ACGSA

Committee on Green and Sustainable Architecture

arcasia

REPORT

2019-2020

December 2021

ACGSA

Ar. Dr. Acharawan Chutarat
Chairman

ASA
The Association of Siamese Architects

Ar. Tushar Sogoni
Deputy Chair /
Zone A (rep)

IIA
The Indian Institute of Architects

Ar. Debatosh Sahu
Imm Past Chairman

IIA
The Indian Institute of Architects

Ar. Qasi M Arif
Past Chairman

IAB
Institute of Architects Bangladesh

ACGSA

ZONE A

Ar. Tushar Sogoni
Deputy Chair /
Zone A (rep)

Ar. Gaurav Agarwal	IIA	
Ar. Dr. Zebun Nasreen Ahmed	IAB	
Ar. Damith Premathilake	SLIA	
Ar. Pranita Shamapandet	SONA	
Ar. Yeshey Jamtsho	BIA	
Ar. Rashid Rasheed	IAP	

ZONE B

Ar. Alice Leong
Zone B (rep)

Ar. Dr. Alice Leong	PAM	
Ar. Rodney Tew	PUJA	
Ar. Maria Luisa D.	UAP	
Ar. Dr. Pattaranan Takkanon	ASA	
Ar. Prasetyoadi Tiyok	IAI	
Ar. Tan Szue Hann	SIA	
Ar. Dr. Nguyen Tuan	VAA	
Ar. Tran Khanh Trung	VAA	
Ar. Wah Wha Myint Thu	AMA	
	ALACE	

ZONE C

Ar. Terukazu Nii
Zone C (rep)

Ar. Terukazu Nii	JIA	
Ar. Kyotae Do	KIRA	
Ar. Xiao Yao	ASC	
Ar. Cheung Suet Fai	HKIA	
Ar. Chan Suk Fun (Alt.)	HKIA	
Ar. Donna Kim Kam Wu	AAM	
	UMA	

Table of Content

Deputy Chair's message

Over the past 3 years, I very much enjoyed working with our ACGSA committee, ARCASIA friends and family. The last time ACGSA committee physically met was at the committee meeting during the Forum20 in Dhaka in November 2019. There were many of ACGSA representatives participated. Since then, thanks to the COVID-19 that has made it possible to work online, closely among ACGSA committee. From the time we brainstormed during the Roundtable in July 2019 in Jaipur, until today, I am proud to say that we have been working on the agreed direction and to be continued by the next Chair, Ar.Tushar Sogani. First is to learn from the past through heritage/vernacular wisdom towards possibilities for future innovation in sustainable architecture. Second is the New Urban Agenda / harmonizing Green Building Rating System; and third is Resilience. Issues of health, well-being and utilization of digital technology are additional concerns in all aspects. The three pillars have been done through different activities from roundtable, workshops, design competitions, webinar, forum, data collecting and discussions among ACGSA committee and cross-committee. New knowledge through the lenses of ACGSA has been compiled in this report. Certainly, our efforts will be caried through as a reference or guidelines for best practices in green and sustainable architecture. Thank you, our committee, for their hard work and sharpness. I am proud of everyone, the best team ever. I cannot express how much I admire and respect the team. I would like to thank Ar. Rita Soh, our ARCASIA president and her team for their guidance and support. Finally, I am grateful for Association of Siamese Architects and School of Architecture & Design at KMUTT, for providing me opportunity to contribute to ACGSA and for supporting me as always.

Ar. Dr. Acharawan Chutarat
ACGSA Chairman 2019-2021
October 29 / 2021
Report Editor

Vision

ARCASIA President's Vision

S tewardship in use of all resources

E ducaion + Life-Long Learning

E nvironmental Sustainability

D esign Excellence + Empathy

S ocial Awareness + Responsibility

Direction

ACGSA's Mission

PILLAR 1 :

Heritage & Future Vernacular

The strength of Asia, in terms of architecture, building and construction lies in the rich culture and heritage of the region and the people. The culture, history and heritage, the vernacular wisdom had always had significant influence on the development of the vocabulary of architecture of a country in the past. Collection of articles and knowledge which portray traditional wisdom in relation to people, lifestyle, habitat, architecture, planning and construction of a country/ region shall potentially contribute towards future sustainability.

PILLAR 2 :

New Urban Agenda

Crisis on climate change, resilience and the COVID-19 pandemic require impactful guidelines for actions where any efforts towards improvement can affect a massive change. The aim is to leave no one behind by working together to harmonize new green building guide for Asia with responsible and responsive design. Outcome is expected to increase low/zero-energy buildings, while reducing consumption that shapes more livable and resilient environments for communities with respect to new normal, New Urban Agenda and UN's 17 SDGs.

PILLAR 3 :

Resilience

Resilience globalization has expanded the scale & vision of human activity beyond restrictions of local resources & power, resulting in a climate crisis at a global level, affecting weak communities the most. Discussions across national borders in ACGSA offer imageability about natural phenomena occurring across various regions and exposes us to resourceful solutions based on local wisdom. As architects, enhancing such regional potentials for new attempts could be a step towards cooperation between various countries for building a resilient future.

Direction

The Entire work of the ACGSA has been based on the following domains on the main 3 pillars as follow:

PILLAR 1
Heritage / Future Vernacular

PILLAR 2
New Urban Agenda

PILLAR 3
Resilience

Activities

ACGSA Committee have been working together to transform direction through several activities that align with expected outcomes from the 3 pillars. Below are summary of what have been done in the past three years. Detials knowledge and recommendations of such activities have been compiled in the next sections.

Roundtable meeting "Built and Natural Heritage - The Sustainable Face of Architecture"	Jaipur Declaration	E-Book Vernacular Wisdom Asia	Webinar Minding our Heritage : "How to Approach Conservation & Adaptive Reuse of Asia's Built Heritage"
Panel Discussion "Built and Natural Heritage"	Jaipur Charter "Lessons from Build Heritage : The Way Forward"	Forum "Redefining Sustainability Through Vernacular Wisdom"	
Panel Discussion "Challenge in Implementing Green Building Rating Tools"	Green AsiArch 2019 "Selected Green Building Practice Exhibition"	Webinar Embracing Digitalisation : "How Architects Can Leverage New Techonologies for Our Future"	GB with Health Well-being SDGs Guide E-book
AAA : Sustainable Design Award Criteria	Webinar "How Green Rating Tools Promote A More Sustainable and Resilient Architecture"	Design Competition "The Constribution of Green Buildings in the Fight Against COVID-19"	
Design Competition "Design for Resilience to the Changing Environment"	Webinar "The Evolution of Urban Resilience & Sustainable Future"	Webinar Shared Session/Award Ceremony: ACGSA Competition Recognition @ACA	

PILLAR 1 : Heritage / Future Vernacular

Index

Pillar 1 : Heritage / Future Vernacular

Built and Natural Heritage : The Sustainable Face of Architecture

11th Roundtable Meeting

11th Roundtable Meeting : Built and Natural Heritage

LOCATION

Jai Mahal Palace, Jaipur, India

DATE

27th JULY 2019

11th Roundtable Meeting : Built and Natural Heritage

ZONE **A**

Ar. Tushar Sogani, India

Ar. Tushar Sogani represented India. He discussed the location and climatic conditions of Jaipur. The History and the City and its Evolution, significant facts responsible for the origin of the city and its subsequent layout, military and geographical reasons for placing Jaipur, the prastara pattern, zoning of Mandals 18th and 19thcenturies, there were additions in the built fabric of the city and the Palace.

Ar. Farida Nilufar, Bangladesh

Following topics were discussed as Sustainable development in Bangladesh, National Sustainable Development Strategy (NSDS, 2010, 2011), Heritage Conservation, Legal protection of national heritage, Antiquity- Antiquity Act, 1968, Immovable Antiquity, Legal and Institutional Frameworks

Ar. Damith Premathilake, Srilanka

Ar. Damith Premathilake represented from Sri Lanka. Sri Lanka is a small but serene island rich in culture and history. For such a small country, Sri Lanka seems almost unfairly blessed with ruins, temples, cityscapes, mountains, viewpoints and wilderness, and considered to be of such global importance, that the country boasts of eight UNESCO World Heritage Sites.

Ar. Anjana Shrestha, Nepal

Ar. Anjana Shrestha presented from Nepal. Nepal is home to 10 UNESCO World Heritage sites, including seven in Kathmandu Valley, Lumbini (Birthplace of Buddha), Chitwan National Park and Sagarmatha National Park. She mentioned about the traditional settlements and build forms which included courtyard planning and compact settlement planning.

Ar. Yeshey Jamshto, Bhutan

Ar. Yeshey Jamshto presented from Bhutan. The points discussed in the presentation are: Natural heritage (Forest cover in Bhutan)
Natural Environment is a source of Life not a resource. Bhutan's constitution under article 5, section III mentions explicitly requirement to maintain a minimum of 60% forest cover all the time.

Ar. Maira Khan, Pakistan

Ar. Maira Khan represented Pakistan. She explained green building design and construction practices that meet specified standards, resolving much of the negative impact of buildings on their occupants and on the environment through site planning, water management, material use and indoor environmental quality.

Among zone A the common issues found are related to the disintegration of cultural and natural heritage during urban development. The challenges to Sustainability are encroachment, demolition, manmade hazards, and economic sustainability. Major priorities that need to be address are the compatibility of the existing policies associated to conservation and development of national heritages, as well as promoting sustainable integration of cultural and natural heritages into city development.

