

## FACULTY OF ARCHITECTURE RESEARCH UNIT (FARU), UNIVERSITY OF MORATUWA, SRI LANKA

Faculty of Architecture Research Unit (FARU) of University of Moratuwa publishes research involving all disciplines of architecture. Contents of Morauwa Architecture Research News include research activities undertaken by its staff and research higher degree students in areas like art and science of architecture, town and country planning, building economics and integrated design. Other and future work includes practice and theory focus work, short interviews, book reviews and research visits,

Send a feedback or more research news to [faru@uom.lk](mailto:faru@uom.lk)

### In this issue

From theory to practice

The 4th World Construction Symposium

Carbon constrained building practices grounded on architectural physics

Green Knitting : Creative product design solutions to an environmental challenge

International research conferences to come in 2015

Application of Metronamica urban simulation model to predict land use changes in Colombo

## FROM THEORY TO PRACTICE: IMAGINING A "ROBUST" APPLICATION OF ARCHITECTURE

Dr Milinda Pathiraja, Department of Architecture



This research 'by architectural design' is a study of the possible role of architects in developing world regions as facilitators of construction policy. The study originates from the belief that, when developed with an understanding of regional characteristics, idiosyncrasies and limitations, the strategic design of technological configurations can not only produce sound building artefacts but also increase technical capacity in the workforce. To validate this hypothesis, the research examines whether and how building projects can be conceptually organised – architecturally – to act as training grounds for the development of construction labour skills.

The background against which the study develops is defined by mechanisms, ideologies and impact of architectural and construction practice in low-income, fast-urbanising societies. Based on industrial statistics and building output analyses, the study argues that construction industries in such economies tend to fragment into almost separate spheres of production, where cross-industrial application of technology, acquisition and use of know-how, and career development paths of the labour involved are difficult and limited.

The resulting compartmentalization of knowledge produces forms of 'technological rigidity', or a work environment where mistakes or sub-standard work can be expected if the context of application of the technology is not right (as often the case). It is in response to this condition that the study explores the ability of architectural design to imagine and embed in its language building realization logics as well as trade routines aimed at connecting construction markets rather than keeping them separate. If the rate of participation of the labour force to their own progressive training is to increase, technological contamination and compromise are the levers to pull. By using a series of real and ideal-typical building projects, the study sets out to show that architectural intent, vision and resolution can in fact incorporate technical decisions carrying policy implications in terms of incremental labour development and organization. This however requires changes in approach as well as to architects' understanding and appreciation of the role that design and technology can (or must) play in building production.

While the intellectual unity of design and construction must be recognized through processes facilitating links between technical and social actors, technological systems must be employed that have latitude for errors and non-optimal application. Technology, in other words, must be perceptive and inherently 'robust' as opposed to precise and dangerously 'sensitive'. It is through robustness that broad technological frameworks can be defined at industry level that are both flexible and adaptable.

The work will be presented at the second research colloquium of the Faculty of Architecture at 11 am on last Thursday in August 2015. You are welcome

## THE 4TH WORLD CONSTRUCTION SYMPOSIUM

### Department of Building Economics



The 4th World Construction Symposium 2015 on "Sustainable Development in the Built Environment: Green Growth and Innovative Directions" was held from 12th to 14th June 2015 at Galadari Hotel, Colombo, Sri Lanka. The symposium was jointly organized by the Building Economics Management and Research Unit (BEMRU) of the Department of Building Economics, University of Moratuwa and the Ceylon Institute of Builders (CIOB). The Symposium commenced with the key note address delivered by Prof. Ananda Jayawardena, the Vice-chancellor of University of Moratuwa, and provided a special forum for researchers and practitioners in the area of sustainable construction worldwide to share their knowledge, experience and research findings. The symposium was sponsored by International Council for Research and Innovation in Building and Construction (CIB). Liverpool John Moores University, United Kingdom; Centre for Innovation in Construction and Infrastructure Development (CICID), The University of Hong Kong; Indian

