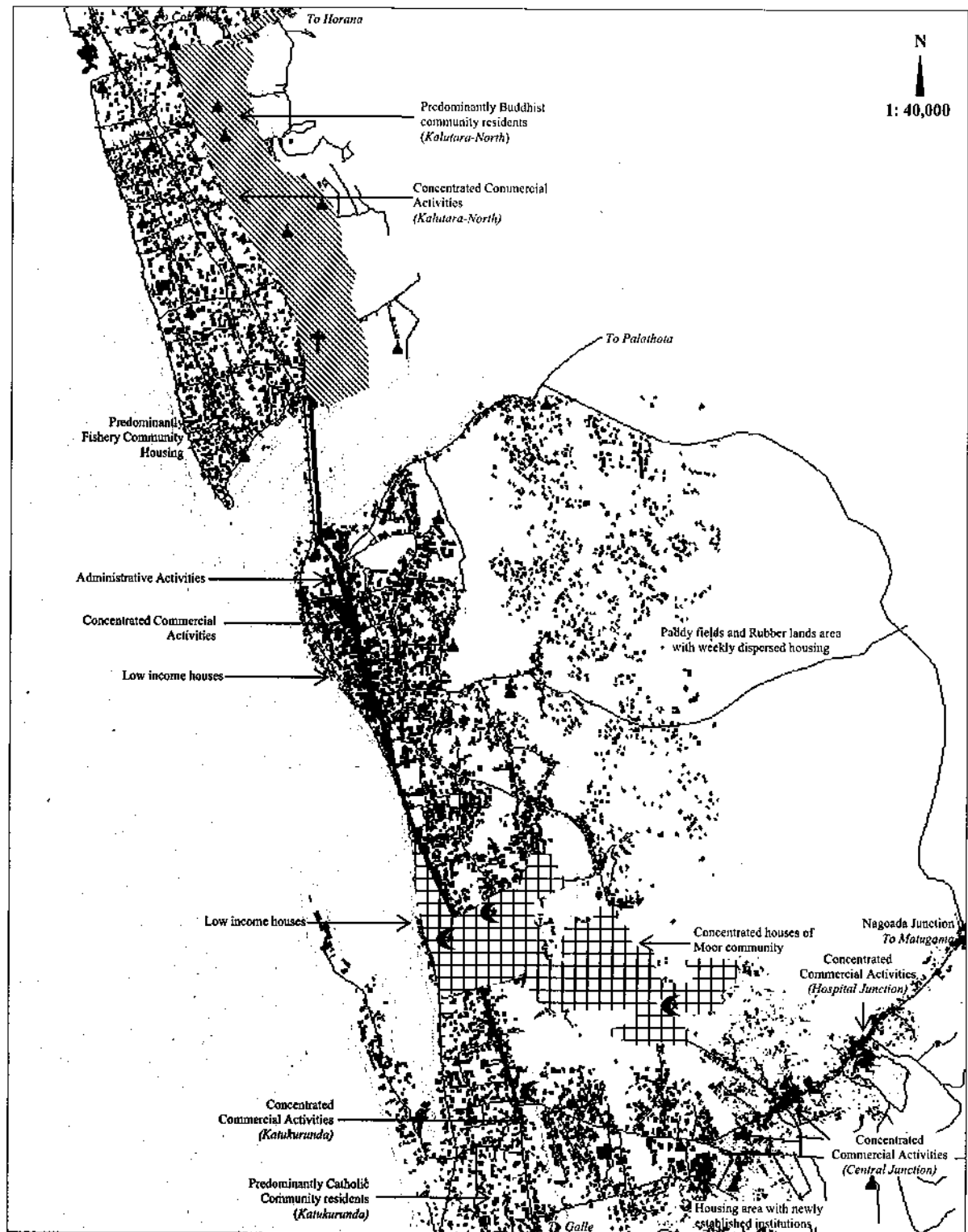


Figure 18: Views of Holy Cross church, Stupa and the mosque from the coast

Map 8: Kalutara in Present Period (2005)



Source: Author's construction based on....:

- Topographic Map, 1:50000, 1980. Survey Department, Sri Lanka
- Satellite Image Google earth, 2007 December
- Land Use Map, 2004, UDA Kalutara
- Field observation
- Interviews with people

## **Conclusion**

This study attempted to reformulate the already known story of Kalutara town as a historic process, intending to explain the spatial form as an evolving phenomenon. In order to conceptualize the process, the spatial extent of the town has been studied relating to the contributions of socio-cultural, economic and political agents acting in within a broader geographic context of the form over last three centuries. The discussion has used a sequence of maps that represented the spatial extent of Kalutara town at different periods in its history. The changes observed in the maps of the town at different phases clearly indicates that it has been in a continuous process of evolution. The brief, yet illustratable account given in this paper, indicated that Kalutara Town that we experience today is not a mere urban setting that accumulated some physical elements over time. According to the study, each element and its configuration in space has a storyline behind and what we witness today in Kalutara has configured over a few centuries and not in a few years. Moreover, it is not a 'spontaneous growth' as is mostly stated of small towns in some planning literature. but, each part of the configuration has been purposive and deliberated by some agent, both internal and external to the town. In summary; political, administrative, and other decisions of rules, ruled, users, used and even the natural setting were equally

instrumental in evolving the the spatial form into what it is today. As a process is a continuous and everlasting, their activities will be there tomorrow too, over a above deliberate planning efforts.

The spatial form of an urban area therefore, is not merely a physical entity which will be planned to a particular end state. Rather, it is continuously reproduced by different agents that acts within the socio-cultural, economic and political contexts associated with it. Sometimes these agents could not be recognized relating to a single event or a process since they are interwoven and sometimes contesting with each other. Buddhist revival movement is one such example which contested the Christian missionary activities but driven by several other political and economic agents. Therefore, the changes in spatial form caused by the Buddhist revival movement has to be seen in the context of Christian and other forces operated in making of it. There may be some constituent agents, other than the ones who were noticeable at Kalutara, and may be apparent in the case of other townships. Further, the same agents who were apparent in the context of Kalutara can act in a different manner in some other context. Hence, it is important to understand the spatial form is not a neutral entity and planning of it does not operate in a smooth line towards a specific end as it is mostly expected.

The main contribution of this study is to bring the above argument into light in Sri Lankan town planning context, where there is a clear gap in this sort of studies.

However, This study can be quoted for containing certain limitations. One obvious limitation is the speculative nature of the method adopted. In fact, reporting of historical events naturally involve predispositions of the reporter and thus, involves some kind of speculation. Yet, in this study, the interpretive sources are evaluated for their validity, while empirical evidences such as maps and elements, physically

observable in the field were the source of information to construct the scrutinized spatial form. Another limitation that can be cited is the assembling of the events. Events are concurrent and not consecutive and elongated rather than instantaneous. Therefore the way the incident reported in this paper may not be highly convening as there are some overlappings, pauses and repeatings. Future studies may look forward to overcome these limitations through better methods of reading & recording and opening new new arenas to read historical process of the evolution of spatial form.

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## COMPARATIVE STUDY OF ENVIRONMENTAL & PLANNING LAW AND DISASTER MANAGEMENT LAW RELATING TO THE CONSTRUCTION INDUSTRY IN SRI LANKA FOR SUSTAINABLE DEVELOPMENT

M. D. T. E. Abeynayake

### Abstract

This research will enable to gain basic understanding of Environmental Law & Planning Law relating to the construction industry; and analyse of new physical planning and disaster management rules and regulations in Sri Lanka. Laws governing protection of environment conservation and the use of natural resources in Sri Lanka are largely based on legislative enactments. There are many physical planning legislation in Sri Lanka such as Housing and Town Improvement Ordinance No. 19 of 1915, Urban Development Authority (UDA) Law No 41 of 1978, Town and Country Planning Ordinance No. 16 of 1946, Municipal Council Ordinance and Urban Council Ordinance, Pradeshiya Sabahas Act of 1987 etc for protection of the environment. Accordingly a set of building regulations are set out in the Schedule to the Ordinances. The objective of the laws are to promote planning of economic, social and physical development and its implementation in the urban areas. The Sri Lanka Parliament enacted two Acts namely Tsunami (Special Provisions) Act No.16 of 2005 and Disaster Management Act No. 13 of 2005 for rehabilitation. These two

Acts specially mentioned planning and recovery techniques and disaster management law of Sri Lanka. In the post tsunami reconstruction work, the government has given high priority to rebuild human settlement and shelters. These relevant legislation are related to rehabilitation and reconstruction strategies in tsunami affected areas through environmental protection. However there are various discrepancies, loopholes in these legislation.

Objectives of the research are comparative study of existing environmental and Planning law relating to the construction industry in Sri Lanka, Analyse disaster management legislation and recommend improvements to the Construction Law practices in order to make planning procedure more effective.

Every professional in the construction industry including the quantity surveyors, architects, town planners, engineers should be well aware of the environmental and planning law and abide by them in order to better protect the environment by the impact of construction project as well as create a country with better living conditions in future.

*Keywords: Legislation, law, Environmental, Planning, rules and regulations, Disaster Management, protection*

### **Objectives of the research**

- ❖ Comparative study of existing environmental and Planning law relating to the building and construction industry in Sri Lanka
- ❖ Analyse of environmental , planning and disaster management legislation and suggest improvements to the Development Law & Construction Law and the practices in order to make planning procedure more effective.

### **Methodology**

For the successful completion of the research the following methodology is adopted -

- Literature review of relevant books, recent journals and seminar papers on environmental law in order to get an idea of the background to the research.
- Review court cases ( Supreme Court , Court of Appeal t)relating to civil / commercial and construction matters and refer various Law Reports (eg. Sri Lanka Law Reports, All England Law Reports etc)
- Field information would be from those obtained from construction consultants, quantity surveyors, engineers, architects, Project managers and construction contractors who are directly involved in the construction activities

### **Scope of the research**

The research is mainly concerning Environment and Planning Law , Disaster Management Law and its regulations ,

however within the scope of the construction industry in Sri Lanka .

### **Introduction**

This research will enable to gain understanding of Environmental & Planning Law relating to the construction industry /built environment and analyse of new planning and disaster management laws concerning post – tsunami reconstruction strategy in Sri Lanka .

Environmental Law may be defined as the law that regulates natural resources in relation to human behavior and this law deals with improvement and protection of natural environment. Environmental destruction and pollution have seriously threatened the human life, health and livelihood. The methods of economic development, which the mankind has followed are also creating environmental problems. With the industrial and technological development, the mankind has not only improved the economic conditions but also altered the natural ecological balance. Industrialization, urbanization and construction industry has affected the natural environment adversely.

### **Basic Environmental Law**

Sri Lanka's Constitution adopted in 1978 specially refers ( Article 27) to the preservation of the environment .The laws governing the protection of environment , conservation and the use of natural resources

in Sri Lanka are largely based on legislative enactments. Sri Lanka Parliament enacted National Environmental Act No. 47 of 1980 to the establishment of the Central

Environmental Authority (CEA) in 1981 as the state agency responsible for the formulation and implementation of policies and strategies for the protection and management of environment in Sri Lanka. Also our Parliament enacted various legislation for protection of environment such as Fauna & Flora Protection Ordinance - No. 02 of 1931, Forest Ordinance - No 16 of 1901, Soil conservation Act - No 02 of 1951, National Heritage Act No 03 of 1988, Coast Conservation Act - No 51 of 1981 etc.

On the other hand Nuisance action is a common law tort action which is based on the premise that one should use one's property in such a manner so as not injure the interests of others. This action was one of the earlier tools used for the purposes of environmental protection. Thus nuisance which is unreasonable covers interference with use and enjoyment of land by water, fire, smoke, smell, fumes, gas, noise, heat, disease or any other like thing which may cause such an inconvenience. As far as environmental related actions in nuisance are concerned, the most common actions would be related to noise, pollution of the air and water ways, disposal of garbage, etc. As regards statutory nuisance, the Nuisance Ordinance No. 15 of 1862 provides that whosoever shall commit any of

the offences specified in that Ordinance, shall be guilty of an offence. Apart from this Ordinance, Municipal Councils, Urban Council Ordinance and Pradeshiya Sabhas Act also provide for the prevention of nuisance. Towards the protection of environment, aspects of control of physical planning and built environment in the country have a considerable role to play. In this regard an account of some important statutes seeking to regulate physical planning matters in the country is useful.

#### **Physical Planning Law**

There are many physical planning legislations in Sri Lanka such as Housing and Town Improvement Ordinance No. 19 of 1915, Urban Development Authority (UDA) Law No 41 of 1978, Town and Country Planning Ordinance No. 16 of 1946, Municipal Council Ordinance and Urban Council Ordinance, Pradeshiya Sabhas Act etc.

One such early legislation is Housing and Town Improvement Ordinance No. 19 of 1915 for control of physical planning matters to protect the environment. The objective of this Ordinance is to deal with the problem of insanitary conditions of urban overcrowding as well as to prevent such a situation. Towards this end, this Ordinance has introduced sanitary and environmental standards in urban areas and to improve the quality of the housing stock. Accordingly a set of building regulations are set out in the Schedule to the Ordinance. These regulations relate to

controlling height, light, ventilation and accessibility. In addition, the Ordinance provides for the introduction of town improvement schemes, slum clearance schemes and street line schemes.

Urban Development Authority Law No. 41 of 1978 (UDA Law) marks a new era in the physical planning exercise in Sri Lanka. This law was enacted in 1978 due to inadequacies found in both Housing and Town Improvement Ordinance No. 19 of 1915 and Town and Country Planning Ordinance No. 16 of 1946 to deal with physical planning problems of the urban areas of Sri Lanka. According to the preamble to the UDA law, the objective of the law is to promote planning of economic, social and physical development and its implementation in the urban areas declared under this law and control of environment. In order to realize these objectives, clearance of slums and shanties, coordination and control of development projects carried out by other governmental agencies, exercising of development controls to ensure conformity to development plans and planning regulations. UDA has introduced a new set of development regulations in areas under replacing the provisions of housing and Town Improvement Ordinance.

Regulations may be made by the Minister of Construction and Urban Development for the purpose of carrying out or giving effect to the principles and provisions of the UDA Law No.

41 of 1978 as amended by Act No. 4 of 1982 to regulate any physical planning projects or schemes prepared by any Government Agency or other persons in such areas or regulating the use of land and buildings in different zones, and imposition of conditions and restrictions in regard to several factors of building development or regulations regarding clear distances of buildings from electrical, telephone, telegraph, microwave and other lines, or regulations in respect of unsafe buildings and prescribing standards of fitness of buildings or regulations for attaining urban design objectives etc.

#### **New disaster Management Law**

On the other hand Sri Lanka is one of the countries that were hardest hit by the tsunami tidal waves that ravaged several countries in the Indian Ocean rim on December 26, 2004. The tsunami caused extensive damage and disruption to human life, livelihood, public and private property, economic infrastructure, buildings in Sri Lanka. The main objectives of the new planning laws in the tsunami affected areas are to provide immediate assistance to communities and local government authorities to speedily restart functions through protection of environment. The Sri Lanka Parliament has enacted special two Acts namely Tsunami (Special Provisions) Act No. 16 of 2005 and Disaster Management Act No. 13 of 2005 for the purpose of rehabilitation. These two Acts specially mentioned planning and recovery techniques of disaster management law of Sri

Lanka . The Government has been taken steps to shift from registering documents to registering titles in tsunami damaged areas .The Registration of Titles Act comply with this task . This Act main objective is grant rights with absolute rights and maintain a better land management system and scientific utilization of lands for any industry . Government of Sri Lanka implemented the disaster management plan for development and support of rehabilitation construction projects through these Acts .

In the post tsunami reconstruction work , the government has given high priority to rebuild human settlement and shelters. Therefore, relevant these legislation are related to the rehabilitation and reconstruction strategies in tsunami affected areas.

However there are various loopholes in these legislation and some times courts were observed.

#### **Environmental protection legal procedure**

The functions of the CEA as provided for in part II of the Act as to administer the provisions the Act and its regulations, to conduct, promote and coordinate research relating to aspects of environmental degradation or prevention, to specify standards norms and criteria for the protection of the environment, to regulate, maintain and control activities relating to aspects of environment and to undertake investigations to ensure compliance with the Act.

Recognizing that the CEA lacked regulatory powers to act on environmental pollution, the National Environmental Act was amended in 1988. The amendment requires all project approving agencies to obtain an Environmental Impact Assessment (EIA) from the developer proposing a development activity. The EIA process is a useful tool in assessing the impact of development projects and activities.

Environmental Impact Assessment (EIA) is a term used to define a document which assesses the environmental effects for proposed development projects or policies and evaluates alternatives to that project /policy that might be environmentally better. The EIA serves as an information base on which important decisions about the development activity is taken. EIA has become a decision making tool throughout the world and multilateral banks and aid agencies now require it as part of project appraisal. The importance of the EIA lies also in the fact that an EIA can become the basis on which community participation is encouraged and information about the development project is made transparent. The procedure established provides for the submission of EIA's in respect of projects that are generally determined by the Minister of Environment. Once an EIA is submitted, the Act provides for a public inspection period with mandatory 30 days period for the receipt of public comments. A public hearing may be held where the public interest so demands and a decision to



proceed with a project with or without conditions have to be arrived at thereafter. Therefore EIA process is a useful tool in assessing the impact of development projects and activities.

Further Antiquities Ordinance has been amended by Act No. 24 of 1998 to obtain an approval from the Department of Archeology before any major project is launched by any developer. This process is known as *Archeological Impact Assessment (AIA) Survey*.

Cost Conservation Act No. 57 of 1981 and the Board of Investment (BOI) No. 04 of 1978 are another two statutes with provisions for physical planning matters.

#### **Nuisance Law and Environmental Protection**

Nuisance action is a common law tort action which is based on the premise that one should use one's property in such a manner so as not to injure the interests of others. This action was one of the earlier tools used for the purposes of environmental protection. There are three types of nuisance actions, namely private nuisance, public nuisance and statutory nuisance.

A person is said to commit the tort private nuisance when he is held to be responsible for an act causing physical damage to land or substantially interfering with the use or enjoyment of land or of an interest in land. Thus nuisance which is unreasonable covers interference with use and enjoyment of land

by water, fire, smoke, smell, fumes, gas, noise, heat, disease or any other like thing which may cause such an inconvenience.

Public nuisance is a crime rather than a tort and an action for public nuisance will be instituted by the state. It is therefore, an act or omission which affects the reasonable comfort or convenience of members of the public. It is not necessary to prove that every member of the public has been so affected. A representative group is sufficient.

As far as environmental related actions in nuisance are concerned, the most common actions would relate to noise, pollution of the air and water ways, disposal of garbage, etc. As regards statutory nuisance, the **Nuisance Ordinance No. 15 of 1862** provides that whosoever shall commit any of the offences specified in that Ordinance, shall be guilty of an offence. Apart from this Ordinance, Municipal Councils, Urban Council Ordinance and Pradeshiya Sabhas Act also provide for the prevention of nuisance.

The provisions relating to **Courts System of Sri Lanka** are found in the Constitution of Sri Lanka as well as legislative enactments. Our Environmental and Planning Laws have given wide powers to the judiciary in relation to matters affecting the environment and physical planning matters.

#### **Case Law and new trends by courts interpretation**

*In Keangnam Enterprises Ltd vs Abeysinghe and Others case* Sri Lanka supreme courts

developed the Environmental Law. In this case the Petitioner-Company had established a metal quarry, a metal crusher and a premix plant at a site taken on lease for developing and rehabilitating the Ambepussa - Dambulla - Anuradhapura road: The Informant-Respondents complained of a public nuisance created by the Petitioner-Company. The Magistrate granted an injunction restraining the operation of the quarry under section 104(1) of the Code and also entered a conditional order under section 98(1) of the Code for the removal of the public nuisance caused by the quarry.

The Supreme Court of Sri Lanka clearly emphasized in the Eppawala phosphate case (Bulankulama Vs Secretary, Ministry of Industries – 2001) that environmental protection and environmental sustainability should constitute an integral part of the economic development process in order to achieve sustainable development and further explained that as a member of the United Nations could hardly ignore the environmental requirements, norms and standards laid down in the Stockholm and Rio Declarations.

In *De Silva vs. Minister of Forestry and Environment* (The case is on Pollution Control - Air Quality Regulation) case petitioner complained that the Ambient Air Quality standards were not being maintained in some parts of Colombo Metropolitan area. And the petitioner sought a direction of Court to the

Minister to make and gazette regulations specifying: Mobile Air Emission Standards, Fuel Standards and Vehicle Specification Standards. Court decided that the respondent, the minister will make and gazette regulations specifying those three standards. As a result of this case the National Environmental (Air Emission, Fuel and Vehicle Importation Standards) Regulation No.1 of 2000 was gazette intended to come into effect on 1<sup>st</sup> Jan 2003.

In *M.M. Khalid and Three Others vs. Chairman, Sri Jayawardenepura-Kotte Urban Council* (The case is on Public Nuisance) plaintiffs who were residents of Senanayake Avenue, which is a residential area and causing a public nuisance to the residents in that it was attracting crows and other animals, was causing diseases. Court decided that the respondent, the Urban Council, garbage must be disposed of in a manner which does not cause a nuisance.

The Eppawala case – Bulankulame and Others vs. Secretary, Ministry of Industrial Development (The case is on Protection of Natural and Cultural Heritage) there is a issue of damage to cultural heritage sites was raised in Eppawala Case. The petitioners state that Eppawala phosphate mining project sites in agriculturally developed area, which closer to Yoda Ela scheme. Therefore possible damage would be caused to Yoda Ela scheme. Court decided that, even the Antiquities Act and archaeological reserves definitions not

cover a "cultural heritage landscape" such as Yoda Ela, it must be under the Heritage Convention.

In the *Environmental Foundation Ltd vs. Geological Survey and Mines Bureau & Seven Others* (The case is on conservation of Biological Diversity) the petitioners claimed to prevent unsustainable sand mining in river beds. Operations under licenses are not monitored and causing severe environmental damage. As a result of unchecked mining, more sand is being removed from river beds. The petitioner pointed out that adverse environmental impacts of these activities include costal erosion, erosion of river banks, salt water intrusion, lowering of the water table, ecological imbalance and habitat loss. The petitioner requested court to carryout EIAs, to monitor the mining activities and to prevent the over exploitation of the resources.

The case is still pending

In the *S.C. Amarasinghe and Three Others vs. the Attorney General and Three Others*

(The case is on Land Acquisition) Lands belonging to the petitioners were to be acquired under the Urban Development Project Act No. 2 of 1980 for the Colombo Katunayake Expressway. The petitioners filed action challenging the order. The petitioners claimed that in forming an opinion that the expressway would meet the just requirements of the general welfare of the people. The petitioners also claimed that

approval for the project must be obtained under the National Environmental Act and can not be in respect of the expressway before an EIA has been prepared. The court states, it is not for this court to determine whether, upon a consideration of all these factors, the disadvantages out weigh the advantages of the expressway or whether in its view the expressway meets the just requirements it the general welfare of the people. The court was therefore unwilling to consider environmental issues at this stage and in relation to the issue of land acquisition.

In *Jayasinghe vs. Seethawakapura Urban Council and Others* (The case is on unauthorized constructions)

Petitioner was asked to remove the unauthorized structure within seven days by the 1st respondent. The area has been declared as a Development Area in terms of the Urban Development Authority Law. The petitioner seeks an injunction of the UDA notice as that notice was illegal and void. The court states, once an area has been declared as a "development area" no person could carry out or engage in any development activity in any such part without a permit issued by the UDA. And if any development activity is commenced, continued, resumed or completed without a permit issued by the UDA, in a development area, action has to be taken only by the UDA. Towards the protection of environment, aspects of physical planning and built environment in the country have a considerable role to play. In this regard an account of some important

statutes seeking to regulate physical planning matters in the country is useful.