- Cultural heritage
- Settlement form
- Traditional settlement power
- Natural Heritage
- New development integration
- Sustainability resolves negative impact on occupant
- Environmental sustainability of natural heritage and conservation of cultural heritage
- Sustainability of cultural and natural heritage

Download full information in the link below :
https://drive.google.com/drive/folders/1ocsdOOMs_-eObs-QQDIoFX2DiYMI9qOq?usp=sharing

11th Roundtable Meeting : Built and Natural Heritage

ZONE **B**

Ar. Alice Leong, Malaysia

Ar. Alice Leong represented Malaysia.CIMB Bank offers lower rates for hybrid cars & GBI-certified buildings, 13 September 2018. GBI Professional Series Course, 21 & 22 November 2018.Developers with new buildings awarded the Green Building Index (GBI) gold or platinum rating before January 1, 2022, will receive a two-thirds rebate on the developmental charges they Pay to local councils, Penang.

Ar. Wah Wah Myint Thu, Myanmar

Ar. Wah Wah Myint Thu represented from Myanmar. She talked about the country information & economic indicator, MAC & AMA, CPD Programs and Built & Natural Heritages. She also talked about the states and regions of Myanmar. Association of Myanmar architects. Registered under the Association Act of Myanmar (6th June 2001).

Ar. Tiyok Prasetyoadi, Indonesia

Ar. Tiyok Prasetyoadi represented from Indonesia. He talked about the IAI Status which established Green Building Department in 2010. IAI has included sustainable and green architecture in trainings, CPD (continuous professional development) and basic criteria for design competitions. Architect with Green Building Training is mandatory to do project in Indonesia.

Ar. Jose Ricky Martinez Philippines

Ar. Jose Ricky Martinez represented from Philippines. The President of the Philippines Rodrigo Duterte instructed the friends in Congress to help expedite request for revision of demolition permit form to finally protect the built heritage and other representations for their imminent conservation. United Architects of the Philippines, Philippines Institute of Architects & National Commission of Culture and Arts.

Ar. Benjamin Towell, Singapore

Ar. Benjamin Towell represented Singapore. Transformation of the Purpose Global drivers requiring our response on Climate change, Digitalization, Future economy. Strategies for transformation are elevating sustainable & livable design, evolving our practice into enterprise, promoting innovation and up skilling, driving collaboration and social responsibilities

Ar. Amornrut-Det Udomsap Thailand

Ar. Amornrut-Det Udomsap represented from Thailand. The key policies are: the conservation and management of Thailand's cultural heritage falls largely under the purview of the Fine Arts Department, under the framework of the Act on Ancient Monuments, Antiques, Objects of Art and National Museums,B.E. 2504 (1961).

Ar. Tan Hung Khuat, Vietnam

Ar. Tan Hung Khuat represented Vietnam. Review on Built and natural heritage's conservation of Vietnam. Transformation of centers of big cities due to new high-rise buildings. Many built and natural heritages are deteriorated or demolished, including Son Tra nature reserve (Da Nang) , Bason Old port (HCM city), Catholic churches (Nam Dinh province) and many French colonized architecture.

Countries in Zone B have similarities in issues relating to outdated regulations and procedures, along with society perspective and awareness on sustainability and conservation of heritages. The current focuses are on strengthening practice, departments, and policies to ensure sustainability. Methods are such as promoting workshops to up-skills, revision of policies and launching public relation initiatives to educate and raise social awareness.

- Policies
- Local Green Building Regulation
- Promotion of sustainability by policy and award
- Encouragement to embrace nature
- Forming Green building society, department, workshops
- Nuture Heritage
- Strengthen practices
- Awareness, Education, integration
- Society perspective, understanding, outdated procedure, regulations
- Laws on preserving heritage

Download full information in the link below :
https://drive.google.com/drive/folders/1ocsdOOMs_-eObs-QQDIoFX2DiYMI9qOq?usp=sharing

11th Roundtable Meeting : Built and Natural Heritage

ZONE C

Ar. Terukazu Nii, Japan

Ar. Terukazu Nii represented from Japan. The Attempts are made for Preservation of built heritage domestic traditional settlements and buildings. The context is defined as an aging & shrinking population in Japan, reducing population in non-cosmopolitan areas average 14% house vacancy, more than 20% in countryside, rejuvenation of community & maintenance of old building stock are the major issues.

Dr. Song Yi, China

Dr. Song Yi represented from China. He demonstrated design process and implementation on cultural, natural and heritage in Wuhan, China. Focusing on the concept of adaptive reuse and renovation of built heritage.
Evolution of the building, from the past to the future design with respect to the spirit of place, history, people, green intergration and new function.

Within zone C, the main issues are on the renovation, adaptation and maintenance of old building and heritage properties. The obstacle is the maintenance cost of heritage properties which is difficult to cover even with commercial activities. The focuses are on increasing awareness among residents and professionals to incorporate local domestic heritage into regional planning of the region. Also, to utilize the renovations for new purpose and lifestyle, to offer new activity and activate local economy.

- Renovation and adaptation of old building and heritage
- Rejuvenation of community
- Maintenance of building and heritage
- Increase awareness
- Incorporate local domestic heritage into regional plan
- Obstacle is maintenance cost of private heritage property

Download full information in the link below :
https://drive.google.com/drive/folders/1ocsdOOMs_-eObs-QQDIoFX2DiYMI9qOq?usp=sharing

Pillar 1 : Heritage / Future Vernacular

Built and Natural Heritage : The Sustainable Face of Architecture

Panel Discussion

Panel Discussion : Building and Natural Heritage

ATTENDEES

8 Local Universities
+200 Students

PANELISTS

ACAE
ACGSA
ACPP
ACYA
ACSR
Fellowship

LOCATION

Clarks Brij Convention Centre Hotel Clarks Amer, JLN Marg, Jaipur

DATE

26th JULY 2019

Panel Discussion : Building and Natural Heritage

ATTENDEES

8 Local Universities
+200 Students

PANELISTS

ACAE
ACGSA
ACPP
ACYA
ACSR
Fellowship

LOCATION

Clarks Brij Convention Centre Hotel Clarks Amer, JLN Marg, Jaipur

DATE

26th JULY 2019

Ganesh Vandana in the Event

Panel Discussion on Built and Natural Heritage

Panel addressing the student and Faculty

The Students and Faculty from Architecture colleges

Panel Discussion on Built and Natural Heritage

The Faculty of colleges receiving certificates

Jaipur Charter :
Lessons from Build Heritage : The Way Forward

Jaipur Charter : Lessons from Build Heritage: The Way Forward

"Lessons from Built Heritage: The way forward"

JAIPUR CHARTER

26th JULY 2019, JAIPUR | INDIA

We, the undersigned participants to the "ARCASIA ALL COMMITTEES PANEL DISCUSSION" held in Jaipur INDIA, hereby declare to support, work and promote for the understanding of the following objectives agreed upon during this panel discussion:

ARCASIA COMMITTEE ON ARCHITECTURAL EDUCATION (ACAE)

1. ACAE commits to promote Cross Border Education/Student and Teacher Exchange in ARCASIA region to emphasis on understanding researches and historic preservation in different region.
2. ACAE shall encourage to consider the importance of Built & Natural Heritage and to conduct workshops, field trips to the historic/heritage site for experimental learning.

ACGSA

ARCASIA committee on Green & Sustainable Architecture (ACGSA)

1. ACGSA Commits to incorporate the vernacular wisdom in the built form and further commits to takes the legacy long way.
2. ACGSA Commits to harmonized the green building rating tools for all the Members Institute of ARCASIA as a part of Cross Border Collaboration.

ARCASIA COMMITTEE ON PROFESSIONAL PRACTICE (ACPP)

1. Architects shall be well aware of the Heritage of their region and shall promote and employ the craftsmen who are well versed with the traditional methods of construction.
2. Architects shall discourage any form of demolition of respectable Built Heritage and devise methods of its adaptable reuse so as to encourage the Government or Private client to preserve and reuse the built form.

ARCASIA COMMITTEE ON YOUNG ARCHITECTS (ACYA)

1. Promotion of Built Heritage Architecture through dedicated social media outlets and technology, such virtual reality, Internet of things (IOT) and Artificial intelligent.
2. Adaptive reuse for built heritage should be more relatable and relevant to the youth, promoted through innovative solution to create sense of pride and love towards cultural preservation.
3. Built heritage Architecture should be documented and implemented, with respect to public consultation and participation, to encourage interest and sustainability of practice.
4. To establish Architectural Heritage tourism trail that can be shared between member countries of ARCASIA.

ARCASIA COMMITTEE ON SOCIAL RESPONSIBILITY (ACSR)

1. ACSR assured the participants of the Jaipur Charter that we are committed towards the cause of preserving fundamentals, essentiality and ready to offer any support.
2. ACSR commits to explore & find regional characteristic of Heritage & Socio-Cultural value to identify and formulate regional grading system through ACSR Projects.

ARCASIA FELLOWSHIP

1. Fellowship Committee is the metaphor of Vernacular Wisdom for ARCASIA with it's embedded potential to vitalize activities in the future.
2. With the immense experience & commendable maturity, members of the fellowship committee shall be associated in the pursuit of ARCASIA in protecting & conserving built & natural heritage across the region.

SIGNED BY :

Ar Rita Soh
ARCASIA President

Ar Lalichan Zacharias
ARCASIA VP Zone A

Ar Saifuddin Ahmad
ARCASIA VP Zone B

Ar Gyanendra Singh
Committee Chair-ACAE

Ar Jonathan Manalad
Panellist-ACAE

Ar Adrianta Aziz
Panellist-ACAE

Ar Acharawan Chutarat
Committee Chair-ACGSA

Ar Tushar Sogani
Panellist-ACGSA

Ar Ridha Razak
Committee Chair-ACYA

Ar Denny Setiawan
Panellist-ACYA

Ar Russell Dandeniya
Committee Chair-ACSR

Ar Sudhir Balakrishnan
Panellist-ACSR

Ar Simon Chan
Panellist-ACPP

Ar Qazi M Arif
Committee Chair-Fellowship

Ar Mukul Goyal
Moderator

Jaipur Declaration

Jaipur Declaration

Content

ACGSA hereby adopts this declaration during the 11th Roundtable on Built and Natural Heritage. A Sustainable face or Architecture, held in Jaipur on 27th July 2019, with the presence of Presidents and/or Representatives of the 14 members institutes present, the signatures of whom, appear at the bottom of this document to express their agreement/consent.

