LB/DON/76/2016
ARO2/26

LANDSCAPE AND HEALTH: A STUDY OF THE HEALTH - PROMOTING IMPACT OF THE OUTDOOR ENVIRONMENT WITH SPECIAL REFERENCE TO URBAN OPEN SPACES



W.B.K.Perera

(108460X)

LIBRARY
UNIVERSITY OF MORATUWA, SRI LANKA
MORATUWA

Dissertation submitted in partial fulfilment of requirements for the degree

Master of Science in Landscape Design

Department of Architecture

University of Moratuwa

72°13° 712 (043)

TH3079

Sri Lanka

November 2013

University of Moratuwa

TH 3079

TH 3079

DECLARATION

I declare that this is my own work and this thesis/dissertation2 does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

UOM Verified Signature

W.B.K. Perera

MSc. Landscaping Design

Faculty of Architecture

Department of Architecture

University of Moratuwa

4th December 2013

The above candidate has carried out research for the Masters Dissertation under my supervision.

UOM Verified Signature

Prof.Shiranee Balasuriya

Supervisor – MSc. Dissertation

Faculty of Architecture

Department of Architecture

University of Moratuwa

4th December 2013

ACKNOWLEDGEMENT

I wish to acknowledge with deep appreciation, the following persons whom without their help, guidance and encouragement, the study may not have been a reality.

I am deeply indebted to our personal supervisor Prof: Shiranee Balasooriya, Department of Architecture, for her guidance, valuable comments and unserved help given to me throughout and to landscape architect Mr. Susira Udalamaththa, lecturer and year coordinator of MSc. 1st year, Department of Architecture for the comments, criticism and continuous monitoring which encouraged me to do this study.

Professor Sarath Koragama, Head, Department of Zoology, University of Colombo for the intellectually vigorous discussions, he had with us during first year and for providing guidance to make this dissertation a more balanced one covering all the necessary aspects.

Dr. John Byrom, even though living very far away yet very close to all the students for guiding us throughout writing dissertation, providing necessary framework to adhere to and going through the document finding even the finest of the deviations from the required quality. Architect Mrs. Shereen Amendra, lecturer, for her valuable comments and unreserved help given during the post graduate first year. I should thank Lanscape Architects Mrs. Sujani Pilapitiya for her valuable comments during dissertation writing.

I should thank Dr. Lal Panapitiya, Director, Medical Services, Ministry of Health and Dr.(Mrs) Janakie Fernando, Consultant Pathologist, National Hospital, Sri Lanka for their continuous guidance and encouragement given to me during the research period.

I should thank the librarian, Library staff of University of Moratuwa, staff of the reading room. Department of architecture and Mrs. Malkanthi Perera for being very helpful throughout our two year post graduate course.

I am also grateful to Charted Architect .Mr.Chamara Liyanage , Charted Architect Mr. GihanMuthugala and to my batch mates , Charted Architect Mr . Damith Premathilake ,Manjula, Ruvini , Purnima and Damayanthi for helping me to continue the second year MSc course.

Last but not least I express my deepest love and gratitude to my wife , Sandya , my daughters , Sakeetha and Nethmi and to my son , Basuru for their encouragement and love and for being with me when ever I need help and for devoting their valuable time for my studies. .

ABSTRACT-

Many people now experience physical and psychological health issues related to the stress, fatigue and pollution associated with living and working in urban environments.

The presence of fascinating components of the environment are important because they attract us, and keep us from becoming bored. In an urban setting, green spaces simulate natural environment and green spaces can provide social, economic, cultural and psychological services especially for the wellbeing of the urban dwellers

The literature review conceptualizes the landscape as a health resource that promotes physical, mental and social wellbeing. Different health-promoting landscape characteristics are discussed. This research is based on literature review and case studies.

A set of meaningful pathways that link landscape and health is intended to be identified from this study. This study may allow to systematically describe the potential use of landscape as a resource for physical, mental and social well-being, a resource offered and available. It is well known that physical activity improves both physiological andpsychological well-being, but further evidence is required to ascertain how urban green spaces influence andshape health. This research considers specially the urban green spaces, their relationship to human health and the mechanisms behind relation between green space and health.

Keywords: Urban green spaces, Landscape, Nature, Health, physical activity.