#### **Panning legislation and its practice**

Housing and Town Improvement Ordinance No. 19 of 1915 is to deal with the problem of in sanitary conditions of urban overcrowding as well as to prevent such situation. Towards this end, this Ordinance has introduced sanitary and environmental standards in urban areas and to improve the quality of the housing stock. Accordingly a set of building regulations are set out in the Schedule to the Ordinance. These regulations relate to controlling height, light, ventilation and accessibility. In addition, the Ordinance provides for the introduction of town improvement schemes, slum clearance schemes and street line schemes. The development control powers are vested with the Mayor or chairman of the local authority under the Ordinance. Until the introduction of the Urban Development Authority Law (UDA) Law in 1978, this Ordinance together with Town and Country Planning Ordinance of 1946 were the main legal instruments with regulated the physical planning and development of urban areas in Sri Lanka. Today these two Ordinances are operation in areas which have not been declared under the UDA Law.

Urban Development Authority Law No. 41 of 1978 marks a new era in the physical planning exercise in Sri Lanka. This law was in acted in 1978 due to inadequacies found in both Housing and Town Improvement Ordinance

No. 19 of 1915 and Town and Country Planning Ordinance No. 16 of 1946 to deal with physical planning problems of the urban areas of Sri Lanka. According to the preamble to the UDA law, the objective of the law is to promote planning of social and physical development and its implementation in the urban areas declared under this law. In order to realize these objectives, the Urban Development Authority is vested with wide powers with regard to preparation and implementation of integrated plans for development, acquisition and disposal of property, clearance of slums and shanties, coordination and control of development projects carried out by other governmental agencies, exercising of development controls to ensure conformity to development plans and planning regulations. UDA has introduced a new set of development regulations in areas under replacing the provisions of housing and Town Improvement Ordinance.

#### **Urban Development Authority (UDA) Regulations**

Regulations may be made by the Minister of Construction and Urban Development for the purpose of carrying out or giving effect to the principles and provisions of the UDA Law No. 41 of 1978 as amended by Act No. 4 of 1982.

The above would normally comprise the making of Regulations on all matters stated or required to be prescribed or authorized under the UDA Law. The latter comprise the following in respect of authorized provisions;

- To regulate any physical planning projects or schemes prepared by any Government Agency or other persons in such areas (Section 8 ( r ) of UDA Law)
- The provision of regulating the use of land and buildings in different zones, and imposition of conditions and restrictions in regard to several factors of building development (Item 3 in Schedule of Amendment Act No. 4 of 1982)
- Regulations regarding clear distances of buildings from electrical, telephone, telegraph, microwave and other lines (Item 4 (k) of the schedule of Amendment Act No. 4 of 1982)
- Regulations in respect of unsafe buildings and prescribing standards of fitness of buildings ( Item 4 (l) of Schedule of Amendment Act No. 4 of 1982)

of 1982) The Minister at that time, acting under the generality of the powers conferred by Section 21, has published the, “ UDA Planning & Building Regulations 1986” in Gazette NO.392/9 of 1986.03.10.

- Regulations for attaining urban design objectives (Item 5 of the Schedule of Amendment Act No. 4 of 1982)

In addition, regulations may also be made on several matters on which they are required to be prescribed. One of the latter is on “the levy of fees and service charges in respect of different categories of developments” .However, all of the above matters should relate to a Development Plan prepared and sanctioned for the development of the corresponding UDA declared area.

On the other hand, since there were no Development plans prepared for the UDA declared areas in the immediate period after the establishment of the principal enactment (No. 41 of 1978), and of its amendment (No. 4

It specifically stated that the provisions of these regulations shall be applicable to every area for the time being declared by the Minister as a UDA Area. These regulations were approved by Parliament as required by Section 21 (3) of the law.

Different branches and divisions of Environmental & planning law in Sri Lanka are categorized as follows

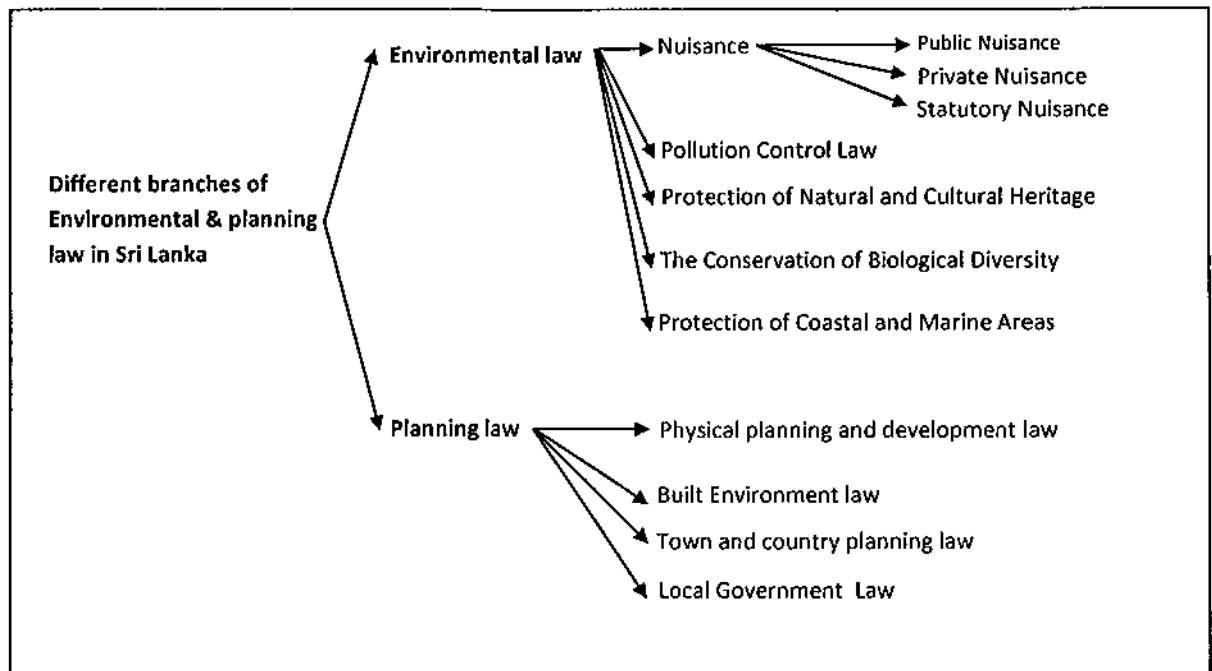


Figure 1 -Different branches of Environmental & Planning Law in Sri Lanka

#### Disaster management planning laws for tsunami recovery facilities in Sri Lanka

Sri Lanka is one of the countries that were hardest hit by the tsunami tidal waves that ravaged several countries in the Indian Ocean rim on December 26, 2004. The tsunami caused extensive damage and disruption to human life, livelihood, public and private property, infrastructure, buildings in Sri Lanka. The total death was over 40,000. Hence Sri Lanka Government enacted new laws to better protection of property rights and disaster management planning matters for affected cities.

The main objectives of the new planning laws in the tsunami affected areas are to provide immediate to communities and local government authorities to speedy restart

functions. Laws and regulations relating to the Tsunami Reconstruction are,

- ❖ Re-construction of infrastructure facilities in cities in Sri Lanka under the new planning law
- ❖ Re-settlement of displaced families outside buffer zone with property law rights
- ❖ Provide future disaster management development laws through new legislation
- ❖ Upgrading regional planning institutions and its laws.
- ❖ New planning and regulatory laws and institution arrangements for reconstruction

The Sri Lanka Parliament has enacted special two Acts such as Tsunami (Special Provisions) Act No. 16 of 2005 and Disaster Management Act No. 13 of 2005 for path of rehabilitation. These two Acts specially mentioned planning

and recovery techniques of disaster management of Sri Lanka .

The Government has been taken steps to shift from registering deeds to registering titles in tsunami damaged areas .The Registration of Lands Act ( Amendment ) have been passed in parliament of Sri Lanka . These two Acts main objective is grant rights with absolute rights and maintain a better land management system and scientific utilization of lands for any industry . Government of Sri Lanka implemented the disaster management plan for development and support of rehabilitation construction projects through this Acts

In the post tsunami reconstruction work , the government has given high priority to rebuild human settlement and shelters. Therefore, relevant these legislation are related to the rehabilitation and reconstruction strategies in tsunami affected areas.In the post tsunami reconstruction work , the government has given high priority to rebuild human settlement and shelters. Therefore, relevant these legislation are related to the rehabilitation and reconstruction strategies in tsunami affected areas.

However there are various loopholes in these legislation and some times courts were observed. Therefore ,

## **CONCLUSION**

Sri Lanka has a rich legal system which has evolved over the years to present state. The Sri Lankan legal system has sufficient provisions to protect the environment as well

as good system procedure for physical planning. The enforcement of National Environmental Act No. 47 of 1980 and Urban Development Authority Law No. 41 of 1978, marks a new era of Environmental and Planning areas of the country. The Central Environmental Authority and Urban Development Authority is vested with wide powers to enforce the regulations as described by the paper .

The courts of first instance that has the powers to act in the environmental planning matters are magistrate court and district court. The Court of Appeal and the Supreme Court has the appellate authority of environmental and planning law matters.

It can be concluded that the legal system of Sri Lanka is well structured with laws for environmental protection and planning issues. And also the regulatory powers are well granted for authorities and a structured court system is available to go through these matters. However still the environmental and planning issues continue to exist despite the legal detailed legal system. As we observed the loophole lies in the resource capacity of the relevant authorities to effectively enforce law in environmental and planning law issues and the effectiveness of jurisdiction for certain acts of wrong doing.

It should be noted however as lawful citizens of a country and as professionals we should be aware of these laws and regulations to ensure that we do not breach them by our



professional conduct. Every professional in the construction industry including the quantity surveyors ,architects , town planners, engineers should be well aware of the environmental and planning law and abide by them in order to better protect the environment by the impact of construction project as well as create a country with better living conditions in future.

People in 21<sup>st</sup> century highly appreciate the value of the sustainable development concept. Protection and improvement of environment is a major branch of the sustainable development. The growth of the construction industry is considered as an indicator of the level of development. Being a developing country Sri Lanka also having a higher growth in construction industry. Environmental and planning law is a tool introduced to regulate natural resources in the ambition of the protection and improvement of the environment.

Ignorance of the law is not an excuse to break the law. Since every single person is bound by the prevailing environmental law it is a mandatory requirement to understand the prevailing law. Legislations, judicial presidents, customs, opinion of writers are few identified sources of environmental and planning law in Sri Lanka. Many constitutional

provisions, environmental legislations are introduced as environmental law. Especially the National Environment Act and its contribution toward the regulating the protection of the environment is identified through this assignment. The mandatory legal requirements in construction with relate to environment and planning law (i.e. Environmental Impact Assessment (EIA), Nuisance and planning law, housing and town improvement ordinance, urban development law is few planning legal provisions that any entity enthusiast with regard to the construction should come to know.

Case laws give a comprehension understanding of the jurisdiction for different legal backgrounds. Beside that a comprehensive understanding relate to the court system in Sri Lanka is acquired through the critical analysis conducted in relation to the powers and functions of the court system. The degree of powers delegated and functions each court could implement in an issue of environment and planning was clarified and familiarized. This understanding of environmental and planning law together with the functions and powers vested to court system in Sri Lanka would be beneficial in the future carrier as professional quantity surveyors ,architects, town planners and engineers.

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## **POST DISASTER WASTE MANAGEMENT STRATEGIES IN ACHIEVING SUSTAINABLE BUILT ENVIRONMENT**

Gayani Karunasena, Dilanthi Amaratunga & Richard Haigh

### **Background**

Disasters cause a substantial damage around the world every year. In the recent few years, large scale earthquakes and tsunamis brought tremendous damages to urban and rural areas in the world, especially in Asia. A disaster is a serious disruption of the functioning society, causing widespread human, material or environment losses which exceed the ability of affected society to cope using only its own resources" (Disaster Management Centre of Sri Lanka, 2008). According to official statistics issued by the Centre for Research on Epidemiology of Disasters (CRED) and United Nations International Strategy for Disaster Reduction (UNISDR) in 2008, natural disasters killed 16,517 people and destroyed US \$ 60 billions worth of property and infrastructure in 2007 (UNISDR/CRED, 2008). According to the statistical figures although there is a reduction in impacts caused on human lives and infrastructure, the frequency of occurring disasters have increased during past years. (World disaster report, 2002, 2003, 2004)

Many disaster situations excessive demands were placed on environmental capacity, such

as water and soil contamination, hazardous waste threatening public health and safety; damages on environmental infrastructure, building and industrial sites (Perera 2003; UNEP, 2005; Pilapitiya et.al, 2006). This statement illustrates that disasters are so closely intertwined with environment and proper environmental management and governance is essential for long term peace, stability and security in disaster prone countries, particularly, in developing countries where affected communities rely heavily on natural resources for survival. This is not an exception to a developing country like Sri Lanka which was heavily affected by the Asian Tsunami in 2004 and frequent smaller disasters.

Waste and debris (building waste) becomes a key issue when compared to the extent of debris created as a result of disaster especially the Tsunami , particularly from destroyed buildings which were very significant (Joint UNEP/OCHA, 2005). Although there is a National Strategy for Waste Management in Sri Lanka it is hard to implement when a disaster occurs due to unawareness, in

capabilities etc. Although, there has been many environmental awareness and education programs conducted by government as well as and non governmental organizations, with no significant progress in improving waste management issues in Sri Lanka (Kurita et.al, 2006). This causes serious environmental and economical burdens on normal living conditions, reconstruction phases as well as on general municipal waste collection process (UNEP 2005; Bandara and Patrick 2003). In this context, waste management and disposal has emerged as a critical issue in responding to a disaster.

This paper attempts to document issues and challenges towards a sustainable waste management practice in post disaster Sri Lanka and the role of built environment professional's regards to that.

### **Research Methodology**

Comprehensive literature and documentary review was carried to identify waste management strategies, issues and challenges at post disaster scenario. This paper primarily based on the secondary data findings and includes more information pertaining to Asian tsunami 2004 since this is the single event disaster that recorded highest number of deaths, damaged houses and affected families during the past decade (Joint Report, 2005; Hettiarachchi, 2004). The structure of the paper consists of disasters, post disaster waste management practices and shortcomings, roles of built environment

professionals and conclusions to conclude the paper.

### **Disasters in Sri Lankan Context**

Sri Lanka is prone to natural disasters commonly caused by floods, cyclones, landslides, droughts and coastal erosion for generations with increasing losses of life and property. (Jayawardane 2006, p.1). Earthquakes have been recorded over the past 400 years and the country is also exposed to various human-induced hazards resulting from deforestation, indiscriminate coral, sand and gem mining and industrial pollutants (DMC 2005, p.1).

Sri Lanka is mainly suffered from the floods which imply that Sri Lanka is more vulnerable to floods. As an example, according to DMC recent flood on June 2008, 20 killed and 315, 368 people have been affected in 8 districts in island wide. However number of people affected by Tsunami which occurred in 2004 is nearly takes one third of number of people affected by the floods that occurred during three decades. Further, Natural Disaster Damage Statistics indicate this as the single event disaster that recorded highest number of deaths, damaged houses and affected families during the past decade (Joint Report, 2005; Hettiarachchi, 2004).

### **Tsunami and its impact**

On 26th December 2004 Sri Lanka was hit by the Tsunami caused by a massive off shore earthquake, measuring 9.0 on the Richter scale which was one of the largest ever

recorded (World Disasters Report, 2005). According to the Joint Report of the Government of Sri Lanka and Joint Development Partners (2005), it claimed 35,322 human lives, injuring 21,441 orphaned 1,500 children and left many families without spouses (Joint report, 2005). In addition, it states that two thirds of the country's coastline was affected, with damaged roads, bridges, buildings, railways and other transport systems, ports and harbours, electricity and water supply systems, communication lines, markets, towns, and private property (Shaw, 2006; UN-OCHA, 2005; ADB, 2005).

The economic impact of the Tsunami includes assets losses (direct damages), output losses (indirect damages) and fiscal cost (secondary effects) (ADB, 2005). The preliminary assessment of damages done by end-January 2005 through a joint effort of the United Nations Development Program (UNDP), Asian Development Bank (ADB) and World Bank (WB) estimated that Sri Lanka suffered asset damages of around Rs. 105 billion (4.5% of GDP) (ADB, 2005). The destruction of private assets was substantial (around Rs.1120 million) in addition to public infrastructure and other assets (ADB, 2005). The trauma, grief, and suffering associated with deaths of family members, relatives and friends, destruction of houses, displacement, loss of livelihoods, savings and valued belongings are unquantifiable (ADB, 2005).

### **Disaster waste management in Sri Lankan context**

The generation of waste at a post disaster scenario would not be avoidable at all. It is a national issue owing to capacity constraints of available landfills at most local authorities, particularly the Municipal Councils. Post disaster waste cannot be overlooked as it occupies a considerable proportion of landfill volume due to demolition waste and boom in construction activities after destruction. One major problem is the non-availability of landfills for such a huge volume of debris left over by a massive destruction.

In Sri Lanka the extent of debris created by the recent tsunami, particularly from destroyed building was enormous. A specific proportional breakdown of Tsunami-generated waste is not available (Pilapitiya et.al, 2006). A rapid inspection of waste at damaged areas, unauthorized dumps and unplanned landfills indicate that, by volume, a large part of waste consists of spoiled soil, damaged building material and vegetative matter, including branches, wood and domestic refuse. Smaller proportions of waste include plastic, metal (of various types and conditions) and items of undetermined origin. No significant presence of hazardous chemicals or technological items (eg., computers, televisions) was noted. Overall, an estimated 80% of waste was of spoiled soil, building material and vegetative matter (Pasche and Kelly 2007). Further, based on the assumption that the average weight of

debris (e.g. bricks, concrete and roofing material) per house destroyed was in the range of 3000 kg, for approximately 100,000 houses destroyed, there would have been about 300 million kg of debris from destroyed and damaged houses alone, without making allowances for lost household goods, furnishings, contents of shops, tens of thousands of vehicles and boats, fallen trees, destroyed roads, bridges and culverts. A conservative official estimate is about 200 million kg, but it could well be hundreds of millions more (UNEP, 2005). Disposal of these waste materials proved to be a huge issue because of the sheer volume and associated costs. Identifying the most suited and applicable strategy for each situation is of utmost importance in order to provide better assistance to victims and to avoid possible future vulnerabilities and environmental degradation (UNDP 2005; Blaine 1994; Moe and Pathranarakul 2006). Therefore, proper planning is of utmost importance to reduce future vulnerabilities and to improve long-term sustainability (Cardinali, 2001).

In case of the Tsunami, the UNEP developed UN Post-Asian Tsunami Waste Management Plan was launched in the Maldives and Indonesia which supported removal of disaster debris (UNEP, 2005). In the Maldives 16 waste management centres were constructed for waste collection and disposal; preparations were made for construction of further 22 waste management centres and a regional waste management facility. In

Indonesia over one million cubic meters of Tsunami waste were cleared, almost one hundred cubes of municipal waste collected through re-established municipal waste collection systems (EC, 2006).

Proper waste management practices include separation, removal, recycling and safe storage of waste. In a disaster situation, it may not be practical to employ a system of waste separation due to amount of debris and time and labour it would require (Treloar et al 2003; Bekin 2007). According to Selvendran (2005), waste separation system became impractical at a post disaster situation as cleanup and recovery became the first priority. Further, there were no previously organized waste management practices in most of Tsunami-affected local areas (Selvendran and Mulvey, 2005).

Local government authorities and volunteers worked diligently at removing and cleaning up neighbourhoods (Shaw, 2003). Land owners also cleaned their own premises depositing waste at locations for collection. Emergency efforts resulted in haphazard disposal of waste along roads, in open fields, into drainage ditches, low lying lands and waterways, including beaches. Burning of debris was also evident in certain areas impacting on air quality, which was later barred by the CEA. The CEA also instructed that solid waste be collected and deposited in open areas such as playgrounds until proper disposal sites were identified (Pilapitiya et.al, 2006). These practices caused long-term

problems by clogging waterways and polluting beaches.

The CEA identified a list of "suitable" sites for Tsunami related waste disposal which included "Best Practice Restoration Guidelines" prepared by the World Conservation Union (IUCN) with collaboration of the Sri Lankan Government for solid waste disposal (ICUN, 2005). The list of sites included abandoned clay mining pits, coral mining sites on land and publicly owned lands already been degraded by human activities, which could be restored. However, due to poor disposal practices waste was still visible at "open dump" sites identified by the CEA. Also in identifying suitable sites, the CEA did not conduct geotechnical or other technical investigations, but based its selection primarily on void space and availability of land. Therefore, these sites may contribute to long term adverse environmental impacts such as ground water contamination and exacerbation of flooding (World Health Organisation, 1990)

There was a considerable amount of recycling of building debris by individual homeowners who attempted to re-use material in reconstruction of houses. Recycling strategy is often to renovate all or part of a structure and rededicate it to new use (Bloomfield, 2004; Huge Brodin and Anderson 2008). Large amounts of bricks, tiles, timber, masonry stone and other roofing material was removed from the waste stream for re-use. Such recycling programs were generally

spontaneous and were quite successful since there was a market for re-using of these materials. There were instances of NGOs organized recycling through "cash for work" programs which was environmentally beneficial as well as helped in livelihood restoration (Peppiatt, 2001, Harvey, 2005).

It revealed that only a few materials are reused or recycled such as *kapok* bricks, roofing timber, doors and windows (frames and sashes), asbestos roofing and ceiling sheets and steel pipes. This was not an isolated issue on construction and demolition waste but a major environmental and economic concern all over the world. Therefore, it is a paramount issue to implement waste management strategies which comprise of recover, reduce; reuse and recycle (4R strategy) that immensely solves problems of material shortages and impact on natural raw materials.

#### ***Challenges in disaster waste management***

Main reason for failure in waste management is poor implementation of prevailing rules and regulations in the country (Perera, 2003). Rules and regulations connected to solid waste comprise of the National Environment Act 1988, Predeshiya Sabha Act 1993 and Urban and Municipal Council Ordinances 1987. The National Environmental Act 1988 restricts dumping of solid waste into environment and states the functions of the Central Environmental Authority (Perera, 2003). The local government Acts and

Ordinances state that local authorities are responsible for proper removal of non-industrial solid waste and should provide proper sites for dumping of solid waste (Perera, 2003). Further, Government enacted disaster management Act.No.13 of 2005 in May 2005 to provide legal basis for a Disaster Risk Management (DRM) in the country. However, due to scarcity of land and unawareness of new waste management strategies, still waste management is a critical problem in Sri Lanka.

According to the Rapid Environment Assessment Report for Sri Lanka (2005) next critical issue is poor coordination among national and local level authorities as well as absence of funds to cover costs of heavy equipment to support debris collection, recycling and disposal (UNEP, 2005).

Same source indicated that next critical issue is poor local expertise and capacities in recycling, composting and environmental management (UNEP 2005). Further, REA indicated that waste removal programs conducted at district levels with collaboration of NGOs do not consistently meet current best practices due to a lack of readily available guidance, practical procedures and resources (Shaw, 2003; Martin 2007).

Other critical issue for failures of waste management process is the resistant to change. Most victims of the Tsunami are low-income less educated people living along coastal lines of the Sri Lanka. Therefore, any significant social change needs to occur within

context of individual attitudes and behaviors (Shaw et.al, 2003).

With reference to the challenges indicated, it emphasizes the importance of increasing an organization's access to information and technical know-how by improving internal management structures, processes and procedures as well as strengthening partnerships among various players in waste management process.

#### **Role of built environment professionals**

Sri Lanka faced challenges in rebuilding a nation that never experienced such a calamity. The government forecasted that it would take 3-5 years to complete rehabilitation and reconstruction tasks and restore services and livelihoods that were severely affected. (Jayasuriya et al., 2005). Inexperience, incapacity and lack of concentrated and effective planning and monitoring processes emerged as salient features of failures in rebuilding an affected nation. Within this context, active contributions of built environment professionals are becoming a one of the key salient features.