We do hereby declare the following:

1. We the members of ACGSA take a pledge that as architects we will be inspired to follow the principle of 'Vernacular Wisdom' in our work and projects.
2. Member Institutes will try to incorporate the principles embedded in sustainable heritage and the use of local materials, techniques and innovations as a part of the advocacy in order to engage the professional architects with commitment at parity.
3. Member Institutes, shall encourage policy makers and citizens of respective community to take effective initiative for preservation, conservation, and adaptive re-use of the Built and Natural Heritage to maintain a Sustainable Face of Architecture.
4. ACGSA shall encourage all the Member Institutes to engage and contextualize the New Urban Agenda and UN Sustainable Goals into practice.
5. In addition to promote Green and Sustainable Architecture across the region and beyond, members of ACGSA take the pledge to address the issues of CLIMATE CHANGE and incorporate the methods of Adaptation & Mitigation to combat Climate Change in ensuring and Sustainable and Resilient future for this planet.

11th ROUNDTABLE MEETING: ARCASIA COMMITTEE ON GREEN & SUSTAINABLE ARCHITECTURE

arcasia
Architects Regional Council Asia

The Indian Institute of Architects
Rajasthan Chapter

on

"BUILT AND NATURAL HERITAGE - THE SUSTAINABLE FACE OF ARCHITECTURE"

JAIPUR DECLARATION

ACGSA hereby adopts this declaration during the 11thRoundtable onBuilt and Natural Heritage- A Sustainable face of Architecture, held in Jaipur, India on 27th July 2019, with the presence of Presidents and/or Representatives of the 14 member institutes present, the signatures of whom, appear at the bottom of this document to express their agreement/consent.

We do hereby declare the following:

1. We the members of ACGSA take a pledge that as architects we will be inspired to follow the principle of 'Vernacular Wisdom' in our work and projects.

2. Member Institutes will try to incorporate the principles embedded in sustainable heritage and the use of local materials, techniques and innovations as a part of theadvocacy in order to engage the professional architects with commitment at parity.

3. Member Institutes shall encourage policy makers and citizens of respective community to take effective initiative for preservation, conservation and adaptive re-use of the Built and Natural Heritage to maintain a Sustainable Face of Architecture.

4. ACGSA shall encourage all the Member Institutes to engage and contextualize the New Urban Agenda and UN Sustainable Goals into practice

5. In addition to promote Green and Sustainable Architecture across the region and beyond, members of ACGSA take the pledge to address the issues of CLIMATE CHANGE and incorporate the methods of Adaptation & Mitigation to combat Climate Change in ensuring and Sustainable and Resilient future for this planet

THIS DECLARATION SHALL BE VALID FROM DATE-27-07-2019

AUTHORISED SIGNATORIES:

AR. RITA SOH
President, ArcASIA

AR. DIVYA KHUSH
President, IIA

AR. ACHARAWAN CHUTARAY
CHAIRMAN "ACGSA"

AR. DEBATOSH SAHU
IMM. PAST CHAIRMAN "ACGSA"

AR. TUSHAR SOGANI
Convener

MR. TIYOK PRASETYOADI
Ikatan Arsitek Indonesia

AR TERUKAZU NII
The Japan Institute of Architects

MS. WAH WAH MYINT THU
Association of Myanmar Architects

AR. ALICE LEONG
Pertubuhan Akitek Malaysia

AR. ANJANA SHRESTHA
Society of Nepalese Architects

AR. TAN HUNG KHUAT
Vietnam Association of Architects

DR SONG YI
Architectural Society of China

AR. BENJAMIN TOWELL
Singapore Institute of Architects

AR YESHEY JUSTSHO
Bhutan Institute of Architects

AR FARIDA NILUFAR
Institute of Architects Bangladesh

AR. DAMITH PREMATHILAKE
Sri Lanka Institute of Architects

AR. MAIRA KHAN
Institute of Architects,Pakistan

AR MORNRUT DET-UDOMSAP
The Association of Siamese Architects
under Royal Patronage

Vernacular Wisdom Asia

E-Book

E - Book : “Vernacular Wisdom Asia”

E - Book : “Vernacular Wisdom Asia”

Overview

THEME

It is well-known to all concerned architects, historians, members of academia that the strength of Asia, in terms of architecture, building and construction lies in the rich culture and heritage of the region and the people. The culture, history and heritage, the vernacular wisdom had always have a significant influence on the development of the vocabulary of the architecture of a country in the past. Many examples of contemporary practice also embraced the lessons from the past in order to be sensitive to the environment and ecology.

It is important to preserve and archive these treasures of knowledge and wisdom for the present and future generations so that the ancient inspirations can survive & persist through ages before they perish and are lost in time.

The book VERNACULAR WISDOM ASIA envisaged to be a collection of articles that shall portray the explicit ancient, traditional wisdom in relation to people, lifestyle, habitat, architecture, planning, building, and construction of a country/region/territory, which shall potentially continue contributing towards future development and sustainability.

Twelves countries have been submitted articles. ACGSA Committee decided to collect more articles from country members. It is the hope that the work will be done in the next ACGSA term.

PUBLICATION / COMMITTEE

Prepared & Submitted :	Ar. Qazi M Arif, Chief Editor
Members :	Ar. Debatosh Sahu
	Ar. Acharawan Chutarat
	Ar. Amina Q Mirza

PILLAR 1 : Heritage / Future Vernacular

“Redefining Sustainbability Through Vernacular Wisdom”

Forum

Forum :
“Redefining Sustainability Through Vernacular Wisdom”

Conclusion

1. Vernacular experiences is the key to preserving identity;
2. Indigenous experiences helps to “cope” with the assimilation pressure of globalization and over-techonologization;
3. Design process must pay attention to mental or intangible sustainability factors;
4. To preserve vernacular experiences, we are not only saving a present for the future generatioin, but also our responsibility for the future. Keep vernacular experiences and promote it to join our current life is one of key solutions for sustainable future.

CONVENOR	ATTENDEES
Ar. Dr. Acharawan Chutarat (ASA)	140
MODERATOR	**DATE**
Ar. Tushar Sagoni (IIA)	7th November, 2020

Forum :
“Redefining Sustainability Through Vernacular Wisdom”

Full Summary

ACGSA representatives from different regions share how approaches towards future vernacular are helping create sustainability. Lessons learned how each region does in their own way. The definition of ‘vernacular
architecture’ was revisited, analyzed and considered the same as modern term ‘sustainability’. With differences in terms of geographical context, environment, and socio - economic background, vernacular approaches in every country in ARCASIA network have common values as they are based on climate, environment, and local materials and construction techniques.

The vernacular architecture of each region has its own unique characteristics. Nonetheless, with the changing environment and the innovation of technologies, they share some problems such as losing identity, no reflection of tradition and culture, and the changing look due to overuse of manufactured building materials.

Example from each country show how government and organizations work together to establish programs for architecture coexist with the modern way of living. Adaptive reuse of architectural heritage is a mean to bridge the gap between the past and the present. It is also essential to seek for the new vernacular within the adaptive development as many regions have been progressing to develop the new vernacular architectural language in contemporary architecture. Since vernacular approaches are contextual and resource based which care for the planet earth, the integration of vernacular approaches and modern innovation is considered a way to achieve sustainability. ACGSA representatives shared their directions and lessons learned through various case studies and reseaches

Summarised by
Ar.Dr. Pattaranan Takkanon (ASA)

Forum :
“Redefining Sustainability Through Vernacular Wisdom”

The vice president emphasized the importance of vernacular architecture that reflects a place, time, and culture. It is built in accordance with the natural environment to fulfill people’s physical, economic, social, and cultural norms. Cities that import identities from others are unfit with their contexts and environment. While over the past three decades we have been suffering from environmental dilemmas so we should focus on sustainability integration with regard to belief, act, use of resources, and built to support society.

Ar. Lalichan Zacarias
Vice president ZONE A

The vice president explained the diverse characteristics of the 9 countries in Zone B in terms of architecture, people, culture, and environment. The regional climate is similar but like most developing countries, the urban landscape has changed regardless of climate and environment. The forum is the platform for sharing knowledge of how each country adapts to changes while maintaining local identity. He urged the committee to work on common findings after the forum.

Ar. Saifudin Ahmad
Vice president ZONE B

The deputy chairman gave an introduction to the forum by emphasizing that sustainability and vernacular architecture are equal as sustainability is the modern-day term for vernacular architecture. There are elements for sustainability including water efficiency, indoor environmental quality, durable and maintainable design, energy efficiency, eco-friendly materials, and waste reduction. Three aspects of vernacular architecture include local climate zone, local materials, and most importantly, local design principles. It is time to think about retaining and reviving the environment.

Ar. Tushar Sogani
Deputy Chair ACGSA

Forum : “Redefining Sustainability Through Vernacular Wisdom”

The ASA representative revisited the definition of vernacular architecture as “it is something that involves living, environment, and knowledge that has been passed down for generations to become the architecture” (Ornsiri Panin). Nothing remains unchanged. Architecture evolves but ‘vernacular architecture’ seems to be separated from ‘architecture’, especially in Thailand in which formal architectural education was established and influenced by the west.

Nowadays, while there are various green assessment tools to quantify architecture all over the world, some ingredients such as culture and local wisdom are missing. In order to elaborate how Thais implement criteria and concept of vernacular architecture to the actual design, there were 4 recent case studies from Thailand presented namely, Huean Tham (House of Dharma), Cocoa Valley Resort, Baan Phompet, and Hotel Labaris Khao Yai. They show that it is possible to apply vernacular architecture principles to any scaled and building type.