TABLE OF CONTENTS	
CHAPTER 1- INTRODUCTION	1
CHAPTER 2. GREEN SPACE, URBANITY & HEALTH	5
2.1 What is Open Space/Green Space?	6
2.2 Types of Open Spaces	8
2.3 Green space themes-	11
2.4 Urban open spaces- 2.4.1 Introduction-	12 12
2.4.2 What makes urban open spaces healthy?	13
2.4.3 Value of urban open space	13
2.5 Open Space and Equity	24
2.6 Children and Young People	24
2.7 People with disabilities-	26
CHAPTER 3. UNDERLYING MACHANISMS BEHIND THE RELATION BETWEEN GREEN SPACE AND HEALTH	1 27
3.1 Introduction-	28
3.2 Human Perception of green spaces	28
3.3 Mechanisms	29
3.3.1 Exposure & Perception	29
3.3.2 Modification of Behaviour	38
3.3.2.1 Physical activity	38
3.3.2.2 Social Contacts	39
3.3.3.Impact on Health by the Components	40
of Open Green Spaces.	
3.3.3.1 Temperature Modification	40
3.3.3.2 Removal of Air Pollutants	47
3.3.3.3 Buffering unwanted noise	51
3.3.3.4 Bio Diversity & Human health	53

CHAPTER 4 – CASE STUDIES	58	
Case Study- 1 Independence Square	59	
Case Study 2-Diyatha Uyana, Baththaramulla	64	
Case Study 3Viharamahadevi Park, Colombo	73	
CHAPTER 5- CONCLUSION	80	
5.1 Introduction	81	
5.2 Functional approach for urban open spaces.	82	
5.2.1 Environmental and ecological functions-	84	
5.2.1.1 Climatic amelioration	85	
5.2.1.2 Noise screening	85	
5.2.1.3 Influencing the hydrological cycle	85	
5.2.1.4 Providing habitats for wild life	86	
5.2.2 Social and societal functions	87	
5.2.2.1 Providing space and facilities for leisure and recreation	n 87	
5.2.2.3 Access to and experience of nature	88	
5.2.2.4 Influencing human physical and psychological health	88	
5.2.3 Structural and symbolic functions 89		
5.2.3.1 Articulating, dividing and linking areas	89	
5.2.3.2 Improving the legibility of the city 89		
5.2.3.3 Establishing a sense of place 90		
5.2.3.4 Acting as a carrier of identity, meanings and values	90	
5.3 Guidelines for Urban space of High quality:	90	
5.3 1 Guidelines to be followed at the planning level	91	
RERERENCE LIST-	98	
APPENDICES-		101
Appendix A- Green space as a buffer between stressful life events and	d health.	102
Appendix B -Air Quality Pollution and Trees-		105
Appendix C Greenness with physical and mental Health		108
Appendix D Lung cancer risk and pollution		109
Appendix E Guidelines for Tree planting in Urban Open Spaces		110
ADDOUGLA L. CHICOLING TO THE DIGHTHE IN CIVAL COCH SDACES		111

LIST OF FIGURES

		Page
Figure 2.1	Open Green Spaces, Atlantic City Park	6
Figure 2.2	Bolgoda River, Hirana , Sri Lanka	6
Figure 2.3	Civic Spaces San Francisco, California	7
Figure 2.4	Brown Fields in United Kingdom	7
Figure 2.5	Public park in London	8
Figure 2.6	Lunuganga Garden, Sri Lanka	8
Figure 2.7	Outdoor amenity space, Sweden	8
Figure 2.8	Childrens' Play Area	9
Figure 2.9	Golf Grounds , Colombo , Sri Lanka	9
Figure 2.10	Green Corridor Between Edwalton and Gamston	9
Figure 2.11	Undeveloped areas with residual natural habitats.	10
Figure 2.12	Rambutan Plantation, Sri Lanka	10
Figure 2.13	Civic Space, South America	10
Figure 2.14	Burial Grounds	11
Figure 2.15	Diyatha Uyana , Sri Jayawardhena pura, Sri Lanka	12
Figure 2.16	Galle Face Green, Colombo, Sri Lanka	13
Figure 2.17	Viharamahadevi Park, Colombo Sri Lanka	14
Figure 2.18	House overlooks water, Sri Jayawardhenapura, Sri Lanka	15
Figure 2.19	Recreational opportunities, Diyatha Uyana, Sri Lanka	16
Figure 2.20	Aesthetic value of urban open spaces, Green park , London	16
Figure 2.21	Aesthetic value of urban open spaces, Green park , Sydney	17