A number of disciplines dominate the term 'built environment' but there is no agreed definition of built environment as to the remit of the term (Amanda et al. 2005). CEBE (2005) includes Architecture, Construction, Housing, Landscape, Planning, Surveying and Real Estate as the built environment professions. Whilst some Universities would categorise



Civil Engineering within the term built environment, this discipline is not normally so classified (Amanda et al. 2005). But Ashworth (2003) identified built environment is a term that encompasses the planning, design and construction of buildings and civil engineering structures and their ongoing management throughout their use.

There is growing concern for the safety and security of the civil infrastructure in relation to natural and manmade disasters. Safeguarding the future requires the expertise of professionals involved in the design, planning and construction of the built environment. This is particularly important to ensure that safeguards have the long-term vision to not only protect this generation, but future generations also (Loughborough University report 2006). Therefore it is recognized the necessity of contribution of the Built environment professionals in local context as well as in the international context to minimize the damages of disasters.

Ofori (1993) suggests that construction industry development has the following components: human resource development; materials development; technology development; corporate development; development of documentation and procedures; institution building; and development of operating environment of the industry. This not exception to waste management since the construction industry is the key contributor of the large proportion

of building waste at the post disaster scenario.

Thus, it is evident that, for a construction industry to contribute effectively to the effort to manage disasters, certain elements must be in place. First, there should be a regime of statutory regulations and codes which guides planners and designers to take preventive action. Secondly, there must be an efficient and effective enforcement framework to give practical effect to the regulations. As discussed previously, although there are various rules and regulations for management of waste in Sri Lanka, there are not properly implemented due to poor standards of local expertise and capabilities and lack of coordination and absence of local investment in the process (Eceberger, 2006). Other issues relate with poor implementation of rules and regulations and strategies and plans dictated from top levels with minimal or zero input from the people mostly impacted. In addition, they are ill-informed of realities of most people's lives and therefore, often unrealistic and prone to failures.

Ofori (2002) also suggests that first, human resource development should equip construction professionals with the knowledge and skills required to undertake appropriate designs and construction. It should be possible for local practitioners to keep themselves informed of developments in knowledge overseas. Second, a programme of materials development should be instituted in each region to find high-performing (disaster-

resistant) materials which are suited to the local context and are of good quality, durability and affordability. Third, it is necessary to put measures in place in pursuit of the technological development of the industry to ensure that it has the capability to handle the various projects which will be required to provide protection against disasters, and those which the post disaster reconstruction process will involve. This further emphasis on the importance of capacity building to increase an organisation's access to information and technical know how by improving internal management structures, process and procedures and strengthening partnership among various players in the waste management process. These will eventually enhance the knowledge & skills of built environment professionals where they can contribute for effective waste management process.

### **Conclusions**

The generation of waste at post disaster scenarios would not be avoidable at all. This is not an exception to Sri Lanka which was heavily affected by the Asian Tsunami in 2004. Among many other issues, post-disaster waste management is a key owing to capacity

constraints of available resources including lands, expertise, funds and technology. Further, poor coordination and lack of communication led this to more critical status. As discussed previously, the emergency nature of a situation as well as poor planning with lack of commitment to address environmental impacts of the post-Tsunami scenario by the built environment professionals resulted in serious long term adverse environmental and natural resource consequences.

Within this context, expanded efforts should address all project aspects, including organization, logistics, recycling, disposal and landfill site selection and management. To achieve above, it is needed to identify requirements of national and local authorities for resources, equipment and environmental expertise and match these with donor offers. Further, best practice approaches to debris removal should be developed to minimise negative environmental impacts. As a result this paper concludes with highlighting the importance of capacity building of built environment professionals for their contribution for effective waste management and their role in minimising the disaster waste management.

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## STUDY OF EFFECT OF SELECTED UNDERLYING FACTORS OF SITTING COMFORT AND DISCOMFORT ON COMFORT AND DISCOMFORT PERCEPTION

M.G. Mohamed Thariq & Harsha Munasinghe

### Abstract:

The present study was carried out under university class room settings to investigate the influence of selected underlying factors of sitting comfort and discomfort at their different levels on the perception of sitting comfort and discomfort while sitting. Questionnaires with 7-point rating scales were used to obtain feelings elicited with five different chairs while sitting. Questionnaires filled by 49 subjects were analyzed. In the factor analysis, comfort and discomfort factors were extracted validating the factor structure of comfort and discomfort obtained in previous studies. The results

obtained indicated that comfort and discomfort factors can co-exist at the same time at different levels. The results further showed that back pain was the most important discomfort factor while relief feeling is the most important comfort factor in sitting comfort and discomfort perception. From the findings of the study it is suggested to study seat features that may influence relief feeling in comfort perception.

Key words: *physical factors; emotional factors; seat features; comfort*

## **Introduction**

Comfort is one of the main concerns in office seat design. Scientific work in the past in the design of seat made a remarkable progress in providing comfortable seats. Researchers keep on investigating the factors related to comfort in sitting. Comfort is influenced by several factors, such as postural support provided to the body, contact pressure with the body, thermal and humidity characteristics of the seat and aesthetics.

Several studies indicate that comfort and discomfort are affected by distinctly different variables (Kleeman, 1981; Kajimo et al, 1982). Zhang et al, (1996) identified the multidimensional properties of comfort and discomfort. It is argued that the sitting comfort and discomfort are affected by different set of factors. Physical strain factors (e.g. muscle contraction, joint angles, pressure distribution – that produces feelings of pain, soreness) affect the discomfort. Comfort is affected by well being factors (e.g. relaxation, impression) (Zhang, 1992; Zhang et al., 1996; Helander and Zhang, 1997). A theoretical model presented by DeLooze et al (2003) recognizes discomfort and comfort as conceptually separate entities. The model identifies the underlying factors for comfort and discomfort at the human, seat and context level. Zhang et al, (1996) postulated a two-stage hypothetical model, based on which, comfort and discomfort need to be treated as different and complimentary entities in ergonomic investigations. They noted that transition is possible from

discomfort perception to comfort perception while sitting. Hence, it is considered that different underlying factors at their different levels may affect different range of comfort/discomfort.

Several subjective and objective methods have been used to evaluate or predict seat comfort. Shackel et al. (1969) suggested that in sitting comfort assessment the user's subjective assessment be the ultimate criterion. Subjective sitting comfort evaluation is a widely accepted method in the field of ergonomic research. Though, the merits of subjective rating scale were questioned by Annett (2002), many practitioners and researchers assume that comfort and discomfort are two opposites on a same continuum. Comfort/discomfort ranges from extreme comfort through a neutral state to extreme discomfort (e.g. Shackel et al., 1969). On the other hand, Helander and Zhang (1997) argue that comfort and discomfort can be quantified / measured independently. Further they stated that multi-dimensional chair evaluation checklist developed by them produced consistent results in field studies. Having their findings they concluded that the checklist can be used for practical evaluation of sitting comfort and discomfort. Kyung et al. (2007) recommends to use discomfort ratings to measure basic qualities of seats with a prevention of pain objectives and to use comfort ratings to measure more subtle qualities of seats with hedonomic objectives.

The checklist used by Helander and Zhang (1997) assumes that different levels of feelings are produced for various individual underlying factors of sitting comfort and discomfort. Further, Helander and Zhang (1997) indicated that when physical strain factors are present (biomechanical factors), contribution of well-being factors to overall comfort feeling diminishes. Hancock and Pepe (2005) showed that discomfort and comfort are at different stages of needs, the latter being placed at a higher stage than the former. In summary, previous studies indicated that comfort and discomfort are two stages in human comfort perception. The one of the important outcomes of the two stage (comfort /discomfort) concept was the development of the multi-dimensional check list which recommends to evaluate comfort and discomfort using separate scales.

Preliminary evidence indicated the tendency that the two stages (comfort/discomfort) may overlap (Zhang, 1992). This may be due to the different degree of effect of various underlying factors at different levels. This ultimately may have an influence on the development of multi-dimensional check list. However, the understanding of how various individual underlying factors of sitting comfort and discomfort at their different levels affects comfort and discomfort perception while sitting is lacking in the literature. In this study therefore we intend to investigate further how underlying factors of sitting

comfort/discomfort influence the perception of comfort/discomfort while sitting.

### **Methodology**

The methodology adopted for this study is described below.

### **Subjects**

Fifty university students (26 males and 24 females) from the University of Moratuwa, Sri Lanka participated in this study. All of the students who were willing to participate from the freshmen of Faculty of Architecture were selected as experimental subjects. Their consent to participate in the study was obtained. Their stature and weight were obtained. The characteristics of experimental subjects were given in table 1.



Table 1: height and weight of the experimental subjects

Characteristics of subjects	Minimum	Maximum	Mean	Standard deviation
Height (mm)	1474	1763	1624.3	83.5
Weight (kg)	34	83	50.1	10.4

### Chairs

Five different types of student chairs currently used by the university students were selected for the study. Though the chairs were student chairs, efforts were made to keep the chairs different in design i.e. dimensions and appearance to represent the different feelings produced by the chairs (Vergara and Page, 2002). The chairs used by Vergara and Page (2002) were office chairs and ergonomically designed compared to the student chairs. Figure 1 shows the chair types used in the study. The chairs were mounted with the

desktops in the right side to the position where armrests are fitted. The mounted desktops are mainly used for writing purpose. Hence no tables were used in the experiment. The chairs were marked as F, G, H, K and M in the back side of the backrest. The mounted desktop of chair H was foldable. Except this, all the other chair features were non adjustable for each chair. Five chairs were taken from each different chair type to facilitate the participation of 25 subjects at a time.

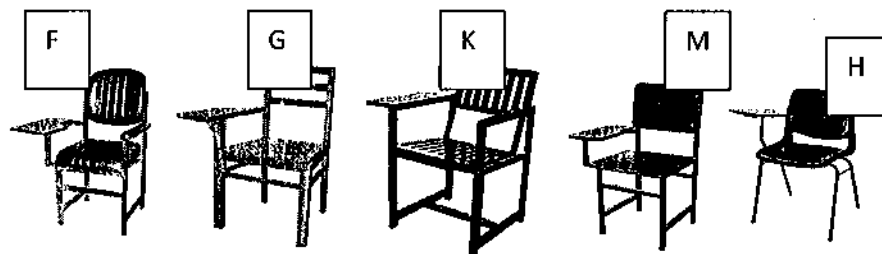


Figure 1: Student chairs used in the experiment

### Questionnaires

Two types of questionnaires were used.

#### Rating questionnaire

The principles adopted by Helander and Zhang (1997) were utilized with modifications to construct this rating questionnaire. For this study, discomfort descriptors such as pain and

fatigue were selected. The discomfort descriptors in the cluster analysis by Zhang et al, (1996) were the main basis to select pain and fatigue for the study. Further, the factors such as pain and fatigue are normally used in chair evaluation studies (Wilder et al, 1994

and Vink et al, 1994). The questions to rate pain feelings from different body regions were included in this questionnaire. The results of the cluster analysis of Zhang et al. (1996) were the basis to select three comfort descriptors i.e. impression, relaxation and relief.

The questionnaire was structured in order to obtain various feelings of subjects while sitting in different types of chairs. Those feelings such as impression, relax, relief, neck pain, upper back pain, mid back pain, low back pain, upper leg pain, lower leg pain and fatigue were included in this questionnaire to be rated at a 7 - point numerical rating scale (i.e. 1- not at all, 4-moderate and 7-extreme). Rating scales to measure both comfort and discomfort independently at 7 – point scale also were included in the questionnaires. With the addition of the separate rating scales for comfort and discomfort, two different sets of questionnaires were used. The first set of questionnaire was marked as “A” and the second set of questionnaire was marked as “B”. The only difference between the questionnaire A and B was that Questionnaire A contains rating scale for comfort and the Questionnaire B contains the rating scale for discomfort. Inclusion of both comfort and discomfort scales in the same questionnaire may confuse the subjects (Helander and Zhang, 1997). It is assumed that the questionnaire will measure the different levels of feelings that are elicited with

different chairs in the students learning environment.

### **General questionnaire**

It was used to obtain the general information such name, age, sex etc. Stature and weight were included in this questionnaire. The questionnaires constructed in English language were translated by professional translators into Sinhalese and Tamil languages which are native to the subjects in Sri Lanka.

### **Procedure**

The subjects were divided into two groups with 25 participants in each group. They were given a brief introduction about the study prior to the experiment. All of the participants were requested to test each chair by sitting for 3 hours in the lecture room during their lessons. They were given instructions on how and when to fill out the rating questionnaires. Chairs were randomized and assigned to the participants before starting the testing. The subjects were given explanation on how to use the adjustability features in the case of foldable mounted desktop.

The questionnaire “A” was distributed to a group of subjects and the questionnaire “B” was distributed to another group of subjects. They were given body part diagram (Vink et al., 1994) which indicated the body parts to facilitate rating pain. They filled the questionnaires four times during three hours; i.e. 5 minutes after sitting, 1 hr, 2 hrs, and 3 hrs after sitting. The experiment was organized to suit the lecture time schedule of

the students. A two-hour and a one-hour lectures one after the other were selected. This helped the students to sit for three hours. The subjects were allowed to leave their chairs between the two lectures only for essential need such going to toilet. The subjects took rest in their chairs between two lecture sessions. The subjects participated evaluated one chair each day, thus it took five days to complete five different types of chairs for each subject. The same lecture hall was used for the entire experiment. The subjects were compensated for participating in the experiment. One incomplete questionnaire was discarded, therefore, total of 49 subjects' questionnaires were used for the analysis.

General questionnaires were administered only once in each session. At the same time

stature and weight were measured using anthropometer and weigh scale. Data collected were analyzed using the SPSS statistical software.

### Results and discussions Factor Separation

The factor analysis was conducted with Varimax rotation to separate main factors for data collected on feeling factors using questionnaires. All of the feeling factors rated in the questionnaires were separated into two main factors (Table 2). The factor 1 consists of all the discomfort feeling factors, and the factor 2 consists of all the feeling factors of comfort. The resulted factor scores were plotted against the comfort ratings and discomfort ratings (Figures 2, 3, 4 and 5).

Table 2: shows the results of factor analysis

Feeling factors	Factor 1 (Discomfort)	Factor 2 (Comfort)
Neck pain	0.869	-0.126
Upper back pain	0.910	-0.191
Mid back pain	0.890	-0.196
Low back pain	0.880	-0.211
Upper leg pain	0.819	-0.202
Lower leg pain	0.853	-0.134
Fatigue	0.813	-0.268
Impression	-0.017	0.727
Relax	-0.290	0.868
Relief	-0.313	0.851

Two main factors were separated in the factor analysis for the data collected. The first factor consists of neck pain, upper back pain, mid back pain, low back pain, upper leg pain,

lower leg pain and fatigue. Therefore, it is named as factor 1 or "discomfort factor" thereafter. The second factor consists of impression, relax and relief, and it is named as

factor 2 or "comfort factor". The results obtained were similar to the results obtained by Zhang et al. (1996) and Helander and Zhang (1997) where the comfort is affected by different set of factors and discomfort is affected by different set of factors. Factor 1 and factor 2 for the data collected explain 77% of the total variance. The factor loadings for upper, mid and low back pain indicate that back pain was the most important discomfort feeling factor in sitting.

The factor scores of factor 2 (comfort) was plotted against the actual comfort ratings (Figure 2). The relationship indicates that comfort scores had strong linear correlation with actual comfort ratings. With the increase of comfort scores, comfort rating increased. This indicates that sitting comfort level can be predicted having variables such as impression,

relax and relief. This result also provides evidence for the sensitivity of comfort scale used to measure comfort. The results also indicate that impression, relax and relief can be included in the multidimensional scale to measure comfort. These results were found to be consistent with the findings of Helander and Zhang (1997). The Figure 3 shows the plot of factor score of factor 1 (discomfort) against the actual discomfort ratings. Discomfort factor score was positively correlated with actual discomfort ratings; this was not strong as the correlation between comfort scores and comfort ratings. The correlation value between comfort score and comfort ratings was 0.76 where as it was 0.60 between discomfort score and discomfort ratings.

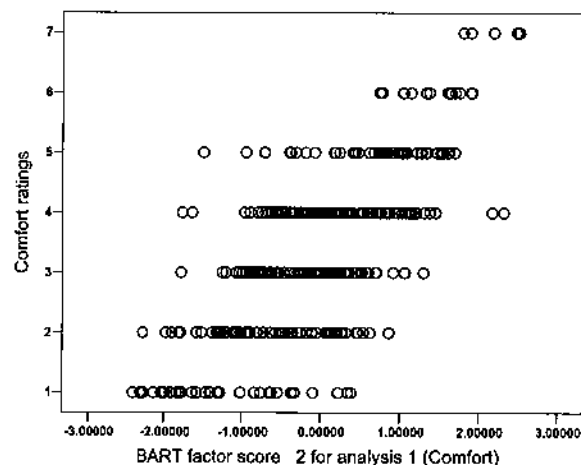


Figure 2: factor score of factor 2 (comfort) was plotted against actual comfort ratings

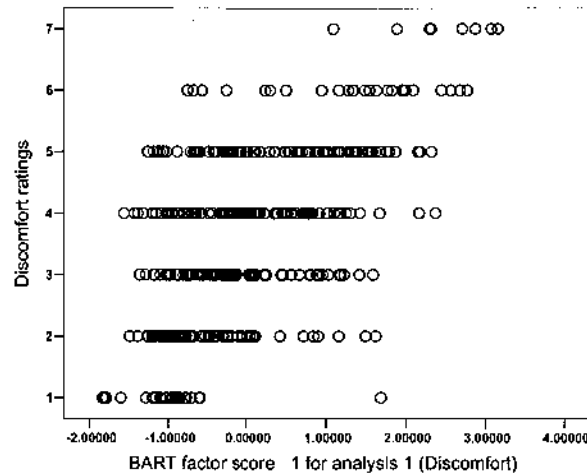


Figure 3: factor score of factor 1 (discomfort) was plotted against actual discomfort ratings

In Figure 3, Lower discomfort factor scores associated with lower levels discomfort rating as well as higher levels (levels 5 and 6) of discomfort rating. The result may indicate that to perceive mid and higher levels of discomfort (level 5 and 6), presence of higher level of discomfort factors are not necessary. Discomfort above moderate levels (levels 5 and 6) may be perceived with the presence of low levels of discomfort factors (figure 3). The association of higher discomfort perception

with low value of discomfort score may indicate that there are other important factors affecting subjective responses (Kyung et al., 2007) that were not included in the study. However, the trend in Figure 3 shows that higher levels of discomfort factor scores reasonably associated with higher levels of discomfort ratings. This result is consistent with those obtained by Helander and Zhang (1997).

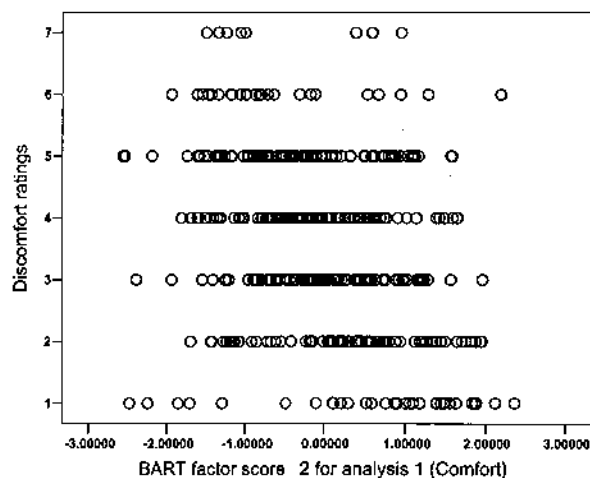


Figure 4: factor score of factor 2 (comfort) was plotted against actual discomfort ratings

Discomfort ratings has an inverse relationship with comfort factor scores ( $R=-0.46$ ), see Table 5. As shown in Figure 4, there is no clear trend between comfort factor score and

discomfort ratings, indicating overall discomfort perception is weakly affected by comfort factor score.

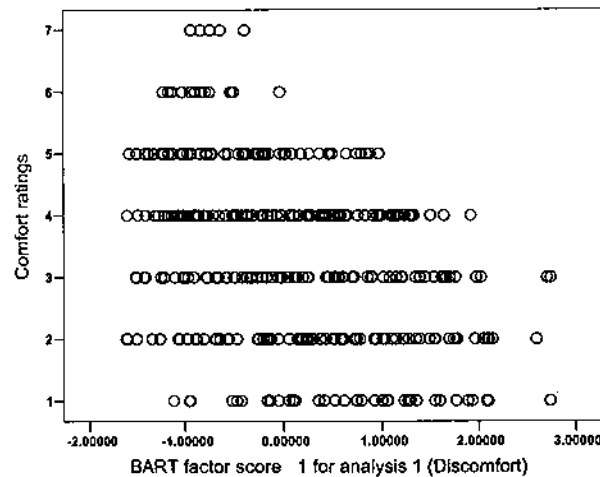


Figure 5: factor score of factor 1 (discomfort) was plotted against actual comfort ratings

Low values of discomfort factor scores associated with full range of comfort ratings from 1 to 7 (Figure 5). There was a general trend for decrease of comfort ratings with increase of discomfort scores. However, the moderate values of discomfort factor scores associated with various levels of comfort ratings (Figure 5). This shows that the factors that cause different effects on comfort or discomfort perception may co-exist at certain conditions. In Figure 5, the high discomfort factor scores were not associated with extreme and near extreme level of comfort ratings (levels 6 and 7). These results indicate that when discomfort factors scores are high, perception of comfort would not exist, because the balance of the harmony is broken. Or, high levels of comfort can only be achieved when all discomfort factors are low.

The presence of discomfort factors will disturb the harmonic state of physical and psychological feelings (Slater, 1985), causing the feeling to deviate from its neutral state (Zhang, 1992).

#### Correlation analysis

Impression, relax and relief are positively correlated with comfort perception and negatively correlated with discomfort perception. Comfort factor score is positively correlated with comfort and negatively correlated with discomfort. Discomfort factor score is negatively correlated with comfort and positively correlated with discomfort (Table 3). All correlation values were significant at  $p<0.05$ . The correlation of comfort factors with comfort ratings indicates that relief feeling is the most important comfort factor in sitting comfort evaluation.

Table 3: Correlation values of feeling factors and factor scores with comfort and discomfort,  $p < 0.05$  are significant and given within brackets

Feeling factors	Comfort	Discomfort
Neck pain	-0.53 (0.000)	0.58 (0.000)
Upper back pain	-0.57 (0.000)	0.64 (0.000)
Mid back pain	-0.57 (0.000)	0.62 (0.000)
Low back pain	-0.57 (0.000)	0.59 (0.000)
Upper leg pain	-0.47 (0.000)	0.62 (0.000)
Lower leg pain	-0.48 (0.000)	0.53 (0.000)
Fatigue	-0.59 (0.000)	0.64 (0.000)
Impression	0.48 (0.000)	-0.33 (0.000)
Relax	0.84 (0.000)	-0.52 (0.000)
Relief	0.91 (0.000)	-0.53 (0.000)
<b>Factor scores</b>		
Comfort factor score	0.76 (0.000)	-0.39 (0.000)
Discomfort factor score	-0.46 (0.000)	0.58 (0.000)

#### Chair and time effect

MANOVA was conducted to identify the chair, time, and chair\*time interaction effects on comfort and discomfort factors, as well as comfort and discomfort perception. The results showed that there were significant chair main effect on discomfort factors, and discomfort perception. These results may indicate that the student chairs can be discriminated in the learning environment using discomfort factors such as pain and fatigue. Despite, Helander and Zhang (1997) argued based on their study and some previous studies that it is rarely possible to discriminate office chairs with discomfort factors. School chairs are generally considered to be uncomfortable

or less comfort because of hard seats and non-adjustability features found with them. This may be why the student chairs were discriminated with discomfort factors. Similarly time main effect on discomfort factors and discomfort perception was significant. Chair \* time interaction effect was not significant. The results indicate that discomfort factors increased as a function of time of day, and chair design is not a matter in the increase of discomfort factors. This result was consistent with result obtained by Helander and Zhang (1997). Helander and Zhang (1997) believed that the time dependency is a fatigue effect.