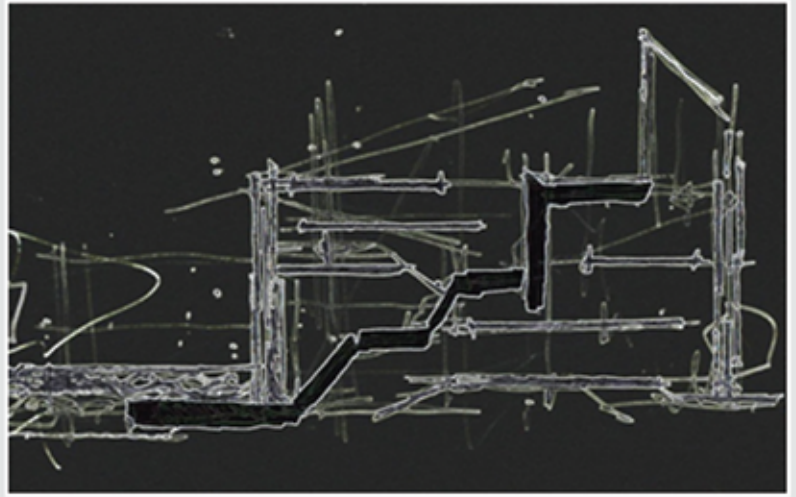
Institute of Technology Madras (IIT Madras); CIB-TG 72 (Public Private Partnership); CIB- W092 (Procurement Systems) and Colombo School of Construction Technology were the Associate Partners of the Symposium.

Built Environment Project and Asset Management (BEPAM), a journal published by Emerald Group Publishing, arranged for two awards, namely; the BEPAM Best Paper award and BEPAM Highly Commended Paper award. The recipients of these awards were announced by editor-in-chief of the journal, Prof. Mohan Kumaraswamy, at the conclusion of the symposium.

Altogether, fifty five (55) papers were presented under 12 theme areas by both local and international scholars. Imminent researchers, industry practitioners and students from over 12 countries including Sri Lanka, India, Hong Kong, Malaysia, Singapore, Australia and United Kingdom took part in this symposium sharing ideas in the area of sustainability in built environment. The diversity of participants stimulated a rich debate of the agenda items.

## CARBON CONSTRAINED BUILDING PRACTICES GROUNDED ON ARCHITECTURAL PHYSICS

Principal Investigator: Dr RMKU Rajapaksha, Secondary Investigator: Dr IGP Rajapaksha



The project funded by Rupees 4.3 million competitive grant from National Research Council (NRC) of Sri Lanka contributes to suggest that the innovative potential of building microclimate, plan form, sectional form and envelope can optimize the “BUILDING\_CLIMATE interplay” for reducing the need for energy in building operation. The current research innovates an innovative thermal landscape for an ideal low energy building operation. The problem of indoor overheating which is a common problem in warm humid climates has been addressed through this work.

The work has developed a “conceptual three dimensional massing” from associations that publicize case studies and literature involving a cross-dimensional performance approach focusing on the microclimate, plan form, sectional form and envelope. This three dimensional massing aims at strengthening envelope dependency considering it

as a bioclimatic entity” contributing to energy sustainability and zero emission status in operation. The work is being carried out to investigate the contribution of diversified air pressure fields within an internal volume, shaded exhaust air type multi layered envelopes, thermal mass, night ventilation and air plenums/atriums as major components in this conceptual three dimensional massing. The research shows that increasing diurnal range between 6-8 degrees C in Sri Lanka as a contributing climatic factor in this process.

Interim findings shows that non-domestic buildings in Sri Lanka are highly energy intensive with Energy Utility Indexes (EUI) moving around 200- 400 KWh/m<sup>2</sup>/a. The research aims at addressing this critical problem. On site field investigations and calibrated Design-Builder simulation results on selected case buildings and conceptual model provide evidence of passive cooling with internal air temperatures moving 4.5- 6 degrees C below the ambient levels and low levels of EUIs even up to 48 KWh/m<sup>2</sup>/a with conditioned office buildings. The long term research intends to conclude by 2017.

## GREEN KNITTING : CREATIVE PRODUCT DESIGN SOLUTIONS TO AN ENVIRONMENTAL CHALLENGE

Dr Hiranthi Pathirana, Udaya Wickramasinghe, Department of Integrated Design, University of Moratuwa



Research seeks to address innovative ways of fashion design and production of hand knitting techniques that are practicing locally that would cause minimal negative impact to the environment. This particular process of knitting has been identified as green knitting mainly because their solutions minimize the use of resources, using biodegradable textile materials and reduce the impact on the environment, using plant dyes instead of poisonous chemicals to improve the appearance of fabrics. This research is an attempt to find out solutions to create green design concepts that has roots locally in the design and manufacturing processes with available man power, material and resources which can create interesting new market place models with international standards. Objectives of the research are to recognize the importance to further the message of sustainability through trends in fashion design and to envision a more main stream approach to fashion design through responsible approach in manufacturing and designing, especially by using seamless circular hand knitting techniques. Data analysis will be done in the qualitative approach

## MORE INTERNATIONAL RESEARCH CONFERENCES TO COME FARU 2015 – “Making built environments responsive”

The conference which will be held on December 11-12, 2015 in Colombo is aimed for the academics, practitioners and students from the universities all around the world. Faculty of Architecture Research Unit welcomes you to this international conference.