Figure 2.22	Environmental value of urban open spaces	17
Figure 2.23	Urban open spaces provide niches for bio diversity	18
Figure 2.24	Cultural value of urban open spaces	19
Figure 2.25	How high quality open spaces impact on health	20
Figure 2.26	Urban open spaces- Place to be physically active	22
Figure 2.27	Consideration for childrens' play in urban open space	25
Figure 2.28	Urban open spaces, planned for people with disabilities	26
Figure 3.1	Human perception of Open green Spaces	28
Figure 3.2	Mechanism, Green space and Health	29
Figure 3.3	Green space as moderator	30
Figure 3.4	Kumbuk Tree (<i>Terminalia arjuna</i>)	32
Figure 3.5	Green colour of foliage, soothing effect	33
Figure 3.6	Vertical fountain jets as accent and exclamation points	34
Figure 3.7	Plants can generate sounds	35
Figure 3.8	Tactile perception of open green space	35
Figure 3.9	Ruk Tree (Horsfieldia iryaghedhi)	36
Figure 3.10	Olfactory perception of Open Green Spaces.	36
Figure 3.11	Green space enhances physical activity	38
Figure 3.12	Green spaces stimulate social contacts	39
Figure 3.13	Urban Heat Islands	41
Figure 3.14	Green Spaces lower the temperature	42
Figure 3.15	Wind breaks reduce the fuel consumption for heating	46
Figure 3.16	Five Criteria Air Pollutants	48

Figure 3.17	Trees as a part of the Air Pollution Solution	50
Figure 3.18	Trees affect temperature and air quality	5:
Figure 3.19	Green Spaces can be used to buffer noises	52
Figure 3.20	Global megatrends in biodiversity and public health	53
Figure 3.21	Immunological tolerance and tissue integrity	55
Figure 3.22	Microorganisms and Immunoregulation	56
Figure 4.1	Independent Square, Colombo Sri Lanka	59
Figure 4.2	Location of Independent Square and Walk	60
Figure 4.3	Independence Memorial Hall	60
Figure 4.4	Independence Memorial Hal, Front view	61
Figure 4.5	Walking path extending towards planetarium	61
Figure 4.6	Walking path with shady trees	62
Figure 4.7	Lagerstroemia speciosa	62
Figure 4.8	Mimusops elengi	62
Figure 4.9	Lit walking pathways at night	63
Figure 4.10	Diyatha Uyana, located on the bank of Diyawanna Oya	64
Figure 4.11	Plant stalls and centrally placed water fountain	65
Figure 4.12	Stalls with local flora, tropical flowers & fertilizers	65
Figure 4.13	Musical water fountain, Diyatha Uyana	66
Figure 4.14	Walking paths and shady areas with seating facility	66
Figure 4.15	Walking path close to the water front	67
Figure 4.16	3 D Art work on a part of walking paths	67
Figure 4.17	Lit walking paths during Night	68
Figure 4 18	Wildlife in the wetland of Divatha Uvana	68

Figure 4.19	Wetland with indigenous flora , Diyatha Uyana	69
Figure 4.20	Paved car Park with Indigenous trees	69
Figure 4.21	Boat Rides and the Floating restaurant	70
Figure 4.22	Newly constructed food court, Diyatha Uyana	70
Figure 4.23	Stalls of the food court & seating facility nearby	71
Figure 4.24	Water front Restaurant	71
Figure 4.25	Newly installed aquarium	72
Figure 4.26	Location of Viharamahadevi Park	73
Figure 4.27	Colombo Town Hall & the Cenotaph War Memorial	73
Figure 4.28	Museum , Art Gallery and Nelum Pokuna theater	74
Figure 4.29	Golden image Buddha statue and water fountains	74
Figure 4.30	Flower beds and Walking paths	75
Figure 4.31	Viharamahadevi park, habitat for animals	75
Figure 4.32	Small Lake and the Hanging Bridge	76
Figure 4.33	Large flowering trees & Ficus bengalensis	76
Figure 4.34	Large ever green trees delivering good shade	77
Figure 4.35	Children Play area & Elephants in a part of the park	77
Figure 4.36	Renovation work of Viharamahadevi park.	78
Figure 4.37	Viharamahadevi park after being renovated	78
Figure 4.38	Colombo Municipal Council after being renovated	79
Figure 5.1	Public open spaces are theirs	81
Figure 5.2	Open spaces contribute to promote community health	82
Figure 5.3	Open space of Good Quality , University of Nevada	83
Figure 5.4	Urban Open Spaces and Greenway Connections	84

Figure 5.5	Waterways in urban areas promoting biodiversity	86
Figure 5.6	Green spaces supporting life cycle of local species	92
Figure 5.7	Different type of habitats inside the urban park	94
Figure 5.8	Working in Outdoor Open Space	96