The chair main effect was significant on relax, relief and impression and comfort perception as well. Chair \* Time

interaction effect was not significant for comfort factors and comfort perception. The results indicate that student chairs can be discriminated using comfort factors such as impression, relax and relief in the student learning environment. Time main effect was

significant on relax, relief and comfort perception and not significant on impression. Significant effect of time on relax and relief may indicate that relax and relief were not purely emotional factors like impression. And these two factors seem to be somewhat related to biomechanical aspects of sitting. With passage of time, relax and relief feelings decreased. Hence comfort perception too decreased.

Table 4: Chair and time effect on comfort, discomfort and underlying factors of comfort and discomfort (p values were given in the table; values  $p < 0.05$  are significant).

Items	Chair type (p values)	Time (p values)	Chair type * time (p values)
<b>Discomfort factors</b>			
Neck pain	0.000	0.000	0.803
Upper back pain	0.000	0.000	0.704
Mid back pain	0.000	0.000	0.555
Low back pain	0.000	0.000	0.875
Upper leg pain	0.000	0.000	0.493
Lower leg pain	0.000	0.000	0.887
Fatigue	0.000	0.000	0.976
<b>Comfort factors</b>			
Impression	0.000	0.781	0.984
Relax	0.000	0.000	0.976
Relief	0.000	0.000	0.973
Comfort	0.000	0.000	0.996
Discomfort	0.000	0.000	0.856



### **Conclusion and recommendation**

The study under the university learning environment validated the factor structure of sitting comfort and discomfort established by Zhang et al. (1996) under office settings. Discomfort factors i.e. pain and fatigue can be used to evaluate student chairs for discomfort. Back pain is the most important discomfort factor. Relief feeling is the most important comfort factor in sitting comfort and discomfort perception and evaluation. The result indicates that comfort and discomfort factors can co-exist at the same time at different levels at certain conditions. From the findings of the study it is suggested

to study seat features that may influence relief feeling in comfort perception.

### **Acknowledgment**

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## RESPONSIVENESS OF URBAN LANDSCAPE AND FLYOVER

E.A.T. Suresh

### ***What is Urban Landscape?***

*"Urban landscapes are storehouses for these social memories, because natural features such as hills or harbours, as well as the streets, buildings and patterns of settlement, frame the lives of many people and often outlast many lifetimes."* (Hayden1995, p.9)

Hayden refers "*these social memories*", to the memories of the histories of families, neighbourhood, fellow workers, and ethnic communities. Further the author mentions that urban renewal and redevelopment are also creating the memories with urban landscape in its evolution. The generated architecture must be enhancing the lives of the people than over govern it. So that urban landscape is the overall architecture of the context and the links in the urban communities.

*"There will always be landscapes which are intended as settings for architecture, where Formal, Virginian, Picturesque, Deconstructed or whatever."* (Jellicoe1992, p.24)

The urban landscape depicts the particular urban spatial flow including each and every element which is static in the context like buildings, bridges, flyovers, trees, etc.

The elements like people vehicles and even pets which are moving included in this. The classification can be done in different ways.

As an example living elements and the non living elements, but these classifications should be done focusing the final objective. Present landscape was not emerged suddenly but with a continuous evolution of time. This evolution is about people and their perception of these issues. Different concepts, trends related to their lives change the built environment and the urban landscape.

### ***Factors affecting the emergence of the cities and its structure***

#### ***Physical factors***

From the beginning of civilization, people were bound to the natural environment and its physical structure. Earlier, nature was for their survival. They were depending on resources of nature; rivers, water bodies and forests. Later, with the improvements in tools and weapons to defend the growing boundaries against enemies, emperors thought of the more secure places for their civilization to live in. Again, they used the

natural barriers and followed the patterns of the nature; further developments were according to these patterns. Later, people tried to conquer nature for example, in overcoming constraints of the connectivity the tunnel and the bridges were erected by them.

### ***Social factors***

To understand the urban areas and its landscape, the vision of the society and its social links become worthy aspects of study.

*"The more we know about the cultures, about the structure of society in various periods of history in different parts of the world, the better we are able to read their built environment."*(Kostof 1991, p.10)

The society and its perception never stagnated within its history even when there were more disastrous events. There are also examples, though the context was totally destroyed and people have reconstructed themselves not wanting to lose the social and their moral links due to such eventualities. The same architecture was repeated again as they wanted to see that their community were not affected, which can be witnessed in the city of Munster, Germany.

### ***Economic factors***

This is the reality and the main factor when considering the capabilities of development of a city or a certain precisely defined area. The constructive ability and the needs of adding or removing elements from the landscape depended on its economic conditions. This is common scenario from history to date.

Since citizenry is vital are concerned, while building up the city it is important to identify the potentials for urban development and how it can be interpreted in a spatial manner than giving priority to the economics.

According to Kostof 1991, p11, the subject of the legal and the economic factors is colossal and it is having a greater impact on formation of the cities and its environments.

The quality of the environment and the care of citizens are merely a matter of the economic factors of a city. As an example the urban left over spaces, common in most of the developing countries, in the contemporary developed countries it is well managed and conceived as user friendly.

### ***Philosophical factors***

In ancient cities people believed that the cardinal directions and the water bodies seems relevant whilst locating the settlements. Some river banks were considered auspicious and were selected as the living city while letting the opposite bank to be the dead city. Sometimes the directions in relation to the sun was considered essential when laying out to cities and its entrances.

E.g.:- Anuradhapuara, Sri Lanka

Ancient capital of Egypt

Kostof 1991, p.11 reveals that the cities are shaped by different categories of people. For example ship gunner's (early port cities of India), military engineers, etc. So it is clear that the urban context is formed with the philosophies followed by the creator.

### ***Elements of the Urban Landscape***

Several scholars have looked at the urban context; cities in different perspectives. Looking deeper into it, as Kostof, 1992 mentions there is the urban process. This is the contribution of the man and his activities responding to the environment surrounded and the factors described above. The process also contributed to the vivacity of the urban landscape.

Krier, 1975 argues that the urban space is twofold; the Squares and the Streets. It is more conceptual because the built masses are identified as the periphery of the square which generates the ambience in the urban square and the open space are such enclosed by the peripheral buildings.

*"I shall attempt to discern this quality whatever we are dealing with physical features and of the spatial nature two basic elements are the streets and squares"* (Krier 1984, p.16)

But Kostof describes it in a different way going into further detail of a city in "City Assembled", reveals that the Edge, Divisions, Public spaces, Streets and Urban process is vital. The importance of this classification is that it describes about the living nature of the city as an urban process. Besides both Lynch, 1979 was thinking of an image of a city by handling five elements; Paths, Edges, Districts, Nodes and the Landmarks. This is more detailed and almost covers the whole fabric. As Lynch reveals that this is about imaging a city and it is the real time experience of the city landscape; the urban landscape. Further

Bentley strengthens this idea of these elements as it very relevant to a responsive environment and these are used to discuss the responsiveness of an environment by him.

### ***Evolution of Urban Landscape***

*"The specific organization of the city, and the behaviour in it, are the result of interaction of environmental characteristics, the choice processes of individuals and groups, and various constrains."* (Rapoport 1977, p.81)

The performances of the spaces and the capability of tolerating the new functions are significant throughout the evolution. Therefore each function may change or may not, but it has to accommodate new functions as well as the traditional at the same time. That the society, urban form, urban spaces, activities and their expressions are creating a base to explore how the evolution took place in urban landscape than going for an elementary evolution.

### ***Society***

The change of the people in different eras reveals facts about the socio-spatial connections they had and proved the evolution of urban landscape had a direct impact on communities. Generally the attitude of people influenced the urban landscape and was similar to human relationships. Earlier the man was more community oriented and their landscape was depicting the sense of community. It was evident as they settle in a particular place as well as they grow in the context.

*"The land prices are high and going up as they raise higher the buildings get taller. The poor people, of course, get pushed out either in to the far-off suburbs or to live in the crevices here and there- in illegal shanty towns, on the pavements, whatever. - Charles Correa"* (Editor 1986, p.11)

While cities are becoming more complex in its conditions people got lost in urban landscapes because the cities are not much responsive enough to guide them. Then people tried to find different methods to improve the sensitivity of it, they defined and tried to arrange the paths, demarcations, segments, nodes and landmarks to make the cities more people oriented, with more population there were more and more activities gathered, and for the functionality of it different layers emerged.

Sometimes there are evidences that these structures are defining the spaces for different user categories. Such common example can be found in New Delhi where the flyover easily forgets the community under it; sometimes it is the social attitude.

### **Urban Built Mass**

Urban form must be expressive to have a better communication with the people who live there. It creates the image of the city as people experience it with the several elements according to Kevin Lynch. Also they are the elements which bring up the features of urban landscape in more details.

The urban form can be divided in to two categories for better understanding; the

urban built mass and non-built spaces. Generally the built masses may affect on segmentation of the cities, its edges and landmarks. Paths and nodes deal with the non-built urban spaces as these are open free spaces, but these are parts of a single entity as each of these having strong connections and being influenced by each.

As Relph, 1987 reveals the modern form of urban contexts had undergone many criticisms and arguments since the architecture changed the landscape. As a first step after the modernism with the post-modern concepts the landscape was much expressive than the modern urban landscape generated by the built masses. Christopher 1981 sees it is not people oriented even today.

*"By comparison, the developments of today are not human in their origin. They are too often created by cooperation that manipulate stock for profit at long distance or decided by committees concerned with abstract social welfare. They are too often grey and colourless."* (Christopher 1981, p.55)

The viaducts in that sense are defined vital as its built mass comprised with different interpretations in the urban landscape since these are emerging and flowing through the city making problems even with its scale. This is proved as the research done for Seattle in United States, where it reveals public life and the surrounded cultural masses were affected by the new viaduct.

### **Urban non Built Spaces**

There are mainly two types of urban spaces, interior and the exterior. The exterior influenced by the forms or the built masses surrounded by it. As the Krier 1984, classifies the urban space is streets and squares. So it said that squares are both the built mass and the space trapped. The interior spaces are defined by the buildings itself most of the times, and it is secured by the weather and the threats from outside. But as a part of the whole it may not merely defined by a single building but other buildings around being interconnected.

*"Urban space... This space is geometrically bounded by a variety of elevations. It is only the clear legibility of its geometrical characteristics and aesthetic qualities which allows us consciously to perceive external space as urban space"* (Krier 1984, p.15)

The evolution of the urban spaces, both the interior and the exterior are depends on the time and the changing need of the dwellers being guided by their psyche.

The viaducts created another layer to the urban landscape while rendering different types of urban spaces in the contemporary world. Different elements with varying definitions were making the essence of the space which is positive and negative. The viaducts offered such varieties on demarcations, channels, segments, nodes and landmarks, which seems challenging to the functionality as well as to the existing urban non built spaces. These structures most of the

time making lost spaces, especially considering the third world cities. These are affecting the urban form as well to the urban non built spaces and the activities of their contexts.

### **Functions / Activities**

*"In addition to the geographical factor the individual character of the towns will also have been shaped by their activities and buildings related to them."* (Tugnet 1987, p.25)

The activities can be public and private. The public functions hold the importance in the urban context than the private functions. The transportation, recreation and commercial activities are such which evolve rapidly in the broader sense. These different functions have affected the organization of the urban landscape. So the evolution of the urban landscape can also evaluate with the functions of the context periodically.

*"It commonly thought that before the industrial revolution on people had a sense of equilibrium, which the pace of modern life has destroyed through dislocation, industrialization and specialization. Disequilibrium is a powerful motivating force in human society, it is what makes people drive to conquer nature in order to rationalize and control the conditions of life.- Tay Keng Soon"* (Editor 1986, p.33)



### **Expressions**

The expressions of the cities change as dramas or other forms of arts according to the time of performance. It is hard to find two cities with the exact identical expression because it is a matter of time in the macro level. But in micro level there are common features in cities though these are suggested by distance.

*"The 1980's have witnessed a celebration of differences, of poly-centralism, of variety, of style and stylishness, and post modern townscapes are a clear expression of this celebration."*(Relph, 1989)

The buildings, the structures developed for the functioning of the cities are quite common currently. The monorails and the flyovers for vehicles attributed influence to the urban landscape. These structures are rigid but more flexible in its use and form; though these individually aid people by its own expression, considering the collective impression it holds in this context.

### **Responsiveness of the Urban Landscape Responsiveness**

*"The relationship in the physical environment is spatial. Basically objects and people are related through representation in and by space."*

*"Space is experienced as three dimensional extension of the world which is around us. - the intervals, relationships and distance between people and people, people and thing, things and things and space is at the heart of the built environment."* (Rapoport 1977, p.9)

As Rapoport 1970 reveals in *"Human Aspects of Urban Form"* it is necessitated to consider about the social values, other such attributes; *human aspects*, and the quality of the physical erection of the environment in urban contexts; the *urban form*. This is quite compatible with the urban landscape also, as it is a facilitator for human performances in public and private life.

### **Social and Cultural Responsiveness.**

*"In any ideal situation each group of people would move to match their preferences and the city would consist of a set of areas expressing the social identity, status and preferences of various groups."* (Rapoport 1977, p.12)

Financial and the political responsiveness are always dependent on society, cultures and different ideologies. More than the political and financial responsiveness of the urban landscape, social/cultural responsiveness and environmental responsiveness became crucial because it breeds the others.

### **Environmental Responsiveness.**

The environmental responsiveness refers how and to what extent it communicates and allows people to perform their activities as preferred in a particular defined environment. These appear veritable in the urban contexts because the complexity of issues which are supposed to minimize the diverse effect on citizens; since the urban landscape is the platform where people celebrate the urbanity.

*"The spatial characteristics of built environment also greatly influence and reflect the organization of communication. Thus who communicates with whom, under what condition, how, then, where and which context in one important way in which the built environment and social organization are linked and related."* (Rapoport 1977, p.12)

The landscape is derived by its physical elements. This responsiveness too is required towards urban landscape as people affected by their surrounding than in other environments. Further, responsiveness means creating dialogues between people and their surroundings. So positive responsiveness creates more connectivity with the landscape and stresses/ joys being a part of the environment as these are being shared.

*"This means, of course, that physical elements in the environment take on varying meaning and their influence and importance, and their effect on behaviour, changes accordingly."* (Rapoport 1977, p.12)

#### **Environmental Responsiveness**

The responsiveness is vital considering the living environment; the urban landscapes, on which the populace live, experience and enjoy their daily life. The responsiveness of the urban landscape will enhance the communication with the citizens; lack of environmental responsiveness is a threat that leads towards deserting of the public spaces and public life, which is vital in the urban contexts. Here the environmental

responsiveness is evaluated with different physical factors found in the urban landscape. Bentley 1975 describes seven factors of environmental responsiveness as permeability, variety, legibility, robustness, visual appropriateness, richness, and personalization concerning about the communication of man with the surrounding environs in relation to its physical attribute. These factors are also described with the Lynch's categorization of the urban elements.

#### **Permeability**

Permeability is the quality which enhances the choice of fenestration or accessibility in the urban landscape. When the permeability is more it means that the context is more porous and less cohesive, if permeability is to be promoted with control to generate private and public activities separately in the same landscape, so there should be an interface since those are contrary and the permeability level must keep appropriate.

#### **Variety**

Different uses, forms, meaning and the expressions which creates a variety in the urban landscape is considered here. Different variety levels of above mentioned forms, meanings and expressions is automatically enhanced by the variety of uses prior to the functions. The different approaches of accommodating uses will create different forms, meanings and expressions in the urban landscape automatically.

### **Legibility**

Legibility is the ability of understanding or reading a structure or perceiving it in mind. In general terms, this is reviewing a layout of the landscape elements in mind, as the memories gained through experience directly and indirectly. If the landscape is legible, people may tend to flow freely enjoying without any conflict because they know where these are leading to, besides references from the context. When the elements are supporting to evoke memories through experience the landscape is more legible.

### **Robustness**

Robustness provides the association of more functions at a single space at the same time. In simple terms it supports multifunctional requirements in a single space for a larger user category. Robustness will promote and enhance the mix of uses in the urban landscape. Participation of different social categories will animate the urban landscape and it shall always gain the attention of the people.

### **Visual Appropriateness**

Visual appropriateness is the determinant factor of the responsiveness in more detailed version. This strongly affects the interpretations of a particular place through the visual media on the urban landscape obviously. The meanings of the places and the elements are by these visual interpretations, so meanings help people to make their choices.

Visual appropriateness is vital in the places with a great public participation, where many people are from many different backgrounds. As people are the living part of the urban landscape, this quality is important in terms of animating the urban landscape by influencing people.

### **Richness**

Richness will contribute to the sense-experience that users can enjoy.

*"For most people, sight is the dominant sense. Most of the information we handle is channelled through our eyes..... visual richness."*(Bentley 1975, p.89)

But the visual experience is not mere experience, but there are other experiences as well; sense of motion, smell, hearing and touch as Bentley describes.

Visual experiences created by the environments are twofold; firstly by focussing the attention on different sources, and secondly by moving away from a source towards another. Bentley, 1975 mention two factors as the basis of the richness. The orientation of the surfaces concerned and the likely position from it will be viewed.

### **Personalization**

In the urban landscape, personalization becomes purposeful because people are having the intension of keeping a stamp on places where their demeanour abides. y behaves. Therefore this is having a direct impact on the responsiveness of the urban landscape, so in each place it is necessary to

let personalization to some extent, regarding making such places functional. Sometimes it is automatically personalized by selecting the

most suitable place for each one, but this is not a passive personalization on urban landscape.

### **Case Study1: Analysis of the Responsiveness of Flyover, Demetagoda.**

#### **Role Plays by the Flyover in the Urban Context**

#### **Urban Location**

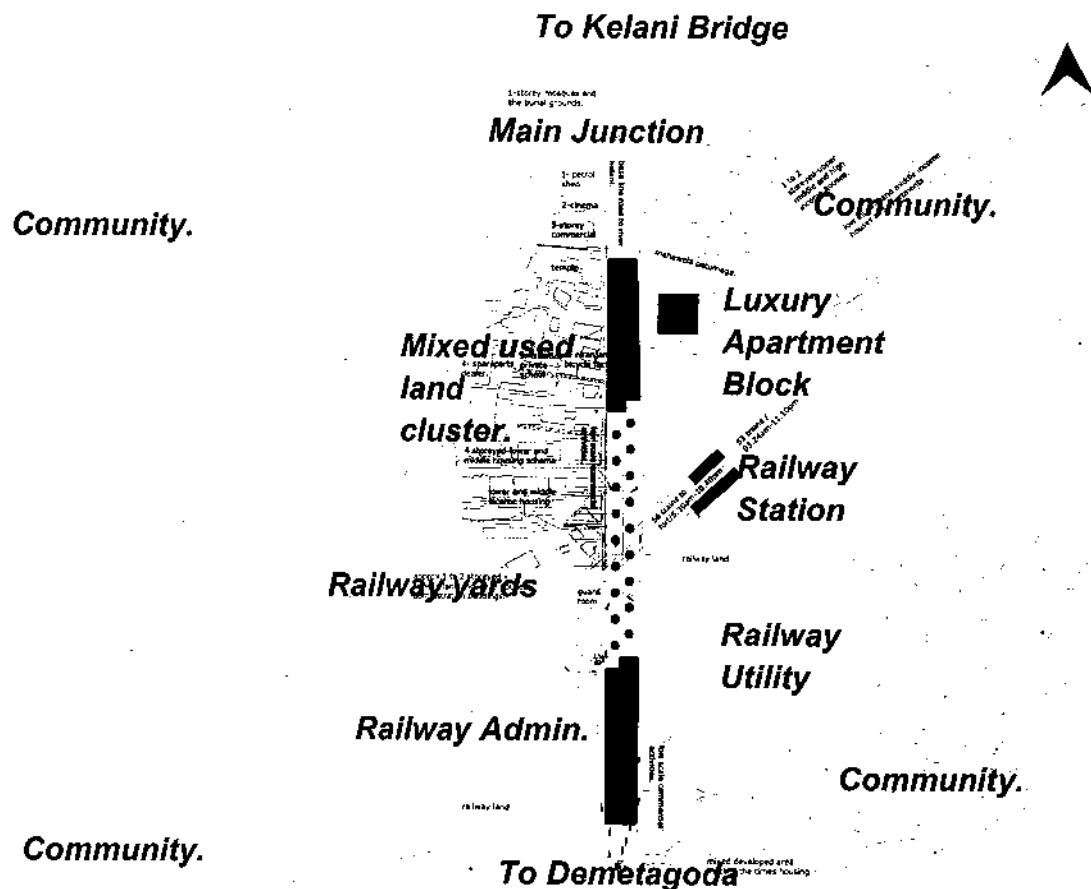


Fig. Layout map of the context

Flyover, which is approx. 82 feet wide and 1635 feet long, locates with the Base Line road at the crossing of Demetagoda railway lines flanking the railway yards. Demetagoda can be identified as an area which is most of the times residential, where the other activities such as commercial and industrial too thrive. Major land use is by the railway as

a sole authority and the residents mostly are low income personnel.

The commercial activities are evident along the Base Line road while the residential and industries are further detached from the Base Line.

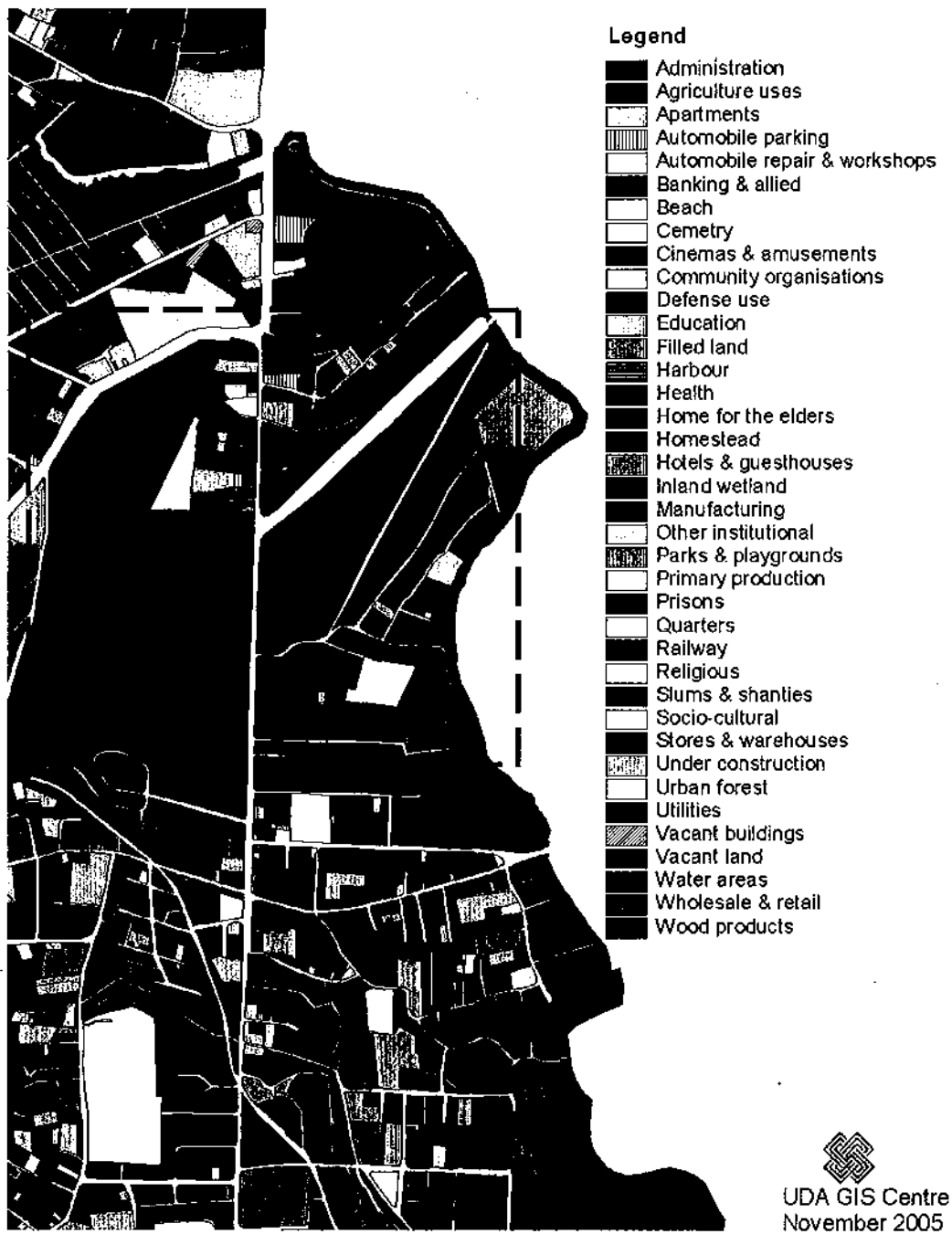


Fig: Land use map; Demetagoda flyover and surrounding.