Key elements such as climate-responsive design to enhance thermal comfort and the use of local material was recognized and further developed in quest of finding new Thai vernacular architecture. Redefining sustainability through vernacular wisdom is essential as green/sustainable architecture needs to connect with local tradition and culture.

Dr. Pattaranan Takkanon
Representative of ASA

The HKIA representative brought back the history of HK, how architecture and the city have been transformed through time and how subtropical climate shaped the architecture till today. Several examples present architectural characteristics for shading and natural ventilation such as verandah, and courtyard, to bring light into the space and create a social interactive area. Balcony, verandah, and communal spaces can become exhibition areas. A wide range of projects includes a hospital revitalized into a community complex, housing estate, shopping center, area for artists and activities, high-rise building, sports center, etc. There can be different designs for projection and we should work with them instead of against the existing material world.

Challenges these days include 1) Decision Makers may not know what can be done, 2) Lost of Craftmanship, 3)New Generations may not know the value of Heritage, and 4) Public may not know what we can contribute collectively. In order to overcome these challenges, there are activities to co-vitalize our heritage: 1) Co-tour to appreciate and review what's been done, 2) Co-Craft with Master to draw Awareness and Respect, 3) Co-Create to educate out Secondary Students, and 4) Co-Design to construct Visions. It is suggested for us to work with the public and decision-makers to carry through all great ideas from vernacular architecture towards sustainability.

Ar. Rover Cheung
Representative of HKIA

Forum :
“Redefining Sustainability Through Vernacular Wisdom”

The ASC representative gave the presentation covering topics as follows:

1) The role of vernacular heritage in national strategies on sustainable rural development which considers the revitalization of rural areas as a very important basis for a healthy national economy and an effective approach to the inheritance of traditional culture. Theoretical research and practical projects have been carried out throughout China.

2) ASC’s effort in promoting vernacular heritage and its role in the modern situation. The ASC emphasized the conservation and modern use of vernacular heritage. Sub-societies of relevant subjects were established to promote theoretical research and practical application.

3) Vercaular heritage and architectural experiments in China. There are examples of design projects that present the coexistence of the past and the present as well as the use of local materials such as bamboo and earthen material.

4) CITIC’s projects in Chonhyand County, Hubei province. Rural revitalization strategy was carried out intensively in villages throughout Hubei due to its great variety of vernacular architectural heritage.

Ar. Wei Xiao - Ar. Xiao Yao
Representative of ASC

The speaker redefined the term vernacular architecture as it is the core for sustainability and has evolved with the need for human adaptation to the ambient environment and constrain of resources. It evolves local identity but is presently somehow triggered by globalization. However, every place has unique characteristics and identities. Nepal is small but well known for its beauty. It was geographically divided into 2 parts. The loose-settlement pattern on the plain land in Terai region is suitable for a hot-humid climate. Local materials are wood and mud. The settlement of the Hilly region allows winter sunlight. The Himalayan region has a compact settlement to avoid heat loss. Dwellings are attached to one another and thermally insulated.

Kathmandu, the capital city, is rich in heritage and has its own vernacular architecture showing architectural elements such as a courtyard that functions for climate response as well as social interaction. Rowhouses along narrow streets are built with wood, brick, and mud mortar presenting the beautiful urban fabric. Another example of local wisdom is a traditional pond that collects stream water.

However, there is a decline in local identity as shown in an example of the Barpark reconstruction case after the earthquake in 2015. Local identity was lost to modern materials. An attempt to achieve local identity which shows climate responsive design features in terms of orientation, thermal insulation, solar electricity, groundwater recharge, and use of local material, etc. In conclusion, integrating modern innovation with vernacular architecture can preserve the glory of the past and achieve sustainability.

Ar. Anjana Shrestha
Representative of SONA

Forum :
“Redefining Sustainability Through Vernacular Wisdom”

The VAA representative presented 3 main issues: 1) Vernacular wisdom applied in traditional architecture of Vietnam, 2) Sustainable design based on local experiences, and 3) Future of new vernacular architecture. Since globalization is increasingly widespread, adopting culture architectural duplication has become global problem regarding losing identity especially in Asia. Technology was introduced and replicated, thus duplicating the same identifiable architecture, buildings, and cities with similar content and form. There are questions whether modern technology can solve everything while it is expensive and the more urban area spreading, the less rural area for vernacular living. Are we developing sustainably?

Since vernacular experience is rooted in architecture and vernacular wisdom is applied in traditional architecture, we should look into climate, material and skill, and culture and lifestyle. Vernacular is very green. Relationship between people and the environment is very harmonious.
Vernacular wisdom is accumulated and passed on from generation to generation. For Vietnam, vernacular architecture respects geography and landscape. Shapes, local materials are suitable to the climate and residential spaces are considered as independent ecological units. These are best demonstrated by design elements including eaves, sunshades, elevating floor as well as column system, materials, and courtyard.

New design trend combines ‘modern’ and ‘vernacular’ called ‘modern-tropicalised architecure’. There are example of facade design from the old days that still works very well these days for sun shading and probiding ventilation. The comparison between tradition vernacular and the new vernacular show future of vernacular architecture under the current climatic conditions and changing environment. While urban growth and technology affect exploitation of rescources, promoting vernacular experience is considered more suitable as it conserves identity and is the key solutionfor sustainable future.

Ar. Nguyen Tuan
Representative of VAA

Forum : “Redefining Sustainability Through Vernacular Wisdom”

The IIA representative raised the question about vernacular architecture, the old and the modern, as there is a contradiction between the traditional vernacular approach and the invention of technology. The answer remains within the juxtaposition of the two by adaptive development. There are broad parameters to development sustainability through vernacular approaches namely, environmental aspect, choices of materials and resources, socio-cultural aspect, and project viability which is considered the most important.

India has a wide range of climatic conditions resulting in a diversity of design such as wooden structures and big balconies in northern hilly regions, courtyard planning in the hot dry northern India, Jali used for protection from harsh sunlight and dust in western India, lime plaster used with mixed of sandstone and limestone, jaggery, the climate in southern India, and stone-based, burnt clay brick building with terracotta cladding in eastern India.

Taking a vernacular approach, an innovative approach can be developed as shown in many examples in Kolkata. Heritage conservation-adaptive reuse projects emphasize the answer to the beginning question that the old and the new are juxtaposed by adaptive development.

Ar. Debatosh Sahu
Representative of IIA

The AMA representative recaptured definitions and characteristics of vernacular architecture. It is based on culture, construction, and environment so it includes tangible and intangible aspects and shares knowledge from generation to generation. In Myanmar, vernacular architecture depends on the climate, geography, local materials, and construction techniques. The conservation of built vernacular heritage is very important. There are examples of preservation reconstruction and adaptive reuse which lead to sustainability. Various building types include farmhouses, residence museums, and resorts, respectively. Vernacular concepts in contemporary architecture are presented in a contemporary house, the use of traditional materials and construction, traditional form and design, as well as traditional outlook.

Challenges of vernacular architecture today could be cultural homogenization or globalization, the rarity of traditional expertise, fewness of local materials, widespread use of manufactured equipment. To seek sustainability through vernacular wisdom, it is essential to have awareness programs, research and documentation, and conservation work for vernacular heritage. Therefore, adapting vernacular wisdom into contemporary buildings is an approach to a sustainable way of living and leads towards Sustainable Development Goals.

Ar. Mya Hnist
Representative of AMA

ARCASIA Cross Committee Dialogue 1.0
Minding Our Heritage : “How To Approach Conservation & Adaptive Reuse of Asia’s Built Heritage”

Webinar

Webinar : Cross Committee Dialogue 1.0

Minding Our Heritage : How to approach conservation & adaptive reuse of Asia's built heritage

The five ARCASIA committee have been working to exploren key common concerned on Asia's built heritage, technological empowerment of architects and cross-border collaboration. This cross-committee dialogue "Connect 1.0" focused on heritage.

There is always this argument on Heritage building preservation vs sustainability, isn't it conflicting with each other? There is always different in preservation and implementing sustainable idea to heritage during restoration / preservation.

Preservation / Restoration

- no further changes on materials and methods
- water and energy use may be limited.

Reversible & Removable repairs

- not affect the condition of original material now & future

However, by inherent sustainability into heritage, then the followings will be revealed:

- High opportunities to optimize water and energy use.
- Preservation reduces landfill waste, demolition energy use and new construction.
- Adaptive re-use concepts, renovations for less energy use, maintenance and type of use also affect heritage building sustainability.

By introducing new green technology and ideas into preservation of old heritage buildings is a way to sustain the heritage in a greener way for future generation. Furthermore with the introduction of SDGs and NUA, they change and make the "Green" or "sustainable" ideas evolved and upgrading into "Sustainable Development" module for heritage itself. This is important to meet our own needs without prejudice to affect the future generation to meet their own needs.

Moderator	Summarised	DATE	LOCATION
Ar. Mukul Goyal (Deputy Chair ACPP)	Ar. Alice Leon (Rep. ACGSA / Rep. PAM)	24th, July 2021	Zoom

Webinar : Cross Committee Dialogue 1.0

Minding Our Heritage : How to approach conservation & adaptive reuse of Asia's built heritage

The role of Heritage buildings in urban Sustainable development and resilience. These are because:

1. To direct the activities of intervention in historic areas;
2. safeguard the cultural and historical interest of the area and its memory;
3. promote the generation of jobs and activities that develop the area and respects its neighbours;
4. To create conditions to return a part of the urban fabric that values the city existence;
5. promote social spaces and rest areas, open spaces and its relationship with the interior;
6. apply the principles of sustainability & resilience; and
7. return to the dialogue between the habitat and the environment that has existed since the dawn of human existence, as a way to reduce its impact.