Organizing Committee invites you to submit an abstract/s for the consideration by the Scientific Committee. Authors of selected abstract will be notified and invited to submit a full paper. Authors of selected full papers will be invited to present the paper/s at the conference. Conference proceedings will be published. Further details are available at the website <http://mrt.ac.lk/faru2015>

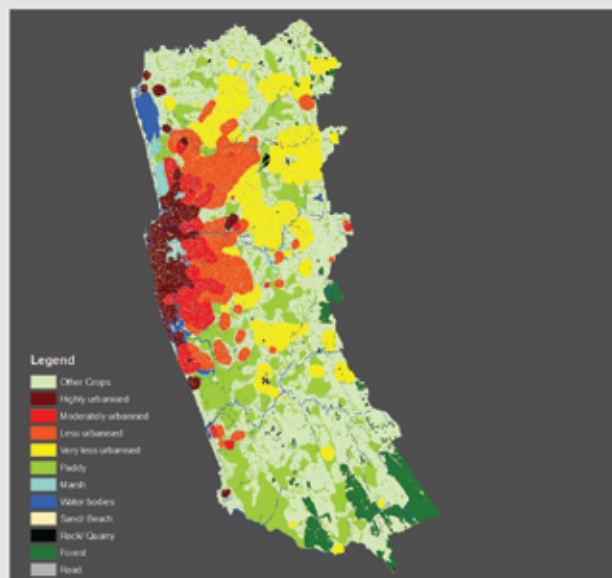
## ICCP – 2015

Towards a New Urbanity; Places for Urban Coherent” Third international conference on cities, people and Places organized by Department of Architecture will be held from October 26 to 28, 2015 at the Galadari Hotel in Colombo, Sri Lanka.

## SOUTH ASIA URBAN FORUM 2015 OF DEPARTMENT OF TOWN & COUNTRY PLANNING

The South Asia Urban Forum 2015 is jointly organized by the Department of Town & Country Planning, University of Moratuwa and South Asia Institute of Harvard University, in collaboration with Institute of Town Planners Sri Lanka (ITPSL), Urban Development Authority (UDA), and the National Physical Planning Department (NPPD), with the participation of Professional Institutes of Planning and many urban planning and the related practitioners and academics in South Asia. It will be held on 19 – 21 August 2015, At Cinnamon Lakeside, Colombo. Further details of this forum is available at the website: <http://mrt.ac.lk/urbanforum2015>

## APPLICATION OF METRONAMICA URBAN SIMULATION MODEL TO PREDICT LAND USE CHANGES IN COLOMBO



Modeled Land Use Map 2010

**Research Team:** M C K De Silva, A B Wickramasinghe, Dr. R Ratnayake, Dr. J N Munasinghe, Ms. J N Wimaldas and C Liyanage of Department of Town and Country Planning

**Acknowledgement:** Short term Research Grant obtained from the University Moratuwa, Dr. Rohan Wickramasuriya and the SMART Infrastructure Research Institute of University of Wollongong, Research Institute of Knowledge System (RISK), Netherland, Department of Transport and Logistics of UOM.

Metronamica is a cellular automata based modeling application that is increasingly popularized among planners due to many possibilities and sophistications it provides to the user. Metronamica model offer a good platform to study urban dynamics. A recent study completed by the Department of Town and Country Planning on testing the applicability of Metronamica for Colombo Metropolitan area, had found that the model can be used as a tool for urban simulation modeling with a reasonable level of accuracy.

The findings of this study has indicated the possibilities of employing this model as a potential tool in simulating urban land uses in Sri Lanka. It is found that model had simulated the changing pattern of marshy lands with a high level of accuracy. Simulations of highly urbanized and less urbanized land uses also showed relatively higher levels of accuracy of nearly 50%. It is further understood that the number of calibrations need to be increased by changing the basic parameter values of the neighborhood rules. In this manner, this is recognized as a useful tool for planning decision makers as it can handle dynamic factors and visualize those changes, which will be instrumental towards making better-informed decisions. However, the constraints related to technicalities and the information sourcing need to be addressed in future applications of the model.



**Editor 'arr' and Director of FARU:** Dr RMKU Rajapaksha

**Advisor:** Prof Lalith de Silva, Dean FOA

**Editorial Committee**

Dr Rasanga Wijethunge, Ms Shalini Mariathaz, Dr Sachie Gunaratne

**Publisher:** Faculty of Architecture Research Unit (FARU), University of Moratuwa, Sri Lanka

**Page Layout:** Archt. Sagara Jayasinghe