The starting and the end of the flyover connect diverse characters of the landscape and even different functions. One end of it is a junction which connects one of the main

transport lines from Fort towards the suburbs and major towns like Kandy, Kurunegala and Gampaha. The other end is the town centre of Demetagoda a few hundred metres away.



Fig. Two spaces connected by the flyover; The main transport node toward Kelani bridge which is more traffic centred and the Demetagoda junction a distance of few hundred metres which is more community oriented.

The flyover is not letting any road to cross, but a railway line intentionally to minimize the traffic at the railway intersection. So, besides all activities this vehicular circulation and the traffic is being the most dynamic and dominating in the landscape design. This dynamism segregates the landscape into two as it holds similarity on both side of the Baseline road.

Considering Demetagoda it is a sort of under developed poorly utilized landscape. This can be observed by the land use and the quality of the built and non built environments. The density is much higher in the area because of shanties, squatters and sheds, prevalent in this residential district, where the commercial activities are focussed on the land price.

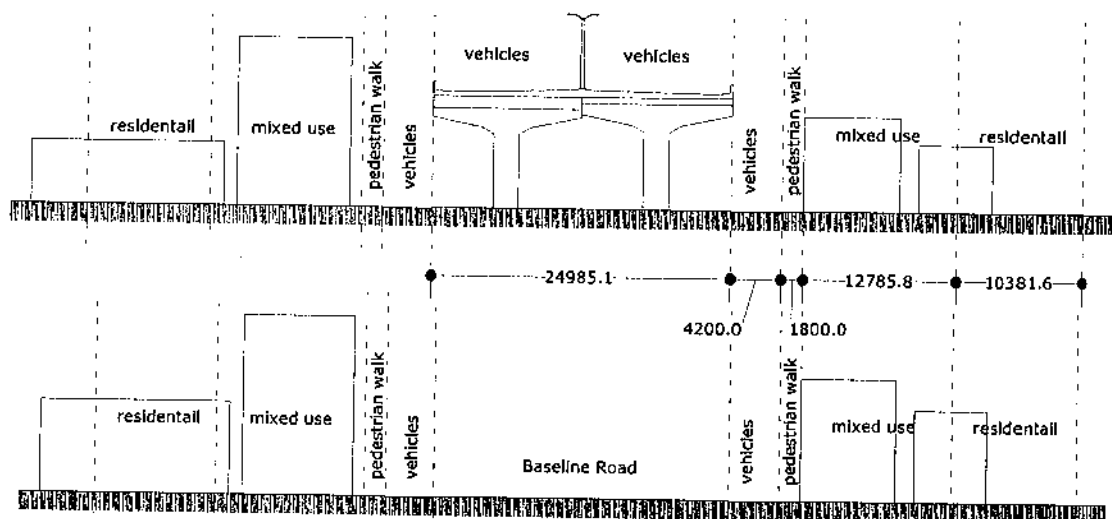


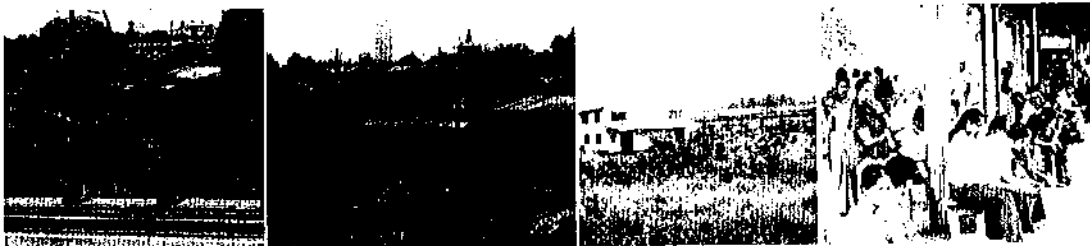
Fig. Typical section across the flyover and a section across the baseline road; zoning of activities



*Low income developments and the commercial activities; the density is high due to the land prices, the commercial activities are varied from small shop to the multi storied commercial functions.*

The next important feature is the dominance of the railway with its character in the context, as it accommodates the highest portion of land being its sole owner; the railway sheds, administration, factory and

tracks. The railway station is less significant since it is not prominent and defined in the existing landscape though it is a recognized transport terminal.



*Fig. Dominating usage of the Railway; their Sheds, Tracks, Administration and Factory.*

The conspicuous luxury residential apartment is the tallest built structure in the neighbouring landscape but Jaic Hilton Tower and the HNB Tower can be seen from a distance of a few kilometres, to this residential apartment behaves as the

landmark in the context. Being a residential building it is not getting any favour of the context because the paths are not promoting pedestrian movement but the vehicular primarily.



*The Luxury Apartment Building; the landmark of the context which is over governed by the flyover.*

The next biggest sole ownership of open land extent in the landscape is for the manufacturing. Every other land is also protected individually and there is no

connection with the overall landscape as there are paths even for human use than the vehicles. Such uses are access ways by foot for public and for the individual use.



*Fig. Special block of land with many activities; Land use, Commercial activities, Religious and Residential*

There locates cluster of land which is identical with its mixed use locates in between the Base Line and the railway sheds. It cannot be identified as a district but it contains almost all the functions there; the residential

apartments for low, middle and high income people, religious, small industrial activities, commercial activities, utilities and even the administration.



*Pedestrian paths; by the heavy traffic, vehicles are a threat, setbacks as design considerations*

Since it is difficult to identify where what happens where, the land utilization and the legibility of the landscape are not appropriate. The division of the lands and the layout of the buildings are haphazardly built and arranged.

The flyover creates an opportunity to overcome the traffic delays and it can be identified as an element which is used for the

efficiency and un-interrupted flow of traffic, thus the path created above, there are two paths laid on both side of the flyover at ground level. The widths of these paths are 15' feet each and used by the public transportation buses and also by pedestrians, especially those accessing the railway station at the ground level by crossing those roads.



*Fig. The paths at the both side of the flyover at the ground level, the access path to the luxury residential apartment and the path at the opposite side of it.*



The flyover is allowing people to cross it, by crossing the side roads, through its lifted and

supported column structure which creates physical and visual links to certain extent.

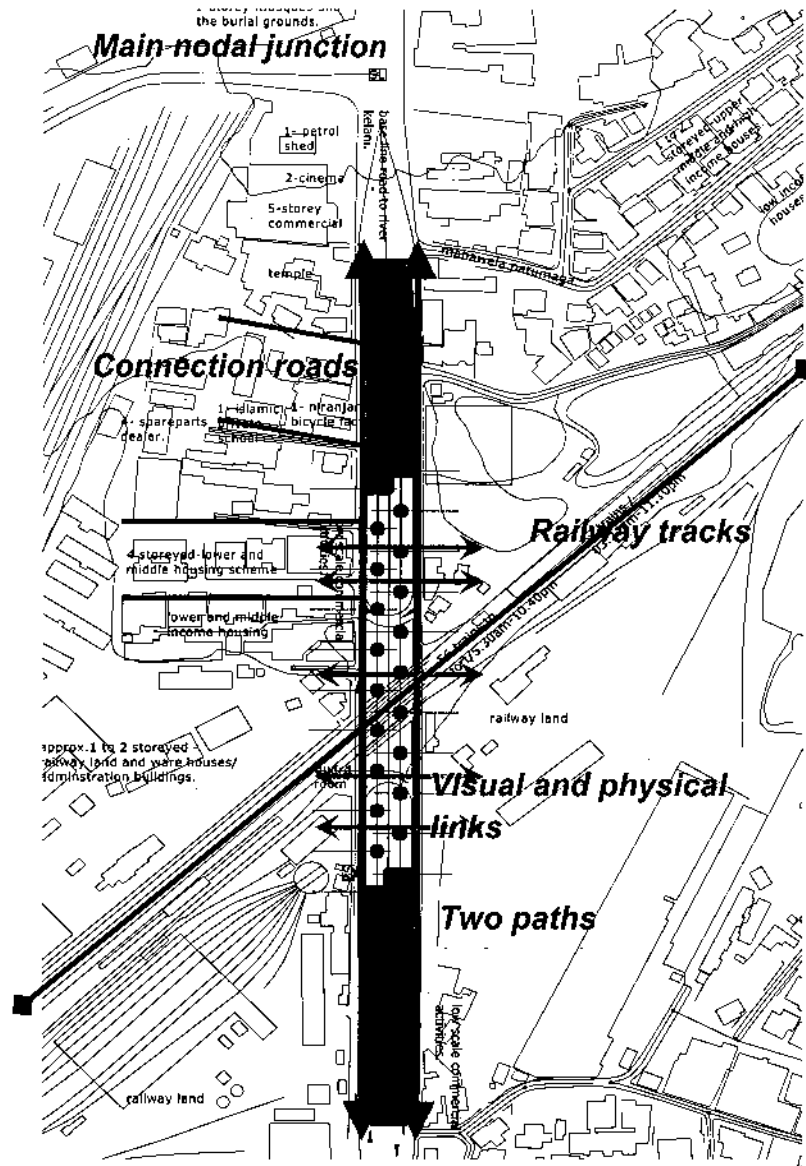
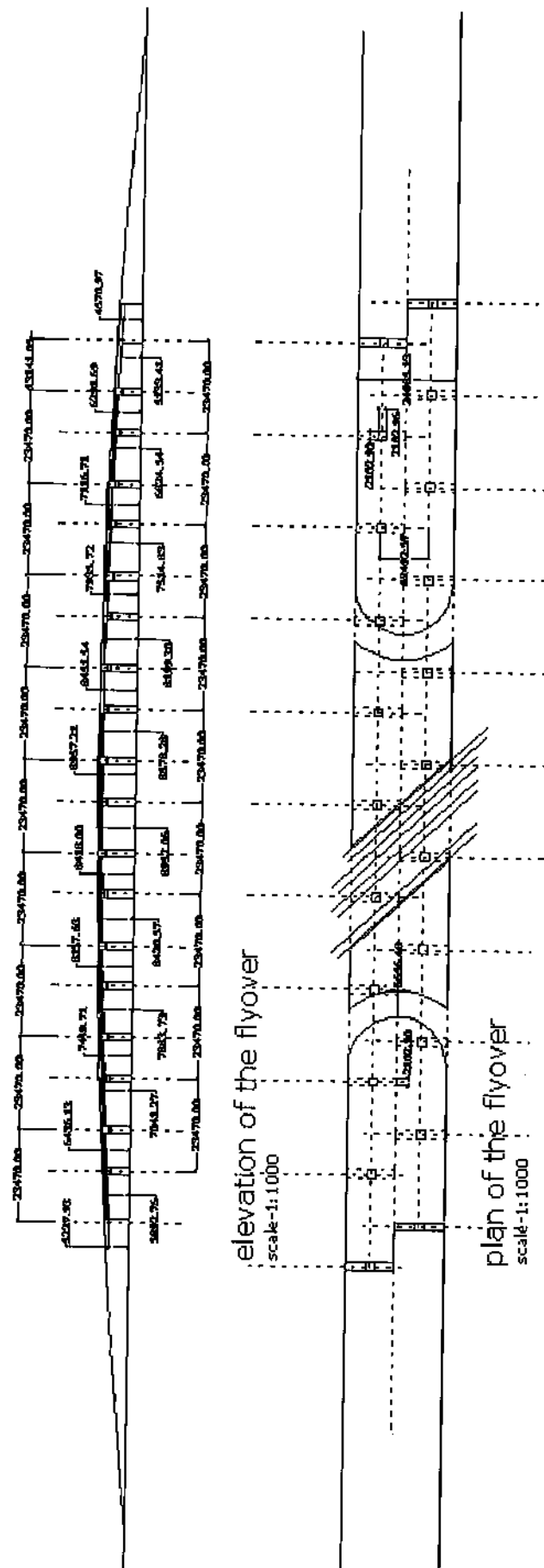


Fig. Layout and the connectivity of the neighborhood context of the flyover

Figure of the Flyover

Fig. Section



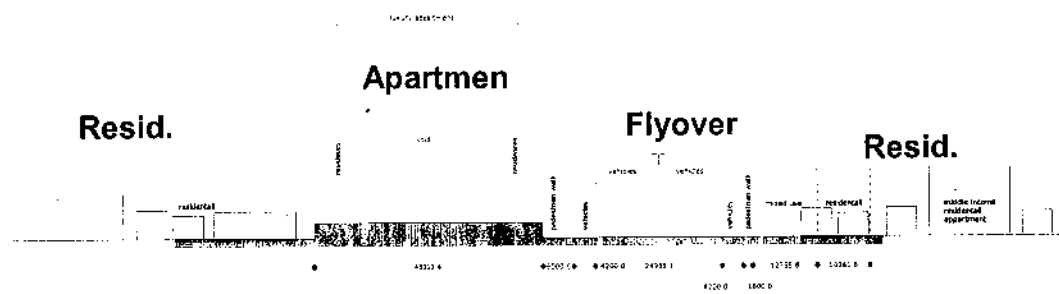
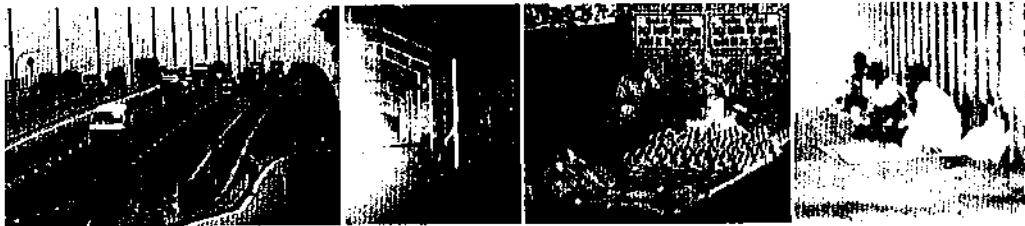


Fig. Section across the luxury apartment looking Demetagoda.

prominent than the luxury residential building. In the dominance of the height (vertical direction) is by the luxury apartment

and the horizontal dominance by the scale of the flyover. Therefore the pedestrian activities are not gaining any prominence.

### How it Functions



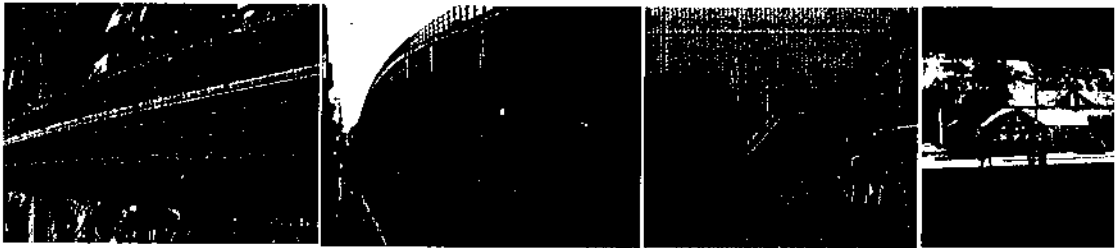
Different functions of the flyover; Bypass the traffic, Vehicle Park, Payment hawkers, beggars and community.

The functioning of the flyover is not determined merely by the means of traffic control, since it has other responsibilities and a role to play as it stands in the urban landscape.

The Flyover is a contrasting element in the Demetagoda landscape, for the vehicles it is an option of crossing the railway lines without any delay, and it is a dynamic experience to cross it above the normal ground level. But for the pedestrians who put up their efforts to the urban landscape receive no concern since its nude concrete structure.

### Expressions

Instead of the railway, the functions that neighbored the flyover are the pedestrian activities, residential access and the small scale commercial activities as discussed earlier. They are not sophisticated but more expressive by its nature than the flyover. But the flyover is more dominant and a clear definite edge with concrete which makes the directional qualitative where as the access and other activities are happening in a perpendicular direction. Even it has created lost spaces in the context used by those who live in the street.



*Fig, Different expressions of the flyover; A dominant path, Definition of edges which is on ground as well as above ground, The landmark and a district in the middle of the road, expressive buildings in the near context.*

Considering the role play by the flyover in the Demetagoda landscape, it is evident that it is created and acts as a path. It has a clearly defined edge in two different dimensions; at the below level, on the ground and the above head which is inclining. It has an identity as a landmark though it is not dominant by its height but because of its function, scale and the structure.

Even though the functions like railway and the other means of transportation amalgamated, there is no significant experience like gathering or breathing, created by the landscape for people, such spaces and the nodal character are not encouraged.

### ***Responsiveness of the Demetagoda Flyover to its Landscape***

#### ***Permeability***

The Baseline road distinguishes the landscape into two as mentioned above by its layout and function. Considering layout it has a clear definition of the edges created along as a demarcation for vehicular movements. The flyover also behaves in the same way. But it is having a three dimensional edge which

inclines and declines along the base line road. This edge defines the path of the flyover.

This edge or the path created is not promoting the connectivity physically on both sides. The station is just hiding in the landscape without any significance and it is more encouraged by the less permeability of the flyover and the activities around it. The paths which connect to the Baseline road are disturbed by the mass of the flyover as a barrier. Therefore the permeability has been discouraged in the landscape as they are not functionally, visually and physically connected.

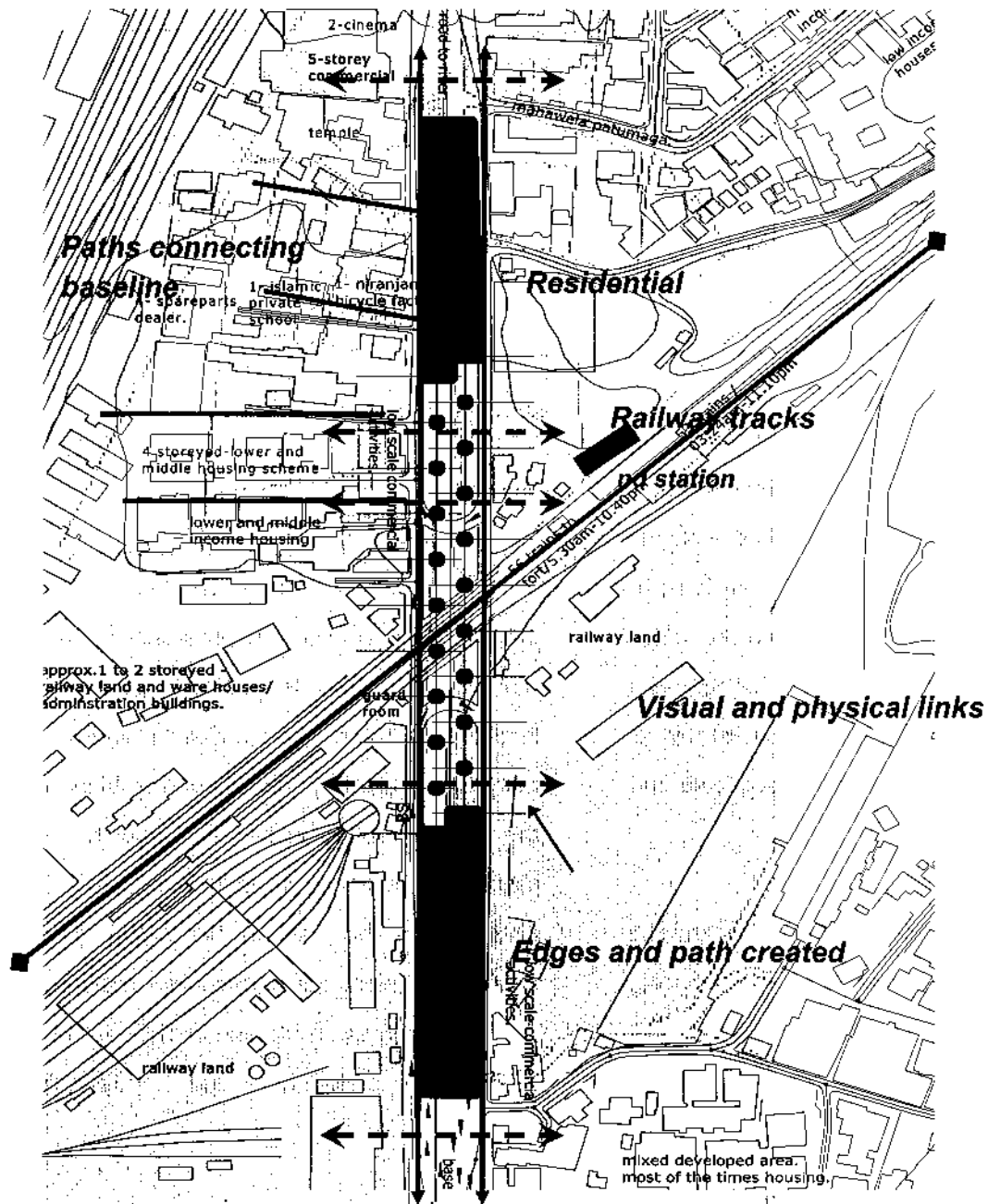


Fig. Merged Land Use map, Layout and the connectivity of the neighborhood context of the flyover

"The second common cause of misalignment to the rest of the city was the sharp

separation of a path from surrounding elements." (Lynch, p.56)

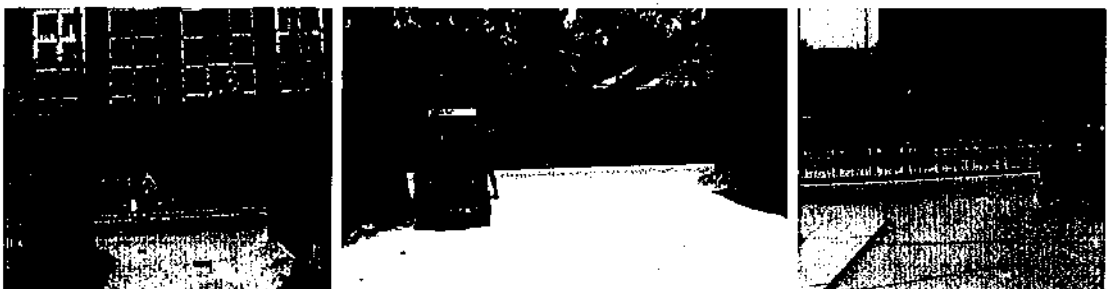


Fig. Visual and the physical barrier created by the flyover which reduces the contacts of landscape visually and physically. Therefore the permeability of the context is damaged.

Flyover also encourages the directional movement and there is no response to the other directions. But it is necessary for the responsiveness of the landscape where there are many other streets. So the other directions will not get any clue or an influence to enhance the experience through the landscape.

The flyover structure lies along the road for many hundred feet and because of its three dimensional character; the edge which is elevated gradually from the ground disturbs the physical links with the surrounding, but to some extent the visual links are promoted with the voids underneath.



*Solid barriers and the voids for visual contacts through the supportive structure of the flyover.*

This visual barrier has already affected the residential buildings in the surrounding as the flyover get focus on their windows. So this

visual barrier obstructs the view of the urban landscape as well as created arid view of the vehicles speeding and sound.