Sustainable development aims to put the world back into balance while resilience is to look for a way to manage the imbalance world. Same applies to heritage buildings, hence the 3 Bs "build back better' concept is becoming more alarming to the whole nation. It is also proven that by implementing Reuse, Rehabilitation, Regeneration, Renewable & Rejuvenation to sustain the heritage buildings do contribute to urban living communities a better livability, competitiveness, inclusion and resilience.

PILLAR 2 : New Urban Agenda

Index

Pillar 2 : New Urban Agenda

Challenge in Implementing Green Building Rating Tools

Panel Discussion

Panel Discussion : Challenge in Implementing Green Building Rating tools

PANELISTS

Ar. Jayantha Perera
Former ACGSA from SLIA

Mr. Pankaj Dharkar
Chairman Assocham Gem India

Ar. Benjamin Towell
ACGSA from SIA

Ar. Acharawan Chutarat
ACGSA Chairman

LOCATION

Jaipur, India

DATE

27th JULY 2019

Panel Discussion : Challenge in Implementing Green Building Rating tools

BRIEF SUMMARY

Asia countries have slightly different perspective towards archieveing net zero emission as comapred to the other continents in fight of climate conditions, social systems, strong vernacular architecture, local building materials and government forms. Green building rating tools are supposed to be a successful steps towards reduction in global warming effects. Panel dicussion toward on specific issues and solutions according to Asian context.

When Climatic conditions vary from tropic to temperate to freezing, the huge social diveristy will greatly impact on different SDG focus. Critical issues for implmentation of green building rating tools are aware-ness for its value which can be an integrate part of architecture education and government supporting policies.

Other critical issue is the balance between a vast exper-irnce of such vernacular architecture and new material / techonologies which require activities. There is also a need to deveop passive design tools in different context that will help in the design decision making process.

Finally, building rating tools provide similar structure and univeral in a core concept, but they are different in some details that each country requires different focuses and solutive impotances.

GreenAsiArch

Selected Green Building Practice Exhibition

Exhibition : GreenAsiArch

Overview

THEME

GreenAsiArch is a yearly exhibition event initiated by ACGSA (ARCASIA Committee of Green and Sustainable Architecture) to create awareness in the built environment and to present selected green building design practice from ARCASIA country members. Two selected green and sustainable building projects from country members are featured every year. They are normally exhibited in print media and electronic media during FORUM and ACA, organized by host country. Database of all GreenAsiArch will be launched on ARCASIA website.

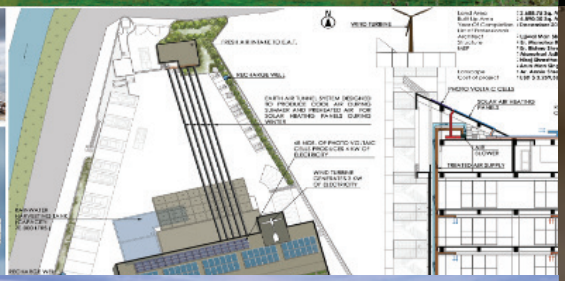
It is interesting to find that directions of the best green building practice submitted ARCASIA country members are aligned with concerns from ACGSA representatives. Those are Heritage/Adaptive reuse; New Urban Agenda; and Resilience.

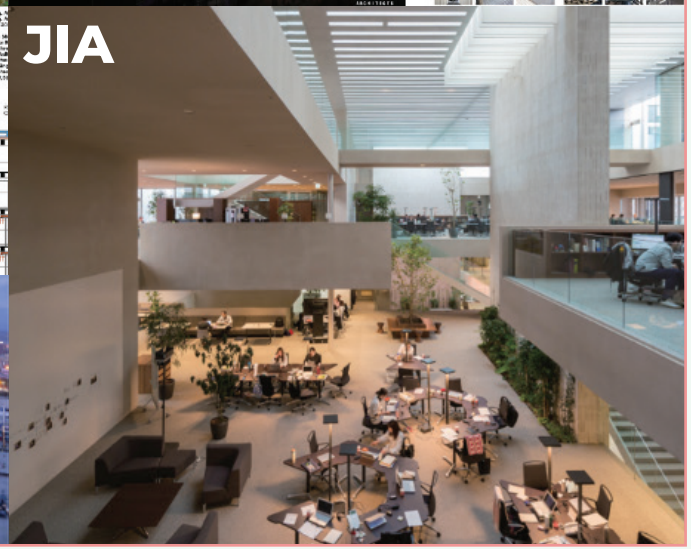
Exhibition : GreenAsiArch

Heritage / Vernacular

Exhibition : GreenAsiArch

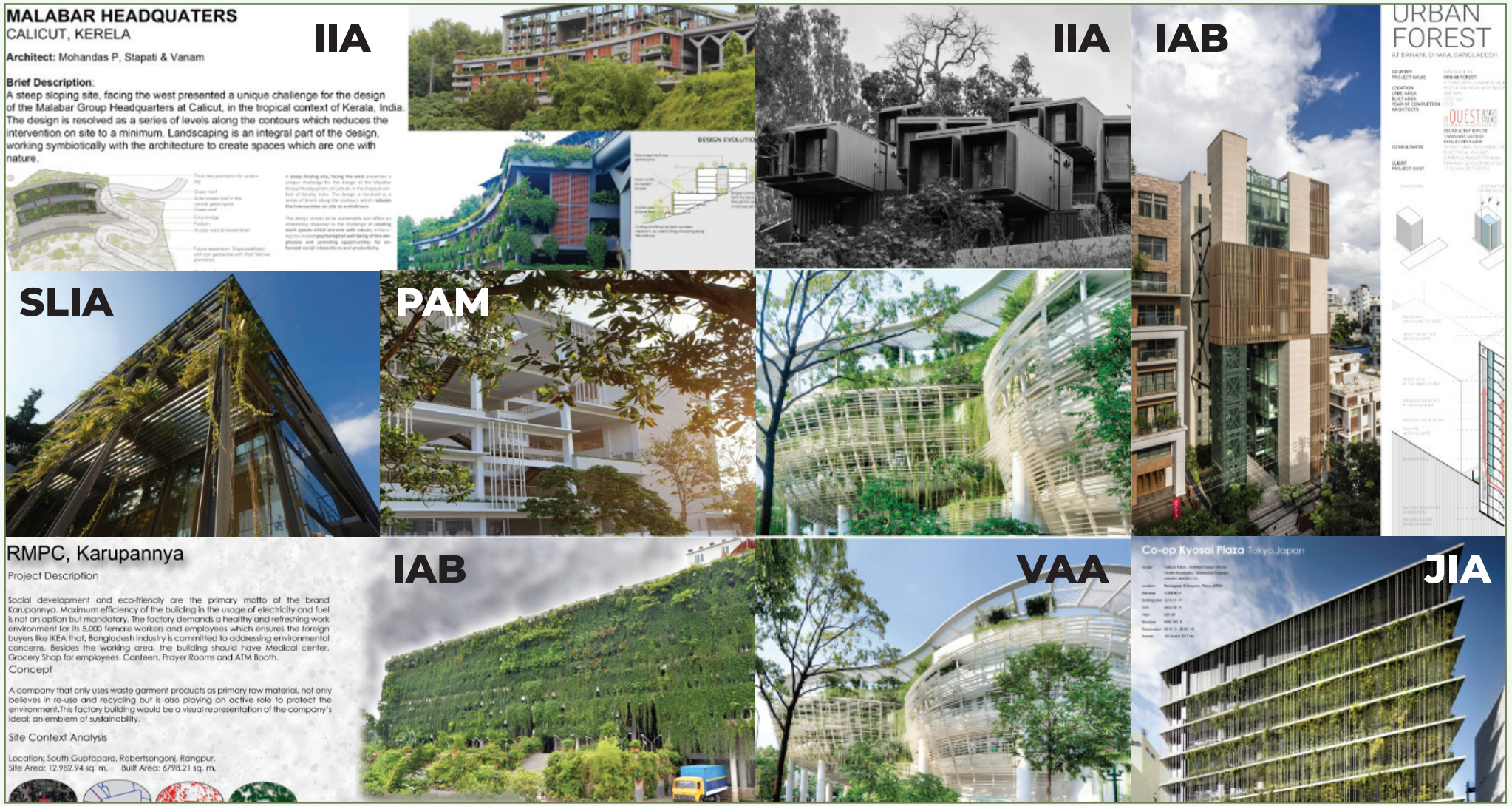
New Urban Agenda





Exhibition : GreenAsiArch

Resilience



ARCASIA Awards for Architecture (AAA)

Sustainability Award Criteria

AAA : Award Criteria

INTENTION

In 2021, ARCASIA has revised its special award in sustainability in response to AAA 2020 Jury's request for clearer evaluation criteria. ACGSA proposed revised criteria for AAA 2021.

The objectives :

- To ensure that architects are not just responsive to the sustainable development but also prescriptive in its implementation and evolution,
- To create a bridge between the initiateves of the UN, UIS and the practical acitivities of architects in Asia
- To promote :
    - Sustainability Engagement and Performance
    - Environmental Quality and Well-Being
    - Resource Conservation

Click the link below to download2021 AAA criteria

https://drive.google.com/file/d/1QM9_JGNwpgMdQlJfC0CDmy4pYAAWBChu/view?usp=sharing

ADOPTED CRITERIA

Special Award for SUSTAINABILITY should demonstrate outstanding achievement in :

- **Sustainability Engagement and Performance for example :**
    - Design that demonstrate strategic commitments to combat climate change Encouraging stakeholders' engagement to build resilient infrastructure, promoting inclusive and sustainable design, conducting postoccupancy evaluations on user satisfaction & effectiveness of sustainable design measures.
    - Design that inspires and promotes principles of sustainability considering durability, flexibility adaptability in the long term.
- **Environmantal Quality and Well - being for example :**
    - Quality of outdoor and indoor environment that promotes headlth and well-being through integration of architecture with light, view, water, air, acoustics and accessbility.
    - Quality of built environment that values the ecological, social and cultural aspects of the site and its surrounding neighbourhood.
- **Resource Conservation for example :**
    - Building Desgn that promotes outcomes towards net zero-energy, low carbon emissions, and innovative use of renewable energy scources.
    - Building Design that reflects reduction in material and resource consumption from a life-cycle perspective. (use of reusable/recyclable/recycled materials, use of clean energy, cost efficiency)
    - Design, construction and operations that adopt effective waste management, minimizing material waste and environmental pollution.