*Fig. Physical and the visual berries created by the heavy traffic functions over the flyover and on the ground level as well.*

Because of the intensity of the dynamism of the activity; transportation, also enhances this separation and reduces the permeability on landscape. Even the space created below it is not allowing people to be associated as it is naked structural supports. That space can be an intermediate space for better connection with th both sides of the landscape.

### **Variety**

Unlike the buildings, flyover is a special kind of a contrasting element. Within the whole landscape and enhances the variety by its form being contrasting. It is hard to identify a functional variety which welcomes people to get involved. The form is derived considering the engineering construction; it is just a concrete mass with no variety in its form.

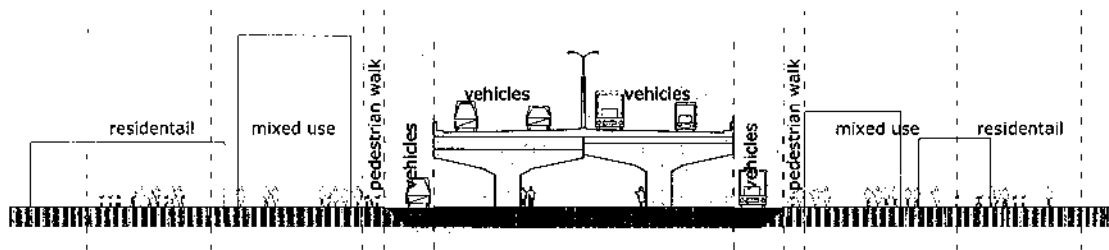


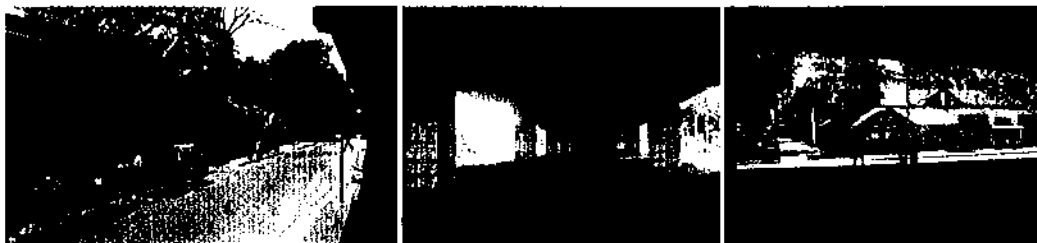
Fig. Typical activity flow of the landscape cross the flyover, section looking towards Demetagoda.

The using of the flyover by vehicles will make a different experience through the landscape because it facilitates the vehicles to pass above the railway and the neighbouring context at a higher elevation. The flyover can contribute to variety than the mere Baseline road laid along, because it keeps a structure in-between the two separated landscapes by the road at the ground level.

Therefore it is not lending a glance to promote variety of activities connecting both landscapes, though it is having the potential. It is possible to cross the ground laying roads as there is no much vehicular traffic, and get

involved with the activities transpiring. The design of the flyover is not sensitive enough to do so, though many such spaces are left devoid. Therefore the spaces are not used by the people as it belongs to them. So it has created more leftover spaces in the context which is not acceptable in the urban context.

There is no contribution to the public activities because the dynamism of the context it over governing the people, all the priorities are set for traffic concerns and it is not penetrating though the spaces are created under it.



The activities at the edge of the curb can be penetrated in to the space under the flyover in terms of improving variety and the interconnection, but it has been neglected because the under space is not well treated.

Because of the heavy structure and the separation of the paths at both sides of the flyover the space has been isolated. Hence

people are not moving into it gradually and therefore such premises are dormant. But there are potential promoting terms of

railway activities, since the length of the flyover (1635 feet), which is having the same character dissolved the variety of form and even the function.

Because of the directional quality of the flyover, and the traffic it is hard to see people

are waiting and participating in way side activities; but in front of the luxury apartment there is a 20 feet setback which creates a breathing space for the landscape. It hardly contributes to the landscape because there are no other activities nearby to get the benefit of it.



*Fig. Flyover with no variation, Set back of the building as a urban response, when there is no set back more tension and isolated. So people hardly stay in such spaces.*

Mobility of the pedestrian is lacking in the neighbouring context though there is a major railway station located there as the flyover has diluted the variety of activities and the permeability of the urban landscape.

The flyover seems to have no mutual compatibility with the context itself as it doesn't promote people to be close enough to promote activities around it. There is no potential created for the neighbouring small scale commercial activities by the flyover, so these are isolated and struggling to survive, with even the separations to both sides of the road having adverse effects on these mutual interrelated functions.

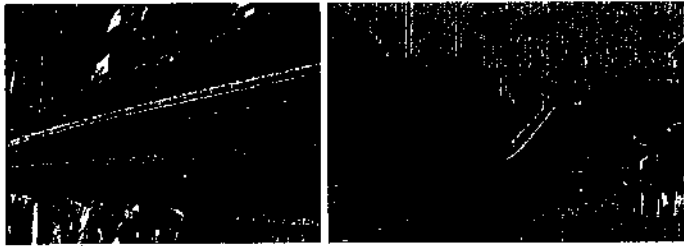
### **Legibility**

*"The desire to separate the vehicles and the pedestrian routes makes both central and the*

*suburban areas far less legible."* (Bentley 1975, p.43)

The legibility of the landscape is having the negative and the positive effects from the flyover. According to Bentley as mentioned above with the separation of the different uses and the users the legibility has been damaged even considering the width of the Baseline road. The whole Demetagoda context, flyover as a landmark, is making landscape more legible, though it is different considering the neighbourhood context since it disturbs, cuts off the visual links and the physical access to the neighbouring landscape with the edge that it creates.

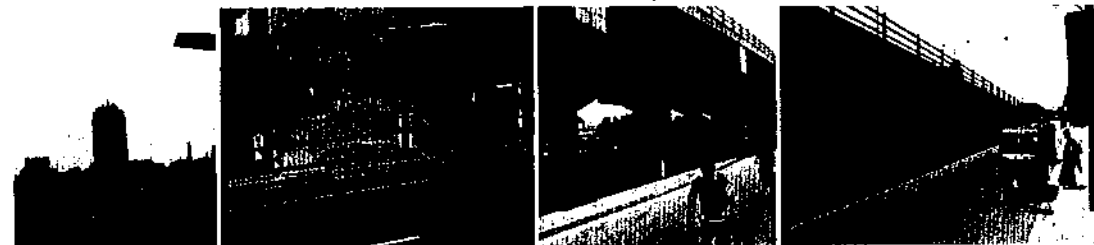




*Fig. The pedestrian, vehicle segregation; discourage legibility, the as a Landmark; improves the legibility of the landscape.*

While travelling in a vehicle by whichever route taken; on the flyover or on the ground routes, when the flyover is passed it evokes images about the different links and the

places associated with the place, making it a legible image to some extent with distant landmarks and the view of the connecting routes which can be perceived.



*Legibility is encouraged; distance landmarks and the connecting routes, Legibility is discouraged; the visual barriers created by the structure.*

The people who are on the ground are disturbed visually for having neighbouring links by the built masses.

The landscape seems like it is squeezed by the issues of the traffic and the human congestion. So the public relevance is not considered in the landscape. Even there is no

legibility of the activities as it is not visually and physically well connected through the space under the flyover. The railway station seems a hideout which is not legible at all as it is neglected by the flyover, being evident that it even didn't give clues about the activities surrounded or about the experience of the landscape.



*Railway station is hiding in the landscape with no significance in its use, The vehicles damage the legibility; the street is inaccessible and hiding in the urban landscape.*

## Robustness



*Activities; Railway passenger, Residential, Religious, Commercial and Community.*

There are activities around the flyover with different scales; residential, commercial and religious which are more pedestrian oriented. This diversity of the activity can be even seen from the land use map of the context. The flyover as it creates a visual and a functional barrier for those activities, and because these are separated without any physical access, therefore the basics of robustness are

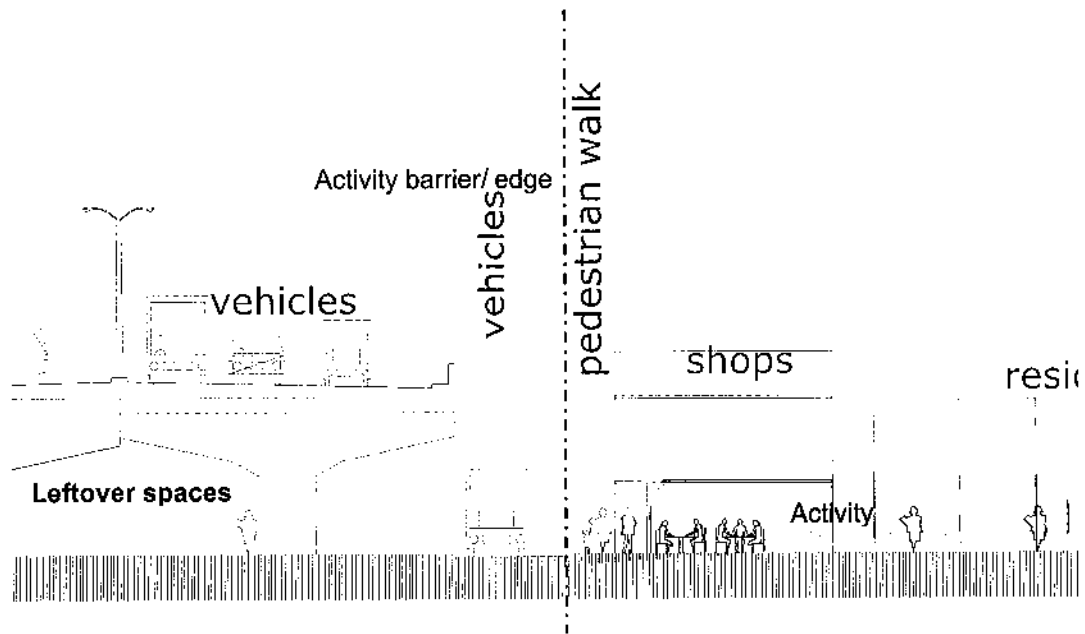
ignored. Remember, there is a potential for improving robustness by connecting all the activities around through the leftover space with the column structure and this has not been considered. Hence the space under the flyover is a vacuum which is not promoting any positive activity in terms or responsiveness to the environment.



*Fig. Connection of the activities and the space under the flyover; small scale trading, commercial activities in the surrounding with no attachment with the flyover, leftover space under the flyover.*

The definite edge of it is not creating a potential for the activities to link with each other or to make relationships with the structure itself. The structure is having texture created purposely to drop the weight in visual means but the expressionless nature of the

front is avoiding people as barrier. The streets which connect the baseline are not connected through the spaces under, even with visual links which enhance the functional nature of the space. So the flyover is over governing and the robustness is lacking there.



*The edge of the pavement is creating an activity barrier which reduces the flow of the activities.*

Along the foot walk by the sides of the flyover at the ground level, the activities are of a communal nature, these are small scale commercial activities with the residential spaces. The activities are not limited to the interiors but they are happening on the

outside of the built environment too. This is positive in terms of robustness, but the flyover is a separate element by its expression and it is not supporting such activities.



*Fig. Directionality of the flyover reduces the robustness; the solid ramp which inclines, the overhead edge runs, the narrow paths at the both side of the flyover.*

Though there is no much space between the pedestrian path and the edge of the flyover there promotes only the movement in one direction and this is negative in terms of robustness.

The layout of the flyover seems that it can be developed to gain the large scale robustness as Bentley reveals. The space under the flyover can be detailed with different links to it and make the public activities happening there. But the designing of the flyover have

no options for such which enhance the responsiveness of its structure. Therefore it is clear that the flyover merely thinks of the functionality of the traffic flow because there is no potential that it created on the urban landscape to be meaningful or responsive in terms of people.

### ***Visual Appropriateness***

At the first sight the flyover occupies a conspicuous position in the Demetagoda landscape being a landmark as well as a contrasting structure because of its scale and

the function. Visually it is a single object, a dynamic structure which runs through the landscape.

The visual appropriateness can be analysed in different ways as Bentley mentions; by its form in terms of legibility, supporting variety, and robustness.

The form of the flyover is not complex and it is easily graspable. But it is monotonous along the full length of the structure as it repeats the same elements disastrously.

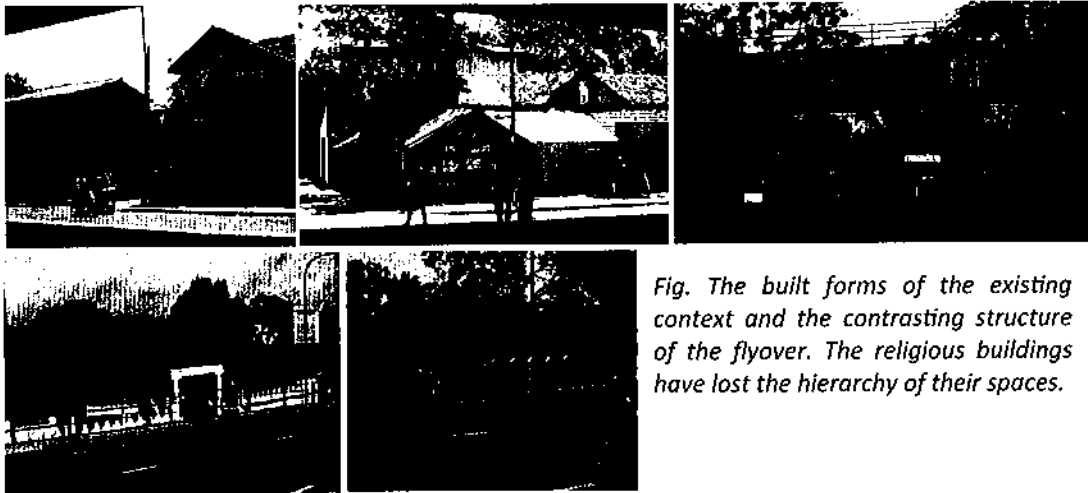


*Fig. Form of the flyover is easily graspable, the elements consisting in the form*

The colour of the structure is grey, which is fare faced, and there is no special variation in its colour. The textures and colours make the structure more solid, heavy and less contrasting, it depicts its functionality or the use, with its form it is quite legible. The appearance of the flyover seems like an elevated road and even the colour of it is matching with the function of it but in its context it relates with a community living under it. The use of the spaces below is also

to be considered, therefore the visual appropriateness is a vital concern.

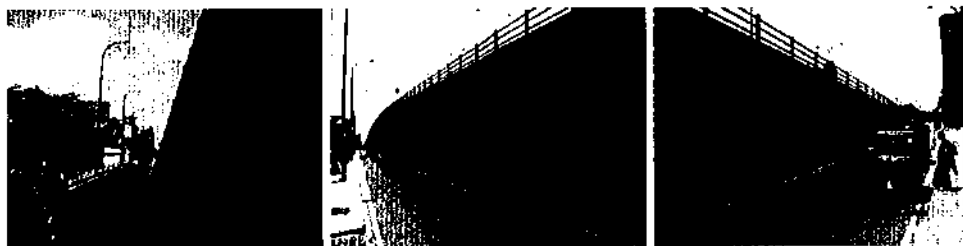
Considering the neighbouring context it is low scale built structures and more community oriented and some are religious. The flyover is being the focus from such spaces. But the structure hasn't paid any concern on it. The rigid, formal dull, impression of the elevation of flyover is conflicting the context by contrast and in its scale even.



*Fig. The built forms of the existing context and the contrasting structure of the flyover. The religious buildings have lost the hierarchy of their spaces.*

As analysed earlier it is evident that the flyover is not promoting variety by its form. It is just a concrete structure which stands on the pillars which are repeating at 24.7m. But with the form the activity is not conflicting which is positive in terms of visual appropriateness.

Though there is a potential to develop robustness in the context the flyover and the spaces it created haven't been looked into adequately, and the robustness of the landscape is discouraged and the activities are happening individually though these are supportive to each other.



*Fig. Inclinations, Declinations and the Intermediate columns of the flyover.*

Considering the public vision, the façade of the flyover is not identical, as it runs along the direction of the movement, but for the pedestrians it is much important as the flyover starts people have to walk along a narrow path which is demarcated by the façade of the flyover and the boundary of the lands of the context.

The façade of the flyover transforms to a void which is with columns in-between, from the solid wall of the ramp. Repeating column structure as the flyover flies at a higher elevation creates a leftover space with no function identified. This space is presently used by the beggars and for informal activities, and it would be negative in terms of visual appropriateness.



Fig. The change of the column heights, The leftover spaces created and the visual disturbances from the interiors.

The columns can be identified with different heights but the similar in all the other measures, so it creates a façade with different relationships, even here the elements are same; as it disturbs the view of the bedroom in flats as discussed earlier, the visual

appropriateness of the total landscape has an impact.

### Richness

The richness has two main factors; the orientation of the surface and the position of viewing.

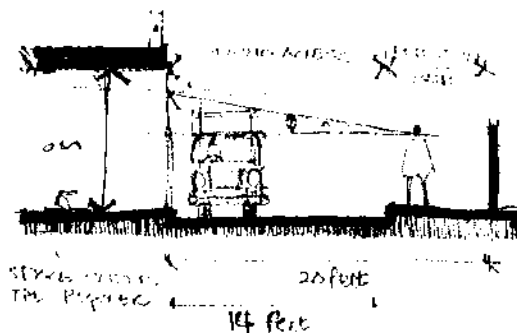


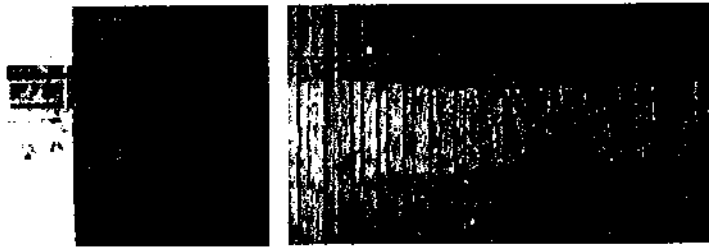
Fig. Distance and the angle of viewing; Distance is very less to observe the flyover as its height, and the viewing angle is very less as the mobility is very high but the pedestrians are viewing it perpendicularly.

Flyover at Demetagoda has its surface oriented along with the moving direction, and has not much contribution to the landscape because there are no prominent (obviously visible) visual angles towards, because the viewing distance is the width of the side roads with the pavement almost 20 feet. Even the pavement, where the people are behaving and seeing, is nearly 6 feet. So there is no much space to stay and to experience the façade of the flyover. But the treatment of the surface of the bare skeleton in the middle



of the road is not considered. The repetition of the same column with different heights is the only objects which catches the eye.

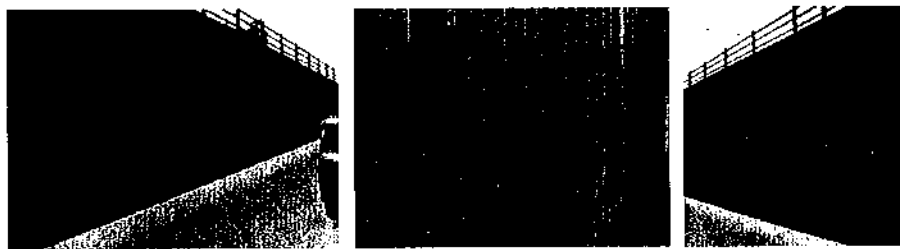
The detailing of the columns expresses the huge strength that it has but the masculine appearance of it is by pure geometric forms and these have no expression of the location where it stands, activities happening around and the people who live there. To reduce the weight of the columns, strips are carved on it in the vertical direction, this can also be seen on the ramp ending wall.



*Fig. The texture of the concrete; the column and the ramp ending wall with the striped carved in the vertical direction.*

Rhythms of changing height of the columns are not much significant. The whole structure seems one thing altogether and there is not much to be experienced by the people who bind with the landscape because they experience the whole object instead of each element.

The material of it is expressed by exposure in fare face. Fare faced concrete and the rough, rustic look of it is not contributing to the richness of the environment as it is not detailed well but expresses it as a stubborn concrete giant



*Fig. Concrete on the ramp wall; the vertical pattern of the concrete panels, The texture of a single concrete panel, Breaking of the pattern with a exposed concrete panel, the illustration of the visual properties of the panel.*

Even the flyover is not creating any positive sensory experience so the spaces are dull and abandoned. Inside walls on ramp are treated with different patterns to dilute the visual impact. The concrete panels are used on wall to create a vertical pattern with two different textures. One panel is plain with no texture and the other is with trips carved on it in the vertical direction, the expression of the ramp will be experienced as a single solid where the texture of the panels are not making such a contrast on surface.

the flyover is dumb. There is no play with the visual elements which makes visual complexities, visual riddles, and interpretations which enhances the richness.

### **Personalization**

The analysis is based on the contribution of the flyover on landscape regarding the personalising of the spaces in it. The structure of the flyover has two main figures; the solid ramp and the see through column array. Therefore the more

Considering the distant experience it is much interesting in its form. But when it is closer

potential is in the space with the columns as it can contain people and activity. The width of

the space under is 82 feet, and the height varies between 12 feet to 29 feet

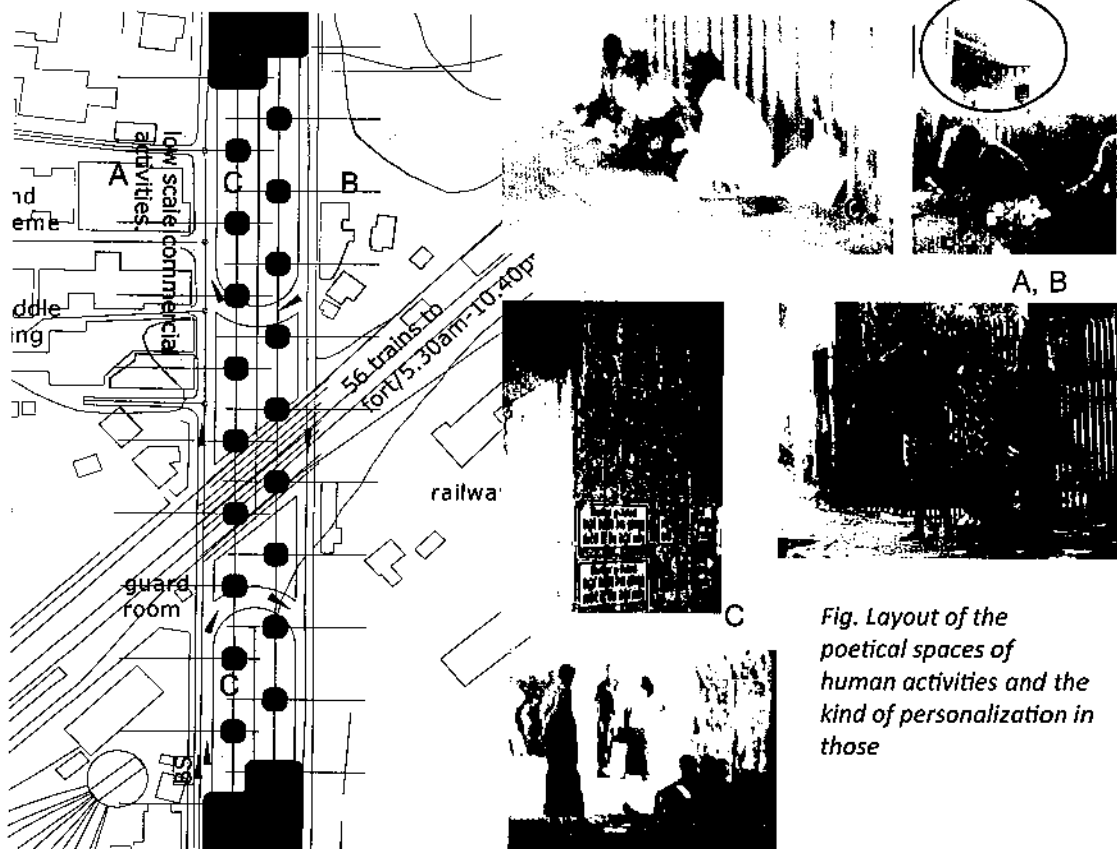
approximately and columns are at 27.4m c/c in a single row.



*The structure of the flyover; the space created with column structure, The solid ramping unit, the space under the flyover.*

It is not possible to consider the personalization of the flyover by the community as it is separated with the edge, which is not penetrating and discourage people from accessing, created by the paths at the ground level. The space is not used by the people effectively in a meaningful way the space has become a lost space in the landscape.

Considering the elements that are under the flyover it is too rigid and solid with no variation. The less public access is vital but even the similar elements with no variation and visually not aesthetical has also deserted the space with no personalization. It seems nobody's space and socially not related.



*Fig. Layout of the poetical spaces of human activities and the kind of personalization in those*



Considering personalization it is vital to cater a mutual variation where different people from different backgrounds will feel to be involved. But the regular location of the elements with the same character will dilute this special quality, because it is equal

everywhere though the people are not. This sort of issues are evident in the history where the modern landscape was deserted because it was inhuman and so contribution to be personalized with its clear edges and dominating quality.

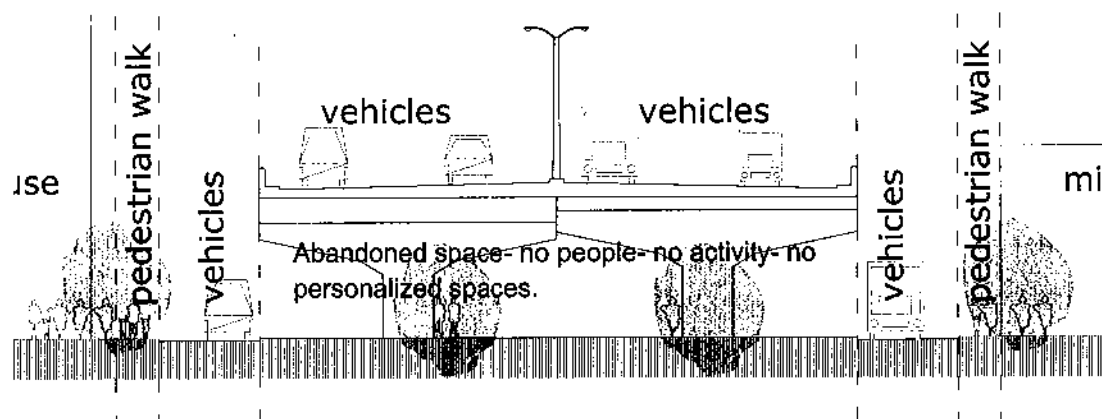


Fig. Personalization of the spaces is hard due to congestion of traffic and pedestrian movement. The space under the flyover is abandoned.

Even considering the immediate context it is contrasting being regular and definite in its form so people will not feel belongingness, therefore they avoid such spaces. Even considering the immediate context it is developed with human activities but no pre-consideration or a plan, so it is more informal

and the materials also not very hard. Therefore such spaces encourage people to keep their stamp on such.

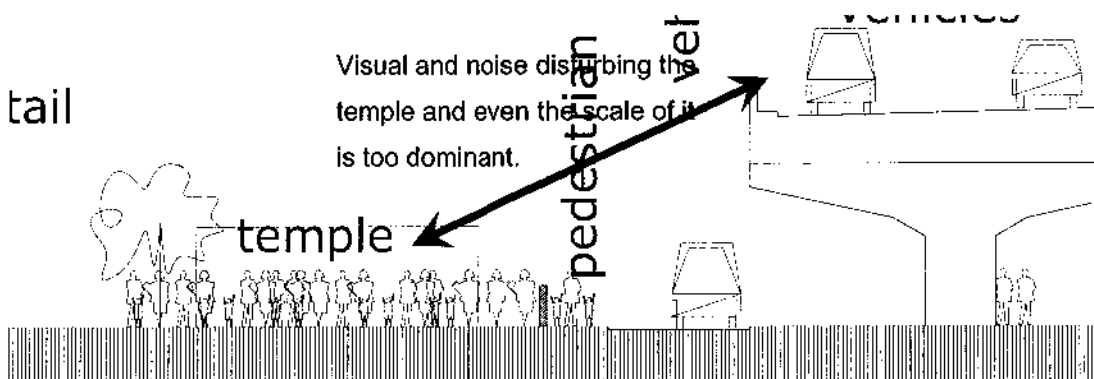
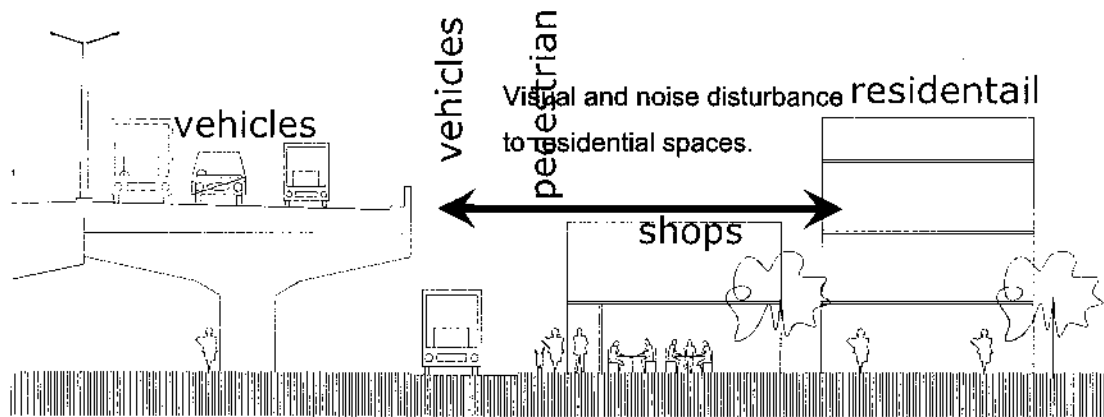


Fig. Personalization is disturbed; Socially important spaces of the urban landscape and the flyover are conflicting with activities and even with scale and form.

The spaces in the urban landscape around the flyover have become hard to personalise since the flyover is overlooking those. The temples are the most damaged since the flyover

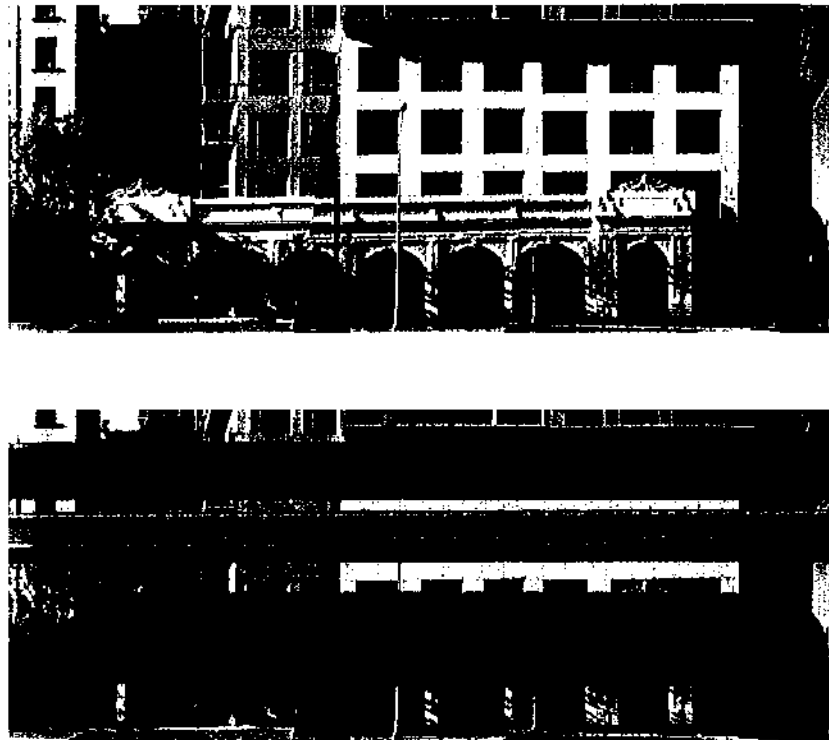
damaged its spatial properties with religious consideration. It also disturbed the views through bedroom windows of residential apartments.



*Fig Visual and noise disturbance to residential spaces discourage the personalization and improve more stress.*

**Case Study2: Analysis of the Responsiveness of Flyover, Seattle Monorail/ Green Line Viaduct**

**Role Plays by a flyover in the Urban Context**



*Fig. Existing situation and situation after erecting the flyover*

The analysis here is done by the following professionals;

Stephen M. Antupit, Robert Aujla, AIA, Fred Bassetti, FAIA, Philip Beck, AIA, Greg Belding, AIA, Tracey Belding, Jeanette Benton, Rachel Birch, David Boone, Kenneth Bowles, R.A., Don Brubeck, AIA, Richard Cardwell, James Castanes, PS, AIA, David Coleman, AIA, Dan Corson, Phillip Decker, Frank Y. Dill, III, William E. Endelman, AIA, Steven A. Erickson, AIA, John Eskelin, AICP, Marni Evans, Assoc. AIA, Michael Fajaris, Nils Finne, AIA, Friends of Post Alley, R. David Frum AIA, Pam Gazale, Carolyn Geise, FAIA, Bob Glanzman, William Gottlieb, Chris Hawley, Michael Herschensohn, John W. Hoffman, AIA AICP, Connie Holloway, AIA, Ginger Huebner, Scott Huebner, Nora Jaso, AIA, Stevan Johnson, Norman J. Johnston, FAIA, Billy King, Laura Lee, Monika Lidman, Jack Mackie, Jud Marquardt, FAIA, Susan Millinich, Jeremy Miller, Andy Mitton, Mike Moedritzer, Erika Morin, Jason Morse, Jeffrey Karl Ochsner, FAIA, Sheri Olson, FAIA, Shawna O'Neal, Mahalie Pech, David Peterson, William M. Polk, FAIA, Teresa Rancourt, Gilbert Recla, Mark Reddington, FAIA, Paul Reinhart, Tim Rice, Bruce P. Rips, AICP, Iain M. Robertson, ASLA, Bridget Rogler, Jim Rothwell, Norie Sato, Walter Schacht, Jerry Schneider, George Shaw, AIA, Buster Simpson, Laura Sindell, Ellen Sollod, Mark Speidel, Dana Staikides, Elizabetha Stacishin, Liza Stacishin, Dr. Sharon E. Sutton FAIA, Hal Tangen, Steve Tatge, AIA, Sherine Tully, Terri Watson, Rob Widmeyer, AIA, Bill Whipple, Eugenia Woo, Judson Youell.

Here are their concerns,

***Why oppose the Green Line?***

"The Green Line monorail will have severe negative impacts on neighborhoods, parks, and our city streets."

**The Green Line monorail will damage our pedestrian environment.** Massive concrete structures and speeding trains do not belong directly above city sidewalks.

**The proposed route through Seattle Center will spoil a civic treasure.** The International Fountain Court is an essential gathering place for people, and an important neighborhood park for Queen Anne; it should not be turned into a transportation corridor.

**Seattle should respect its historic resources.**

The proposed route on 2nd Avenue through downtown and Pioneer Square is unacceptable. Concrete monorail structures will wall off historic gems like the Exchange Building and King Street Station, and will destroy views of Pike Place Market from many points in the city.

**Monorail structures will degrade open space.**

Seattle needs to protect the parks - like the Garden of Remembrance at Benaroya Hall - that help make our dense city center livable for residents and workers.

**The Green Line will block views to our natural surroundings.** We should preserve the view corridors to mountains and water that previous generations worked hard to protect.

The proposed **750-foot skybridge** at Westlake Center violates Seattle's successful tradition of downtown urban design. Skybridges have largely been prohibited in our city, because they damage the vitality of sidewalks and streets.

**How "green" is the Green Line?** Not very. Clearly, the Green Line monorail will damage irreplaceable civic, cultural, historic, and environmental resources along its 14-mile route, while removing few cars from the road. Seattle design professionals are concerned that the monorail planning process is being undermined by the lack of good visual information. The SMP (Seattle Monorail Project) has not provided the public the visual representations it needs to understand the Green Line proposal. The SMP has produced diagrammatic plans and sections, but has consistently avoided showing elevation drawings of the monorail structure in context. This is a critical omission, and has been recognized as such on many occasions by the Monorail Review Panel (MRP), an advisory board that is evaluating the proposed design. Without legible elevations, both MRP and the public are left flying blind through the design review process. The information contained in elevation drawings is essential even now, in this early phase of design, when we are primarily focused on large-scale issues.

***Why are elevations important?***

Elevation views are absolutely essential to convey a true sense of the scale and bulk of an elevated, linear structure like the monorail.

Elevations are also needed to describe the relationship of the monorail structure to its surrounding context: the buildings and open space that make up neighborhoods along the fourteen-mile monorail route.

#### **What would elevations show us?**

Here are some examples:

- Monorail guide beam depth, and how it varies along the route-
- Guide beam height above grade, and how it varies along the route
- Relationships of scale and proportion between guide beams and adjacent buildings
- Impact of guide beams on views from buildings
- Impact of monorail on the privacy of building occupants
- Visual impact of monorail structure on historic facades
- Positions of monorail columns relative to buildings and open space
- Scale of monorail structure relative to pedestrians and sidewalks
- Views blocked by monorail structure along its route
- Size and bulk of monorail switches
- Relationship of switches to adjoining buildings
- Size and bulk of catwalks and various other system elements

**What is still missing from the picture is a general understanding of what the monorail structure looks like in the built environment.** This is troubling, given the serious visual impacts associated with an elevated system. The guide beams are rising and falling,

switching from one track to two in some places, interrupted frequently by large switch platforms: what does it all look like, and how does it relate to the city?

The monorail authority has managed to move through the design process not by clarifying, but by concealing basic information - while imposing an accelerated, unrealistic schedule. This undermines the MRP's ability to conduct a meaningful review process. Furthermore, it makes it very difficult for members of the public, particularly those who are not design professionals, simply to understand what is being proposed. The public has no way of evaluating what it cannot see. As a result, citizens are effectively kept out of the loop in the monorail planning process.

#### **Conclusion**

The flyovers are vital in the contemporary urban contexts as another stage of the evolution. With the growing population and the activities the mobility considered important. Flyovers as a solution to the less efficiency of functions prove that it enhance mobility and reduce congestion.

It is true that it enhances the accessibility of two points and it has neglected the environments of the urban landscape in-between. Though it is the responsibility of the engineers, it is crucial when it is erected on the landscape, since conflicting with the responsiveness. According to the analysis the flyover is enhancing the legibility of the

context as it is contrasting in the urban landscape as a landmark which will be experienced at the ground level as well when it is using. It is positive to some extent but the adverse effects are more because of the lack of the sensitivity in it.

The urban landscape is a social responsibility where people celebrate the urbanity. So the flyovers must be responsible and sensitive enough to be responsive towards them being meaningful. Though legibility is improved by its form, physical and visual permeability, and the nodal activities are discouraged. Therefore the considered legibility is very less and inappropriate.

Considering about the elements of it and the space that it creates, there is much more potential for those being deserted if the flyovers are not thought in terms of environment responsiveness. The lessons of such urban issues can be identified from the history where people abandoned spaces in such landscapes.

Though the structure is primarily derived based on the Imagineering of the engineers, the spaces created and the form must be with a sensitive architectural thought and the positioning of should be evaluated by the planners as well as the urban designers. Even the form of the flyover as well as the elements of it is to be detailed and designed in a way to achieve environment responsiveness.

But in the present context considering the responsiveness is more critical having many diverse effects on the responsiveness. People are discouraged to perform their public life and it has added more tension to the landscape because there is less responsiveness. At the same time the activities around also was disturbed and the created barriers to the potential of robustness and the legibility.

As the urban context is getting more tensed day by day it is important to have more responsive spaces and the structures which are coming to the urban landscape must be well thought and designed according to enhance the quality of the landscape.

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## BUILDING NUMBERS: THE CASE OF POST TSUNAMI HOUSING IN SRI LANKA

Harsha Munasinghe

### Abstract:

Top-down approach used to build housing for the Tsunami victims in Sri Lanka evolved around the number of houses destroyed. The selection of land and the number of units to be built were donor-biased decisions. This *Building-Numbers* may have satisfied the donors and builders for quantification of their achievements but not necessarily the recipients for various reasons. Many recipients have left those houses and some never occupied theirs. Enlarging schism between man, society and place, and further displacing the settler as a result are defined here as the research

problem. We have studied a few housing projects in the Southern Province, using a multidisciplinary approach framed by socio-cultural based settlement planning and morphologically oriented house types. We used qualitative research methods to collect field data. Our findings suggest that building of settlements that are beyond mere collections of numbers could have had more success in term of resurrecting the lost villages.

**Keywords:** human-settlements, social-space, place-making, and Sri Lanka



## Background

Tsunami was an unknown term to Sri Lanka until December 26<sup>th</sup> 2004. Sri Lankans did not pay any attention to the news of rising sea water as this was usual during the season of high tides. The unprecedented destruction was known within hours. A quick snuffing of around 40,000 lives, over 80,000 houses, and hundreds of villages and towns changed the

history of Sri Lanka. In planning the resurrection of the destroyed living settlements, state agencies, NGOs, and professional bodies all considered building of 80,000 houses within a year to resettle the displaced, in a country where 6000 houses are built annually, as a daunting task.<sup>i</sup>

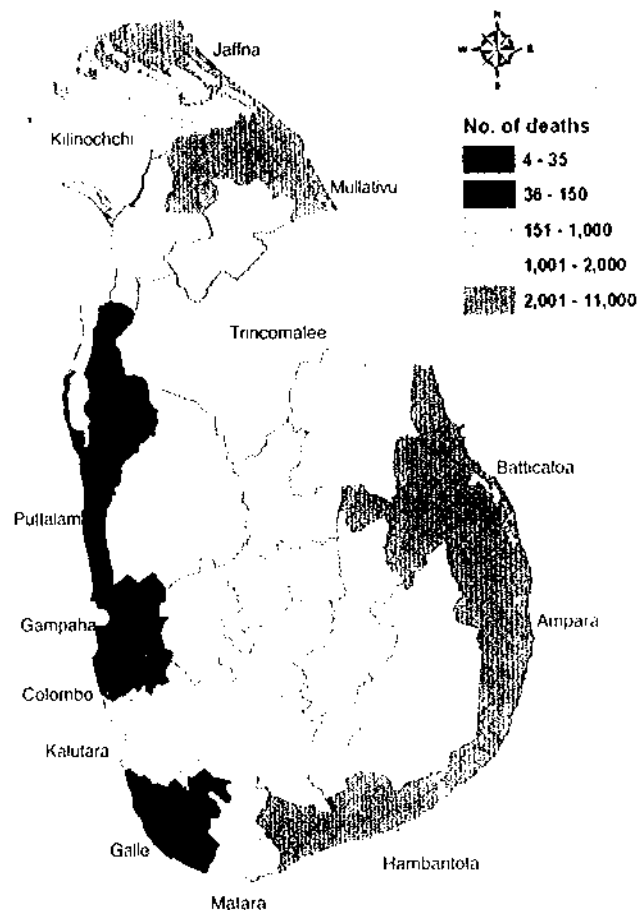


Fig. 1- Tsunami-affected areas in Southern Sri Lanka

The government of Sri Lanka, commissioning local and foreign experts to plan the post-Tsunami reconstruction, emphasised the need of raising living standards and instigating economic development in the devastated coast, where fishing and tourism play the most vital role in socio-economics. Since a substantial portion of the victims were less-affluent fishing families who squatted in reservations, providing them with houses, means of survival and infrastructure facilities in more habitable locations was essential. This was hence seen as a *blessing in a disguise* to instigate regional development by trading off uninhabited lands with those reservations and valuable urban lands where there were squatter settlements. Therefore, each new housing village with its own diversified socio-economic parameters was planned to instigate national development. The difficulty of securing habitable land that is beyond reservations and the importance of integrating new communities in the national or regional economic grid forced building mass housing.<sup>ii</sup> Yet, all decisions evolved around the number of houses lost rather than how those new housing sites would become partners of development by restoring the psychological state of the displaced, facilitating the formation of new societies, and sustaining the environmental qualities of locations. As such, the new housing villages paid less attention to man, society and environment but more on the numbers that could be built. The donors appreciated this approach to *building numbers* for easy

disbursement of funds and quantification of achieved targets.

Uneven distribution of houses, building on unknown locations that were often far from their places of work, and failure to facilitate the qualitative aspects of a human habitat, which is the basic spatial unit where dwelling takes place, led to the further displacement of Tsunami victims.<sup>iii</sup> Accommodating people with diverse and sometimes contrasting socio-cultural backgrounds in more dense built environments has triggered the creation of non-society in most of the *extensive* housing villages. The recipients are rather unsettled as the type-plan houses provide less potential for self expression and identity, and no possibilities what-so-ever for future expansions. The failure to note the existence within a particular social context has turned their occupying a house a mere temporary one. As a result, some occupants have already left their new houses and some never occupied them. Those, who came to settle down there do not dwell the place but just occupy only.<sup>iv</sup> As a whole, most of the *extensive* housing schemes have not been successful habitats.

We, having observed the problems in the post-Tsunami settlements, studied the existing situation in a few key housing schemes to contribute towards the development of a more comprehensive understanding of human settlement planning in a context of post-disaster.<sup>v</sup> By testing the strength of a participatory approach

supported by a typo-morphological approach for designing the living units, we hope to contribute towards the knowledge on post-disaster housing designing.

### Minor Vernacular of the Coastal Village

Tsunami mostly destroyed fisheries villages.<sup>vi</sup> Those small hamlets of tens of houses were vibrant and heterogeneous though they looked casual, arbitrary, or random. The fisher folks had perfected their own behavioural patterns, values and ways of life with reference to the type of occupation and the particular location where they lived. Their community was structured on kinship, caste, clan, or family, and the villages were interdependent as each sub-society providing

a specialized service of the fishing industry. It is noteworthy that those sub-societies were placed in a hierarchical order within the community, depending on the significance of their particular role played in the fishing industry. A closer scrutiny of the layout of the village and the use of public space clearly showed the uniqueness of each village, especially depending on the location and its relationship to their religious centre. The villagers were closely connected to the church or the chapel nearby, and the communities had a close rapport with each other. The humble temporary-looking houses looked alike and arranged in a row whereas the countryside hamlets were organised around a central public space.<sup>vii</sup>

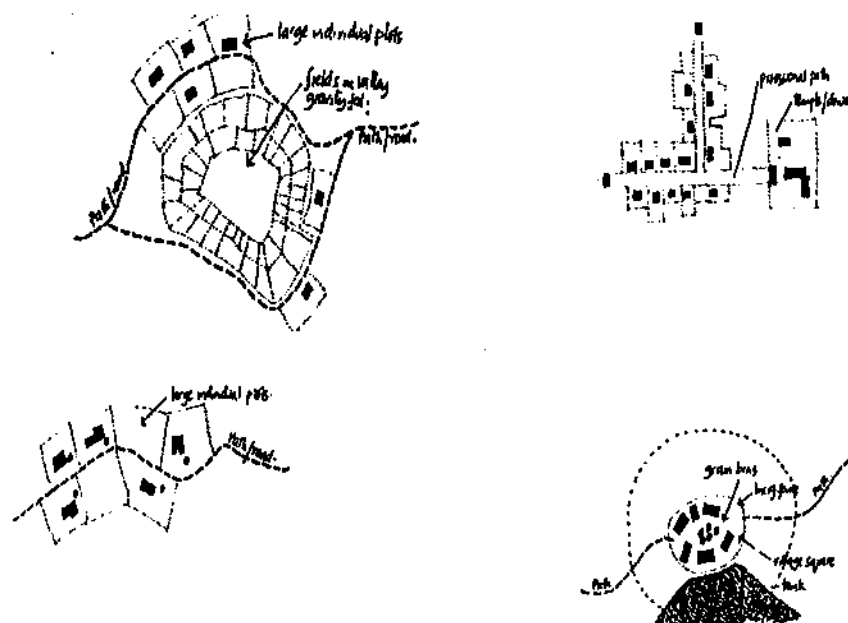


Fig 2: Rural Minor Vernacular: Village types in Pre-colonial Sri Lanka (source: De Vos, 1987)

The fisher folks had their way of demarcating public and private realm. One could see the

celebration of public space and proclaiming a living space in a diverse pattern, and one

could also see how the beach had become their common living room cum village square. Their houses were units of one spatial whole, or rather habitable rooms of one big house, expressing the co-existence as one family while expressing the self. Humble dwellings were organised with the best links to the common space- the beach, that was used as the auction grounds for their products and also for attending to common activities such as processing and preserving the extra stocks, storing and repairing the fishing gear. The beach was a busy place during the evenings as the fishermen were gathering to depart for their occupation.