PILLAR 2 : New Urban Agenda

“How Can Green Rating Tools Promote A More Sustainable And Resilient Architecture”

Webinar

Webinar :
“How Can Green Rating Tools Promote A More Sustainable and Resilient Architecture”

The webinar focused on green building rating tools on how they promote a more sustainable and resilient architecture in a changing world including new normal.

SPEAKERS

Ar. Tushar Sogani (IIA)

Ar. Amornrut Det-Udomsap (ASA)

Ar. Rashid Rasheed (IAP)

Ar. Xiao Wei (ASC)

SUMMARIZE BY

Ar. Dr. Zebun (IAB)

MODERATOR

Ar. Tan Szue Hann - SIA
Chair, Pillar 2, ACGSA

ATTENDEES

50

DATE

12 December, 2021

Webinar :
“How Can Green Rating Tools Promote A More Sustainable and Resilient Architecture”

Green Rating Tools in Combating Climate Change

The first speaker, Ar. Tushar Sogani, Deputy Chair of ACGSA, talked about Green Rating Tools and their role in combatting climate change. In the context of India given the five distinct climate zones, rating tools are contextualized, to address climatic differences and cultural needs. He mentioned the UCCR, which works on the capacity of cities to function and survive disasters, emphasizing the need to develop green infrastructure, to enhance resilience to climate change. Present architecture must reflect on lessons of the past, and on passive and practical means, that had been used in pre-technological eras to suit the climate.

Ar. Tushar Sagoni
Deputy Chair, ACGSA

The Thai Green Rating System in Health & Wellness

Ar. Amornut Det Udomsap, ASA representative, ACGSA, from Thailand, talked about TREES, Thai Rating of Energy Environment and Sustainability. Their focus now is on the aging society, and psychological comfort in addition to physical comfort. She highlighted the main difficulties being faced by urban populations in Thailand; traffic, bad air quality in winter, flooding in the rainy season, head island effect, overpopulation, and messy infrastructure. In Thailand, they are now developing SOOK to address health and well-being as an integral part of building design. Case studies were presented of the five categories of SOOK neighborhood and outdoors, architectural design, interior design and materials, environmental systems, and engineering and Innovation.

Ar. Amornut Det Udomsap
ASA representative, ACGSA

Webinar :
“How Can Green Rating Tools Promote A More Sustainable and Resilient Architecture”

Overview

The SEED tool and a Platinum Case Study

Ar Rashid Rasheed, Founder Director of Pakistan Green Building Council talked about the SEED (Sustainability in Energy and Environmental Development) tool, developed in 2016 for Pakistan, and a platinum-rated case study based on it. The building process was videoed in the 5500 sft home, intending to document the achievable data for the stipulated variables in SEED, to share on various social media platforms, the achievements along with their financing, in order to courage other professionals to adopt green building measures to conserve water, electricity, and reduce waste. The showcase project also aimed to enhance the importance of craftsmen involved in the construction industry, focusing on their qualities and roles in the building construction process, to retain their experience in the building crafts and prevent them from seeking other employment, which would make their learning through to go to waste. Social media sharing also helped to educate all stakeholders in the ease of use of rating tools and in benefits gained in the short and long term economy.

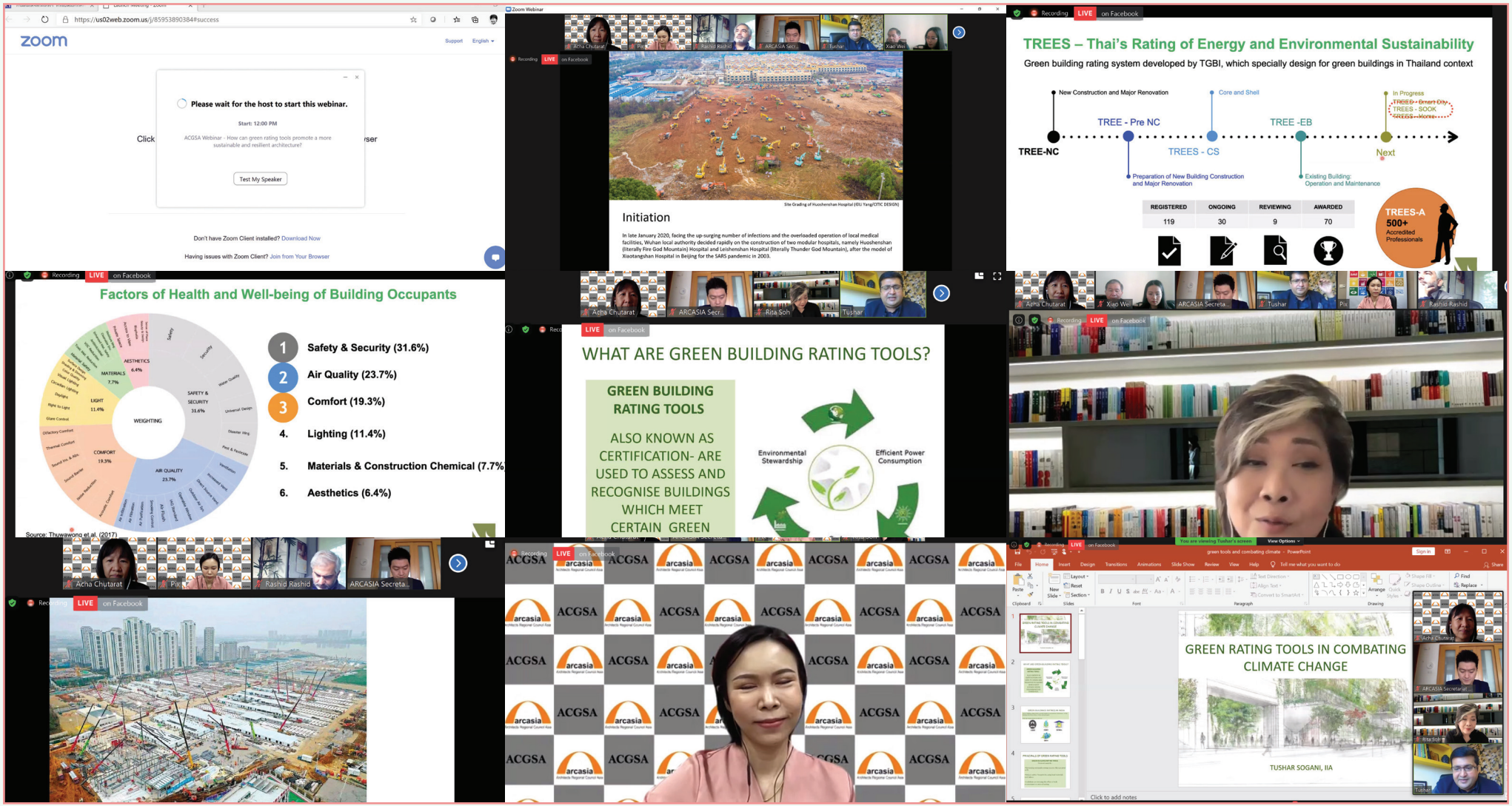
Ar. Rashid Rasheed
IAP representative, ACGSA

Modular Healthcare Facilities in The Pursuit of Resilience

The final speaker was from China, AR. Xiao Wei, Vice President of CITIC General Institute of Architectural Design & Research, who spoke on Modular Healthcare Facilities in the pursuit of Resilience, He focused on the design of Huoshenshan Hospital in Wuhan, an immediate and swift response to the COVID 19 pandemic. Modules of highly contaminated to low infection areas were conceived and completed in approximately 2 weeks, and these facilities were used effectively to give the urgent care that was needed under the present emergency. In the short time that the buildings were constructed it wasn’t possible to check with building codes in a regular manner, but as the professionals have previous experience of using codes and of collaborating with various related professionals, it was likely to adhere to the required standards.

Ar. Xiao Wei
ASC representative, ACGSA

Webinar :
“How Can Green Rating Tools Promote A More Sustainable and Resilient Architecture”



PILLAR 2 : New Urban Agenda

Cross-Committee Dialogue 2.0
Embracing Digitalisation : “How Architects Can Leverage New Techonologies for Our Future”

Webinar

Webinar : ARCASIA Cross-Committee Dialogue 2.0

Embrace Digitalisation: “How Architects Can Leverage New Techonologies for Our Future”

Under President Rita Soh’s guidance and direction, the five ARCASIA Committees and Fellowship have been working collaboratively during their term. This second dialogue session is to consolidate these discussions in the spirit of cross-committee cooperation. The event explores Technological empowerment of architects, and Cross-border collaborations. In this report, concerns written in this section reflects ACGSA's view points.

SUMMARIZED BY

Ar. Tan Szue Hann (SIA), ACGSA representative

SPEAKERS

Ar. Lim Choon Keang (SIA)
“The Future of Design & A Life-Long Education”

Ar. Tony Wong (HKIA)
“The Way Forward”

Ar. Fujinuma Masura (JIA)
“Transition Into New Visual Softwares”

Ar. Tan Szue Hann (SIA)
“Wellness a Future Cities Resilience”

Ar. Sunnie Lau (HKIA)
“Design Resilience For Future Cities”

DATE

4th, September 2021

LOCATION

Zoom

Download full report by SOA+D, KMUTT

https://docs.google.com/document/d/11lsZ0vVPHWt8lBf33yB2jj_GCzAlGgp8/edit?usp=sharing&ouid=112600480844425301382&rtpof=true&sd=true

Webinar : ARCASIA Cross-Committee Dialogue 2.0

Embrace Digitalisation: “How Architects Can Leverage New Techonologies for Our Future”

CONCERNS :

- A quick overview of the state of sustainability on our planet over the past three years, and the impact that the pandemic has had.
- In response, various modes of environmental mitigation, with Singapore as an example - the UN SDGs, as well as Singapore’s responses - the Singapore Green Plan 2030, the SIA EDGs (Environmental Design Goals), and the response in the building sector - the BCA Green Mark
- The SIA Green Book is a mode of guiding, understanding and rationalizing sustainability processes in both the build and natural environments, including its digitization process and potential in being an extended design tool for the Architect.
- Likewise, the HKIA and HKGBC publication, “Hong Kong Smart Green Building Design”, as a document that can be cross-referenced with the SIA Green Book, with its commonalities identified.
- The Malaysia Smart City Framework is a document that reinforces the need to embrace and leverage CIT and its impact on our environment.
- Digitalization tools - a test laboratory that is fully equipped with sensors, that can guide and influence the performance of fresh air exchange for instance, useful in the time of the COVID 19 pandemic.

Download full report by SOA+D, KMUTT

https://docs.google.com/document/d/11lsZ0vVPHWt8lBf33yB2jj_GCzAlGgp8/edit?usp=sharing&ouid=112600480844425301382&rtpof=true&sd=true

- Using digital tools early on in the design process-from a district level (city planning with parametric tools), to building level (planning of massing and voids based on natural ventilation performance), to material level (simulation of electrochromic and thermochromic glass performance based on glare and heat), can greatly enhance the sustainable performance of our built environment.
- When the building is in use, digital tools allow for the identification of workspace allocation (in an office building) that can best adapt to team segregation purposes (e.g. employee attendance control systems during the pandemic); the workstations themselves can adapt to human circadian rhythms by tuning of lighting intensity and color temperatures.
- Moving from a regular power grid to a smart grid system can allow for a higher granularity and tracking of performance, with a means of identifying granular high output area that can then be moderated
- Digitalization of the master plan can allow for a higher granularity of green and blue planning spaces, allowing for varying levels of “productive green plot ratio”.
- Digitalization also extends to carbon accounting and carbon footprint, enabling for full carbon accounting to happen-leading to lower-carbon building
- Potential expansion for digitalization to evaluate building performance based on green rating tools, and universalization of such a process (e.g. IFC Edge), and use of blockchain in tracking building energy and wellness components.

Webinar : ARCASIA Cross-Committee Dialogue 2.0

Embrace Digitalisation: “How Architects Can Leverage New Techonologies for Our Future”

DISCUSSION POINT :

- Possible overlaps between the various green practice guides? (SIA, HKIA, PAM, Zone A’s new vernacular wisdom)
- Fear of obsolescence-we is always on the heel of evolving technology. But if we don't adopt, we’d get left even further behind!
- Renewables-PV sharing, and distribution of energy across multiple sites.
- Technology being used for education too-parametric design and environmental simulation as part of student curriculum.
- Digitalization in social architecture and emergency response architecture.
- Architects not just as agents to the state and our client, but as agents of environmental preservation, and as both enablers of development and stewards of the planet, with digital tools as part of the Architect’s larger toolkit.
- To identify relevant topics and themes for ACGSA's Pillar 2-New Urban Agenda
- Identify overlaps in ARCASIA member nation’s endeavors-e.g. commonalities amongst the various green books and guides that have been published
- Define a possible digitalization roadmap for sustainable architecture?

Download full report by SOA+D, KMUTT

https://docs.google.com/document/d/11lsZ0vVPHWt8lBf33yB2jj_GCzAlGgp8/edit?usp=sharing&ouid=112600480844425301382&rtpof=true&sd=true

PILLAR 2 : New Urban Agenda

“The Constribution of Green Buildings in The Fight Against COVID-19”

Design Competition

Design Competition :

"The contribution of Green Building in the Fight Against COVID-19"

The purpose of this design competition is to raise awareness of the importance of green building and how it contributes in the fight against COVID-19. Green building maximizes health and well-being, minimizes resource consumption and emission. Green building does not mean only energy efficient building, but also means to provide comfort, well-being and pleasant atmosphere.Results from submissions are good references that can be used as guidlines, where summary of key issues has been described here:

JURY MEMBERS

Ar. Debatosh Sahu (IIA)

Ar. Alice Leong (PAM)

Ar. Qazi M. Arif (IAB)

DATE

25th April, 2020

CONVENOR

Ar. Dr. Acharawan Chutarat,
ACGSA Chairman

Ar. Tushar Sogani, ACGSA
Deputy Chair

Design Competition :

"The contribution of Green Building in the Fight Against COVID-19"

MAXIMIZE HEALTH/LIVING CONDITION FOR OCCUPANTS

COVID 19 patients often advised staying home in an isolated condition where the recovery paved up by improving a patient's immune system. Along with other prescribed activities, passive design plays a substantially important role to boost up immune system. Cross ventilation decontaminates the space. Sunlight provides Vitamin D and UV of Natural light sanitizes area, resets biological clock as well as the view to outside can boosts up mental health.

Similarly, for a non-infected person, the indoor environmental quality such as low VOC, anti-bacterial materials, good acoustic design, and high-performance building envelop would be great additions to improve self-immune and mental health. Air conditioning controlling by zones reduces risk in air contamination with adequate ventilation, good air quality reduces infection rate. Since humans work from home, building must be planned with fitness areas and outdoor landscaping with personal and vehicle sanitizing area.

GREEN BUILDING

MINIMIZED CONSUMPTION
MINIMIZED EMISSION

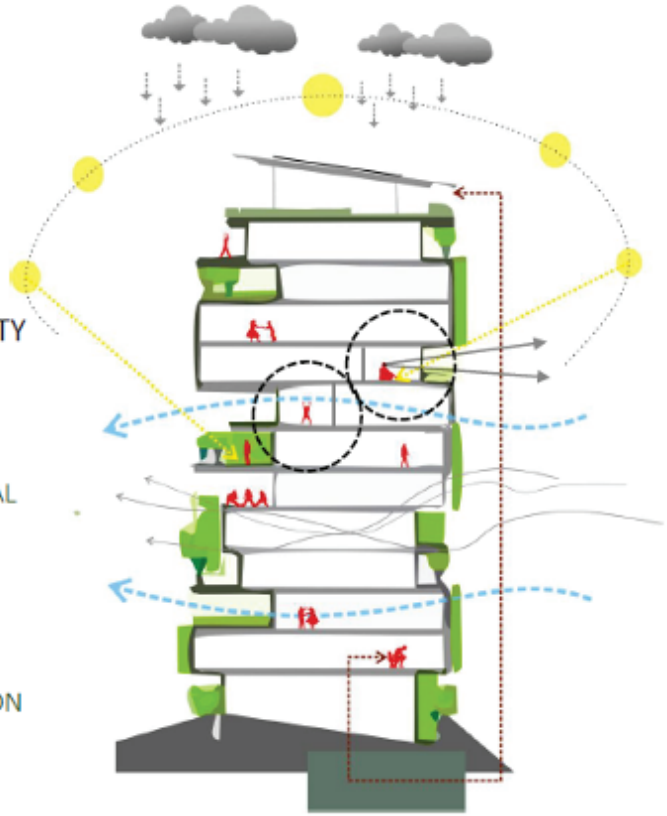
PASSIVE DESIGN

INDOOR ENVIRONMENTAL QUALITY

EFFICIENCY OF NATURAL LIGHT
NATURAL CROSS VENTILATION
OUALITY OF INDOOR AIR
ELIMINATION OF HAZARDOUS MATERIAL
SOLAR ACCESS
LIGHTING COMFORT
DAYLIGHT AND VIEWS
THERMAL COMFORT
ACOUSTIC COMFORT
OCCUPANT COMFORT AND SATISFACTION

HUMAN IMMUNE SYSTEM

DESIGN STRATEGIES



Design Competition : “Fight Against COVID-19”

Minimize Resource Comsumption

Green Building minimizes resource consumption like energy and water. Green Building utilizes potential from nature for example, natural light provides brightness, reducing artificial light consumption. Photovoltaic and Wind Energy keep the demand to an optimum level. During COVID 19 Pandemic many countries have gone through economic and resources constraint, where Green Building would be an effective solution to face the challenge of limited resources.

Green Building design strategies emphasize rainwater recycling and grey water recycling. During COVID 19 Pandemic water usages become substantially higher due to the prescribed personal and community hygiene. This extended demand for water can be balanced with the recycled water without creating extra demand for water from external supplies.