Costal villages emerged in Sri Lanka long before the establishment of the harbour-based trade affairs boosted by the arrival of Arabs.<sup>viii</sup> Mahawamsa, the chronicle of Sinhalese describes the existence of coastal villages.<sup>ix</sup> Arabian navigator Ibn Batuta has recorded the existence of port towns and coastal villages already in the 12<sup>th</sup> century. The arrival of Portuguese in 1505 evicted the locals out of the port towns but not necessarily from the coast. The Dutch wrested the coastal belt from the Portuguese in 1640 and adopted a less hostile attitude towards the locals in order to procure Cinnamon and other spices. Thus the coastal villages reincarnated. People may have come from different places but their society soon formed into a new *Gemeinschaft* as they were all from one caste group or a clan that engaged in spice trade, especially in Cinnamon processing. Some converted to be rewarded

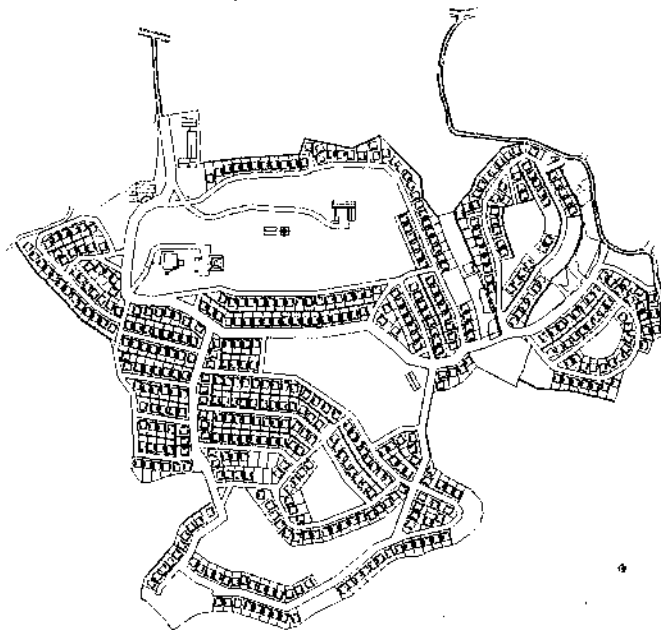
with land and social status. The more diversified society imitated the spatial logic of the Dutch city, expressing their new-accumulated wealth. The settlements were open landscapes, evolved around a Main Street that replicated their familiar social space- village square or street. This along with the necessity to use the beach as the village square may have laid foundations to form the coastal villages of linear form.<sup>x</sup>

The Portuguese evolved an innovative house form in the coastal belt by superimposing the Sri Lankan vernacular on an urban setting. The flexible simple built form with a gable roof was augmented by the Portuguese by adding an open column-fronted veranda and an upper level, thus turning it into a modest two story structure. Most of them being unmarried soldiers spent a lot of time in the veranda, turning the street into a community space. In Sri Lanka's urban history, the street became a public space flanked by such column-fronted verandas for the first time.<sup>xi</sup> The Portuguese veranda was an extension to the activities of the street. The Dutch repeated the house form, but enlarged it into a more elegant single-storey structure evolved around a central courtyard. The well-demarcated veranda became a filter to the street or the public life. The fortified city of the Dutch was exclusively reserved for Europeans and an open landscape. The locals' settlements in the Maritime Province followed the house type and city layout but in a less dignified scale.<sup>xii</sup> The British, who replaced the Dutch, did not live in those

congested urban centres and allowed the locals to settle down in the urban centres. This made the coastal centres even more vibrant and diversified.

The fisheries villages started evolving in and around natural harbours and bays along with the colonial society. They, repeating the humble structures and absorbing all socio-cultural changes took place in the Maritime Province, established a community adding an innovative settlement pattern to country's landscape. Most of the fisher folks had then become Roman Catholics or Christians. The settlements were organized cluster patterns orientated to the beach as the main public space. The village was one big home and the

humble temporary-looking buildings were just habitable rooms mostly used to retire in the night. Their houses, expressing individual needs of privacy, identity and territoriality as well as social interdependence, expressed the most intimate spatial experience thus without compartmentalising a settlement. There was no land ownership or demarcation of one's territory. The most significant feature of the fisheries villages and their housing units was the expression of socio-cultural diversity and the celebration of public space. Our inquiry is how this type of living is accommodated in designed settlements, which usually starts with a survey plan to divide plots without the dwellers.



*Fig 3: Turkish Village in Matara District- One of the largest Post-Tsunami villages (credit to SMAL)*

### **Construction of New Settlements**

There had been many attempts to build housing during the post-independence era. The first was land colonisation in the East in order to boost agricultural production in late

1940s. The government built village settlements and town centres, and provided services as schools, shopping, employment, etc. The settlers came from different

backgrounds, and never formed a solid society nor were they absorbed into the existing societies. Their moving into the colony was single-aimed: to obtain agricultural land. This fragmented society leads a temporary life there to date still relegated to an *alien* community. The failure to facilitate community development has pushed many of the later generations out of those villages too.

Every successive government built several types of housing for middle and lower middle classes, most of which were built around Colombo to relieve the shortage of housing created by urbanisation. Some were housing blocks built for the state employees. Sri Lankans thus started living in small living spaces above ground for the first time in late 1960s. The flats blossomed into healthy settlements as the residents were of similar social classes and hence were able to develop secondary and tertiary relationships. Arrangement of the blocks around an extensive courtyard also helped evolving social life. The blocks of functionalism-modernism provided flexibility of personal spatial likings, and those locations have fostered continuous occupation. At the same time, the government built a few housing blocks for fisher communities just on the opposite side of the beach. The fisher folks were never at home, being above ground without a common space or having to cross a busy traffic spine to go to their known common space. The blocks were soon sold

out and the fishermen moved back to their squatter settlements.

The government that came to power in 1977 first built hundred thousand houses and then one million houses both in the form of housing schemes. The theme *shelter for poor* made the government placing priorities with the poverty-stricken thus providing them with a basic shelter free. Later, it was spreading in to the construction of houses for middle class segments in the outskirts of Colombo. The understanding was that they had the strength to travel to work, and thus would live in the fringe if provided with the necessary infrastructure facilities. The schemes were a mere collection of houses rather than housing villages, and almost all the dwellers have to come to the city in the morning, thus aggravating the inward traffic and consumption of resources. The houses that were given free are mostly abandoned by the recipients due to the lack of facilities and poor accessibility. It is also true that some of the locations were not habitable. It has been accepted by many that the housing schemes were not settlements. Type plans used for houses and the rigid positioning of house units did not strengthen the container quality of the place. Above all, the builders again failed to comprehend the need for public spaces and facilitating social life as their intension was to achieve numbers.

Reconstruction of villages for the flood victims of 2003 with the involvement of the postgraduate students of the Faculty of

Architecture, University of Moratuwa in a one-on-one design clinic with villagers was an exceptional attempt to design post-disaster housing. In this case, houses were designed for the same locations where their previous house stood. Sri Lanka Institute of Architects (SLIA) and the Faculty managed to convince the authorities that the age-old type plans would not provide the necessary psychological strengths to the displaced.<sup>xiii</sup> The approach was to design a *generic form* at a price as low as Rs.100000 that could be improved according to the needs and the strengths of the occupant. This was highly successful in rebuilding the diversity of the rural setting once compared with the village-reawakening programme of 1980s.<sup>xiv</sup> Paying due attention to the *qualitative aspects* of housing, and involving users in the rebuilding process could be considered as designing and building *beyond-formal-house*.

There was no generalisation of decision-making, nor repeating of regular house forms,

but a user-oriented designing of houses: similar to consultative planning. The solutions were far better than type plans, being low cost and time effective. The only lapse of this effort was taking the reinforcing of community spirit of the village for granted as the failure to understand the essential civic qualities of individual houses in a rural village. Awareness of village as its own setting and village house as a self-sufficient unit may have caused the creation of individual houses. Yet, the particular locale of each village absorbed these mistakes, and today we see a rejuvenated community and a living house form. Socio-economics did not change much but the social empowerment through new house form assist the dwelling of communities.

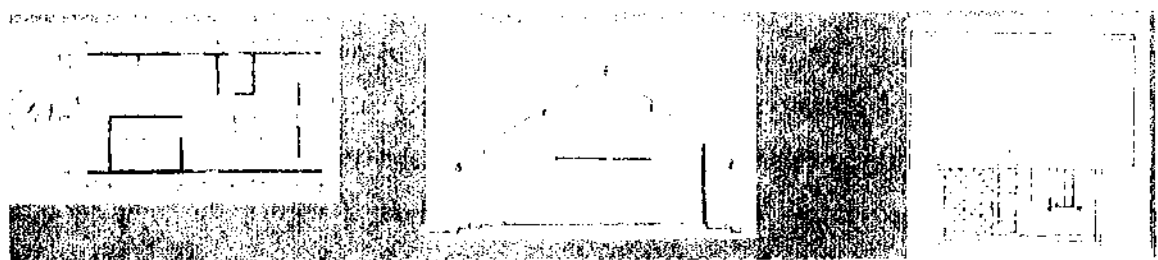


Fig 4: One of the core houses designed by the PG students of University (Credit to Prasanna Kulatilake)

#### Post Tsunami reconstruction

Tsunami mounted a daunting task, in which developing a responsive house form around a legible reference point was more than essential in order to instigate the community

spirit among the new settlers. They had basically lost everything and been highly traumatized. As such, resurrecting destroyed villages certainly demanded far diversified

architectural solutions. On one hand, the scale of new constructions and on the other, the diversity of user communities emphasized the need for an initiative similar to consultative planning, in which public participation plays a vital role. Public participation could be exploited to create an awareness of natural disasters and post-disaster management and could have given some confidence to the victims of the disaster and to minimise possible rejection of new comers by the existing villages. As such exposing architects into new parameters in settlement designing, this exercise could have marked a turning point in the built environments that were mere *tabula rasa*.<sup>xv</sup> Political authorities as well as the Sri Lankan professionals were aware of the difficulties of congregating massive numbers of houses in one land. A bottom-up consultative approach could have grafted new housing villages as a catalyst to the development of the rural society and economy. However, as it is the case of many donor-driven exercises, public participation was not sought and it is a fact that most of the designers/planners never met the prospective recipients of those houses. It was clear that both donors and professionals handled these projects from far.

The failure to comprehend the nature of the villages lost along with their social order and social organization, building typologies and place-morphological understandings, further contributed to the making of non user-responsive housing. It is a fact that most of

the donors as well as designers were based in Colombo, and had hardly seen the lands where the villages were to be built. This is why some housing villages have been built at the expense of the natural terrain thus creating problems of surface water drainage. Some fisher folks are accommodated in flats where there is no provision for them to attend to the daily mending of their fishing gear. On the other hand, these flats are too far for them to carry these fishing gears and they are not provided with spaces to store the fishing gear.<sup>xvi</sup> The families who had used on-ground kitchens now have to use small upper floor kitchens fitted with tiny utility balconies, refuse chutes, etc, but without the knowledge to use them. No facilities are provided to have a chat or exchange food with the neighbour: and in many cases the neighbours are total strangers too. The activities such as cooking that were performed in semi-public spaces have now been withdrawn in to purely private places. As such the said social co-existence is not facilitated at all. There had been no attempts to note these community qualities with which villagers had conceived their place of dwelling. The focus of the authorities has been compensating the number of houses lost and adding more houses in order to be popular among their vote bases. In addition, giving a physical order that looks pretty on drawing board, without facilitating society formation may perfect in a new locale. The new character would eventually turn these 'built-numbers' in to a human zoo.





Fig 5: Turkish Village in Matara District (credit to Dinesha Hewawasam)

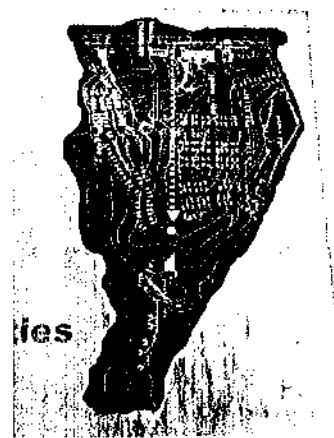
The households were chosen through a lottery. The dwellers often complained that the houses and rooms were too small and planned without the knowledge of their way of life. For example, they noted the amalgamation of the shower and squaring pan in to one room. Once confronted with the idea that their lost housing units were even smaller, shabbier with fewer rooms or no rooms, they all responded equally: *but we had the beach*. Today, they are far from the beach and there is no replication of such a communal space in the housing villages to cultivate a sense of brotherhood and interdependence. In addition, their neighbours in most cases are strangers. Therefore, house has become the only space for them- and that tiny space forces them to change their life style. es. It is a fact that more than 68% do not know their new neighbours as they came from different locations and more than 52% of them are from different sub-casts that engage in different trades c

fishing. It is also true that more than 54% will have to use public transport to get to their fishing harbours. Yet, the most disturbing in the housing village in Matara district is accommodating government servants, school teachers, etc within the fishing community without paying any attention to their social status. As such, it will take a long time for them to settle down and form communities- that is only if proper common facilities are provided with to compensate. One may argue that the time would heal the gaps, but the layout planning has not trapped spaces to facilitate public realm and the distribution of houses among contrasting social groups would result in a non-society. Therefore, those who occupy the new houses tend to develop an introverted living pattern, which is not easy in a rather modest built space and not healthy in a post-disaster settlement situation that demands the security of social interdependence.



*Fig. 5 Failure to express one's self, failure to orientate within the context and identify his/her social role always leads to the displacement of the settlers.*

As the houses are not clustered around a central communal space, the chances for community forming are slim. Most of the housing villages do not have adequate public spaces, but do have a central shopping mall, which in a way imitates the village fair where rural villagers buy their household groceries. The fishing village of pre-Tsunami never had such a village fair where many activities take place in addition to buying and selling. The villagers, who do not have the habit of doing their grocery shopping weekly in a shopping mall and do not have the facility to store even if they have the strength to buy the weekly needs, find it rather difficult to visit the shopping mall daily. This is certainly design failure due to the lack of awareness of the spatial logic of the fishing village.



*Fig.10. Housing village built in Hambantota*

With the failure to facilitate intricate relationships between users, compartmentalisation of the housing estates is inevitable. The possible solution would have been adopting a system of clustering the village, with each cluster depicting a small hamlet they are used to. Each cluster, on the other hand, could have been assigned to one caste group or a clan or an extended family, thus promoting their familiar outdoor living in outdoor spaces. We find the entire problem emerging from *straight jacket* Master Planning of the villages rather than its detailing or house types. However, it is important to emphasize that the architects could have designed a 'core' house rather than a detailed house type. At a glance, these detailed types turn the new villages into a character-less setting.

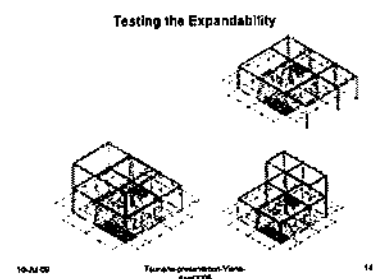


*Fig. 11 Housing Village in Hambantota District is built in an appropriate scale though its composition fails to provide for facilitating of small scale communal spaces.*

Among the other major problems in Post-Tsunami construction is the poor construction and architects' failure to face challenge of building many within the availability of certain resources. It is predictable that since the households are incapable of maintaining the structures, these villages would eventually become concrete slums.<sup>xvii</sup> The attempts to try out new technology and materials also were not successful as the construction sector did not respond positively. As a whole, we see a lot of shabbily constructed built forms called houses and occupants finding it difficult to maintain the houses. It is also fact some housing schemes never got completed due to poor construction detailing.<sup>xviii</sup>

As a whole, the post-Tsunami housing in the Southern Province has further displaced the Tsunami victims. Among the major problems are the failure to comprehend the meaning of village, failure to comprehend the types of social groups and ways of grouping in rural settings. Ignorance of responding to the social

and cultural needs in a settlement such as communal spaces, restrictions on the expansions of families or the villages, links between place of work and place of living, and the lack of provisions to diversified living has cost the opportunities for developing post-disaster housing base as well as for region-base national development. It is clear that the building of new housing villages have failed to thrive as true human settlements due to the failure to respond to the unique relationship between man, society and environment. As a whole, the designers and the builders have not protected the nature where the village was built, have not contained the man who came to live in the village and have not facilitated the society formation.



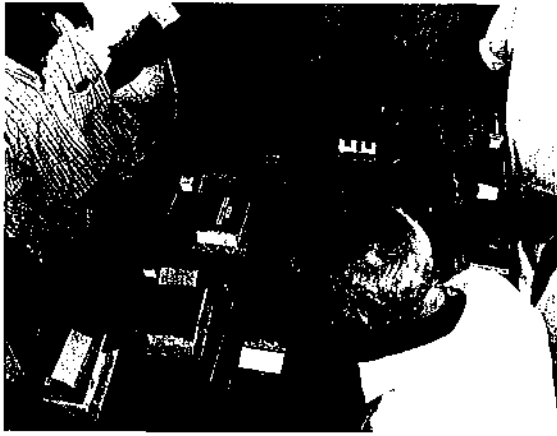
### Towards Meaningful Architecture

The way of thinking that only the city is culturally diversified whereas the village is more homogeneous may have led to turning the new villages in to so called housing schemes, in which the villager is made in to a mere number. The streets of the housing village of Matara even bear Turkish names that are hard for the villagers to remember, thus challenging their basic psychic conditions for dwelling: orientation and identity. The failure to create a settlement that would eventually foster a community makes it difficult for them to orientate themselves within their own village. The type plan houses, built along the arbitrarily laid road network that often contradicts with the natural contours thus creating sever hardships of surface water drainage during monsoon make no provision for the one's identity. They hardly support the facilitating of a group identity either as the master plan fails to cluster village pockets. The failure to express an identity and comprehend an orientation gives birth to the said schism between man, society and environment. This leads to the conversion of dwellers into inhabitants.

One may find this as an identical story of donor-driven housing that focuses on *numbers* rather than the qualitative aspects of community design in terms of identity and sense of belonging, especially in a case of post-disaster settlement planning. Architects

promote themselves as the responsible professionals who play a key role in developing design solutions that are more responsive to the place and the issues related to the particular social context. For example, the said scheme in Matara District could have comprehended the three hillocks that fall within the site to cluster the villages through a properly worked out street network to carve out a geographically defined physical space that is available for the community meaningfully. If this were connected with common open spaces and other facilities, each cluster could have become true places of living. Also, designing a core house thus allowing the households to develop these into their own abode could have provided them with developing an identity while contributing to the creation of a diversified village.

Initiatives such as consultative planning and the communicative turn always prepare the grounds for more user-friendly settlement patterns. This does not mean that the architects shall let the dwellers design their dwellings. The architect shall understand the inner need of the dweller through developing a closer communication with the dweller, facilitating those needs in the house forms. However, it is the architect, who gathers data, processes and then builds solutions upon them. This means s/he will have a good control over the overall project without losing the touch of users.



*Fig 14: An architect's attempt to work on a user-driven solution  
(Photo credit to Archt. I.D. Kuruppu)*

Our research project *Building Numbers* resulted from the identification of a problem manifest by the lack of innovative approach to plan the resettlement of the displaced. We specifically looked into the undue attention paid on quantitative issues and ignorance of qualitative aspects such as social and cultural values in these donor-driven housing. Among the serious issues is the failure of the designers to conceive the extensive housing villages as human settlements and thus planning a *human zoo*. This discourse of Tsunami reconstruction in Sri Lanka has a little connection with the current critical studies of settlement planning, especially its architectural aspects, present day evolution patterns of the local society, and the desirable level of socio-economic development. We have been able to achieve our task of drawing re-housing issues into an open discussion via an analytical study of the discourse.

We examined the institutional work, social dynamics and ideological presumptions linked

to the definition and production of human settlement within their impact on architecture. This goal, pursued as a multidisciplinary research, assuming the form of individual yet interconnected interventions in different aspects of social construction and uses. We also assessed the role played by the International NGOs rushed to the re-housing of Tsunami victims. As architects/ urban designers, we did not prepare checklists to measure the new settlements in terms of their impact on biodiversity, respect/response for users, energy conservation, minimum use of new resources, and holism. We believe that this exercise helped us emphasizing on 'environmentally-sustainable' design principles: man, society and the environment, minimizing the impact of built environment on nature, enhancing social relevance, and improving the quality of life and economic well being. In future, we shall facilitate a critical multidisciplinary approach to resettlement planning, bringing all actors together to analysing and cataloguing several aspects of human settlements to enlarge the awareness of disaster management, and test potential alternative socio-economic bases for new villages in order to resurrect a displaced.

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- <sup>i</sup>. The floods in May 2003 resulted in a similar disaster, in which about 15000 houses were damaged. Re-building them was not less challenging as a better portion was an able community living on their own land.
- <sup>ii</sup>. A regulation that banned construction within the first 100m from sea in the Coast Conservation Act was given 'undue' priority in the post-Tsunami reconstruction.
- <sup>iii</sup>. Some fishermen have to travel over 35 km to get to their harbours.
- <sup>iv</sup>. Refer to the concept of dwelling defined by Heidegger (1971)
- <sup>v</sup>. In selecting these cases, we paid attention on housing schemes in which more than 200 houses have been built because we find more complex situations in such villages.
- <sup>vi</sup>. Some ventured into the sea while others were either service providers or fish mongers though they all belong to one caste.
- <sup>vii</sup>. However, it is possible to note that the fishing hut is an evolution of the minor vernacular of Sri Lanka.
- <sup>viii</sup>. There are arguments that Sri Lanka had a sea-fare culture before the pre-historic times.
- <sup>ix</sup>. There are suggestions that there was one caste called Na- meaning naval affairs, who occupied the estuaries, bays and gulfs.
- <sup>x</sup>. The city of Kandy built after colonial advent has also adopted this linear form.
- <sup>xi</sup>. See Munasinghe (1998) for a detailed survey of the evolution of these built forms.
- <sup>xii</sup>. Galle port of the Dutch and its local outer urban district in Southern Sri Lanka are the most instructive cases to understand the urbanization and settlement patterns of Sri Lanka during the Dutch rule.

- <sup>xiii</sup>. The author acknowledges the efforts of the postgraduate students, their teachers, Architects Vidura Sri Nammuni and Prasanna Kulathilake of the University of Moratuwa, Sri Lanka, and the then President Sri Lanka Institute of Architects, Architect Lalith De Silva in making this effort success.
- <sup>xiv</sup>. The generic form was used to develop about 5000 user-responsive and location-oriented houses.
- <sup>xv</sup>. One settlement in South, which has nearly 500 houses, amalgamates tens of destroyed villages. This means an undesirable resettlement too.
- <sup>xvi</sup>. A housing village in Kataluwa, Galle was originally designed with such facilities. Yet, the location of this being too far from the beach, the fishermen are not in a position to use this community space.
- <sup>xvii</sup>. Once the type houses are not provided with necessary cooking facilities, with which the households are familiar, these become slums too.
- <sup>xviii</sup>. Housing village in Kataluwa, Galle was never completed with much anticipated community spirits as the poor construction detailing and poor construction led to the removal of the entire upper floor. The loss of tens of millions of rupees as well as the lost time reflects the grim picture of the construction sector.