GREEN BUILDING

RECYCLING
REUSE
RENEWABLE ENERGY

WATER RECYCLING

RAINWATER HARVESTING

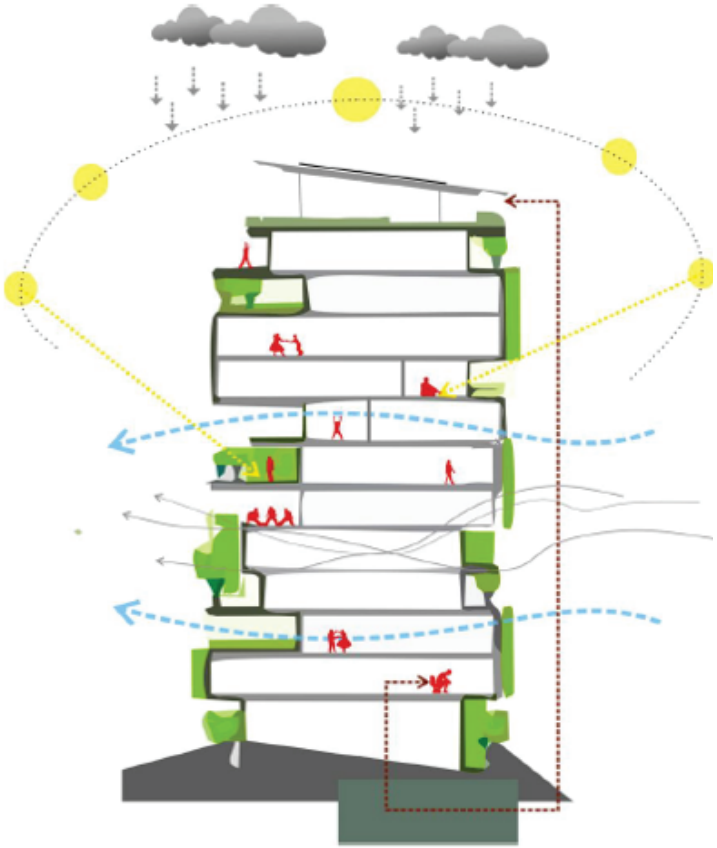
SOLAR ENERGY

OTHER RENEWABLE ENERGY

REDUCE RESOURCE DEMAND

ECONOMIC FEASIBILITY

DESIGN STRATEGIES



Design Competition : “Fight Against COVID-19”

ECOLOGY AND URBAN VEGETATION

The most effective strategy adopted by the world in order to fight COVID 19 is Home Quarantine for a long period. It has become a great difficulty to procure fresh food and vegetable regularly from the outside in the lockdown situation. Green Buildings often promote urban agriculture, vertical gardening and community farming. During the Quarantined period, Green Buildings could ensure the supply for fresh vegetable and fruits for the occupants, allow them to stay home and ensure own safety.

GREEN BUILDING

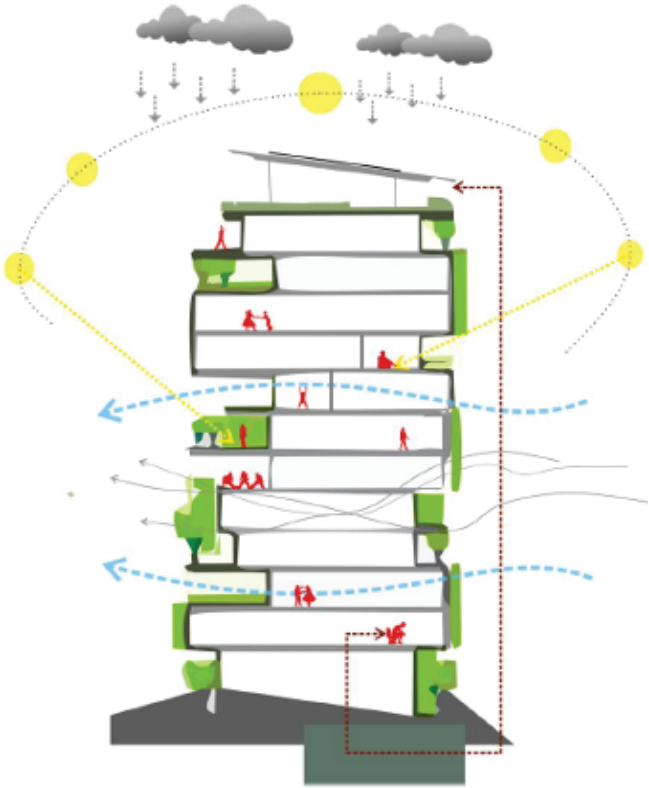
URBAN VEGITATION

FOOD SECURITY

BREATHING SPACE

PSYCHOLOGICAL RELIEF DURING QUARANTINE

DESIGN STRATEGIES



Design Competition : “Fight Against COVID-19”

Conclusion

In summary, while staying home for a long period, it is conclusively seen that consumption of resources become higher than ever. Whereas, this crisis situation demands to descend of resource uses due to the economic recession. Green Building minimizes consumption of resources, maximizes climatic efficiency, and allows nature to interact in an indoor environment. Indoor Environmental Quality in a Green Building is highly beneficial for improving self immune and mental health, which is a great contribution in the fight against COVID 19.

Credit to
Ar. Shafique Rahman
Ar. Surya Prakash Kumawat

WINNERS

1st Prize Winner
Ar. Surya Prakah Kumawat
Architect | B.Arch | CoA | AIIA 21558
Surya Prakash Design Studio, Jaipur | India
Institute Name : The Indian Institure of Architecture (IIA)

2nd Prize Winner
Shafique Rahman (MIAB)
B.Arch (K.U), M.Des.Sc. Sustainable Design (Uni.Syd, Australia)
Assistanct Professor at The Department of Architecture,
Ahsanullah University of Science and Technology (AUST),
Dhaka, Bangladesh.
Trikon Architects, Baridhara DOHS, Dhaka
.

3rd Prize Winner
Ar. Sameer Ratna Bajrcharya
Ar. Sujata Shakya
Institure name : Society of Nepalese Architects (SONA)
Country : Kathmandu, Nepal

Special mention
A.M. Sewwandi Senevirathne
Institute name : Sri Lanka Institure of Architects
Country : Sri Lanka
Architects Registration Board Registered Number-CA19544

PILLAR 3 : Resilience

Index

“Design for Resilience to Changing Environment”

Design Competition

Design Competition :
“Design for Resilience to Changing Environment”

It is time to prepare our home for today’s pandemic and future possible climatic and health crisis. OUr resilience as individuals, as communities and as countries needs to be elevated. Lets contemplate on how we, designer, use resources/materials, and construct, that enchances the occupant’s well begin and safety.

ENTRIES

8 Countries
73 Entries

SPONSOR

Thai Green Building Foundation

DATE

May 12, 2021

CATEGORIES

Student and Professional

Design Competition :
“Design for Resilience to Changing Environment”

BACKGROUND

The Design Competition was initiated after the 2019 worldwide COVID pandemic hit with a vision to put hands together and keep connecting as well as sharing ideas. The competition tried to reflect how any existing building could be made sustainable as well as services during any seen and unseen pandemics or disaster. Society of Nepalese Architect (SONA) conducted the design competition on behalf of ARCASIA - ASGSA subcommittee under the topic **“Designing for resilience to changing environment”**. It was an initiative taken to prepare our homes for today as well as future possible climatic and health crises. It was a project in which the participates could take any existing residential building and modify it to meet the objective-based of health and sustainability. The existing building was first to analysis in the existing state and then modify as per to fulfill the gap. This was divide into two categories students and professionals, where individual, as well as group submissions, were allowed. Due to less amount of submission, the competition was extended for a year which proved to be effective, and got over 8 countries participated with 25 professionals and 48 students submitted for the final among 278 registrations.

JURY AND SPONSOR

Under the supervision and guidance from Acharawan Chutarat (Chairman ACGSA), Qazi M Arif (Past Chairman of ACGSA), and Pranita Sharma Padney (Treasurer and Green Committee Coordinator, SONA) And the jurors: **Rita Soh** (ARCASIA President), **Tushar Sogani** (Deputy Chair-ACGSA), **Zebun Nasreen Ahmed** (IAB), **Athena Chau** (HKIA), and **Prasetyoadi Tiyok** (IAI) the marking criteria was : A- originality with respect to innovation, creativity and sustainability, B-Quality of presentation: with clarity of thought, communicable and comprehensive illustrations and C-Feasibility, realizable and site-specific contextual viability. Seven from the professional and nine from the student category were shortlisted and asked to do a final presentation in front of all jurors on 12th June 2021.

TGBI

The prize was sponsored by **Thai Green Building Foundation**, which was 160,000 Thai Baht or around 5000 USD: Professional 1st won 50,000 Baht, 2nd won 35,000 Baht and 3rd won 20,000 Baht whereas in the student category 1st won 25,000 Baht, 2nd 17,500 Baht, and 3rd 10,000 Baht and other shortlisted were given honorary certificate. Note that the Thai baht is fixed, and the exchange rate may vary.

Design Competition :
“Design for Resilience to Changing Environment”

Results

Winners: Professional Category

1st place: Team P25 Shahreen Mukashafat Semontee, Sabbir Ahmed, Asif Elahi Rocky and Raquibul Hassan Bhuiya -- Bangladesh

2nd place: Team P16 Mahmuda Alam, Samia Anwar Rafa, Naheyan Islam, Nuuhash Akondo and Khairun -- Bangladesh

3rd place: Team P23 Susanne Zeidler, Huat Lim, Kamen Lee, Lee Han Liang, Bethany Lim, Jarod Yap, Gwan Siu Fei and Terence Ong -- Malaysia

Honorable Mention

Team P4 Hasib Sarowar and Shoheli Akter -- Bangladesh
Team P10 Azim A. Aziz , Aznan Abdullah. Muhammad and Haikal Abdul Hamid -- Malaysia

Winners: Student Category

1st place: Team S42 Md. Ferdous Rahman, Fatema Tuz Zohora and Ashefa Washema Basure -- Bangladesh

2nd place: Team S37 Lim Chen Hee, Chor Zhao Gen, Lau Chi Ying and Lee Ze Bin -- Malaysia

3rd place: Team S45 Shahriar Kabir, Naila Alam, Md. Tanveer Bashar Uday and Farhana Chowdhury -- Bangladesh

Honorable Mention

Team S16 Chalisa Sujivorakul and Thanit Rujiwanakul -- Thailand
Team S14 Jirat Sukmongkol and phakwan phanngam -- Thailand
Team S39 Anup Poudel, Ujjwal Sapkota, Smriti Adhikari and Suraj Shrestha -- Nepal

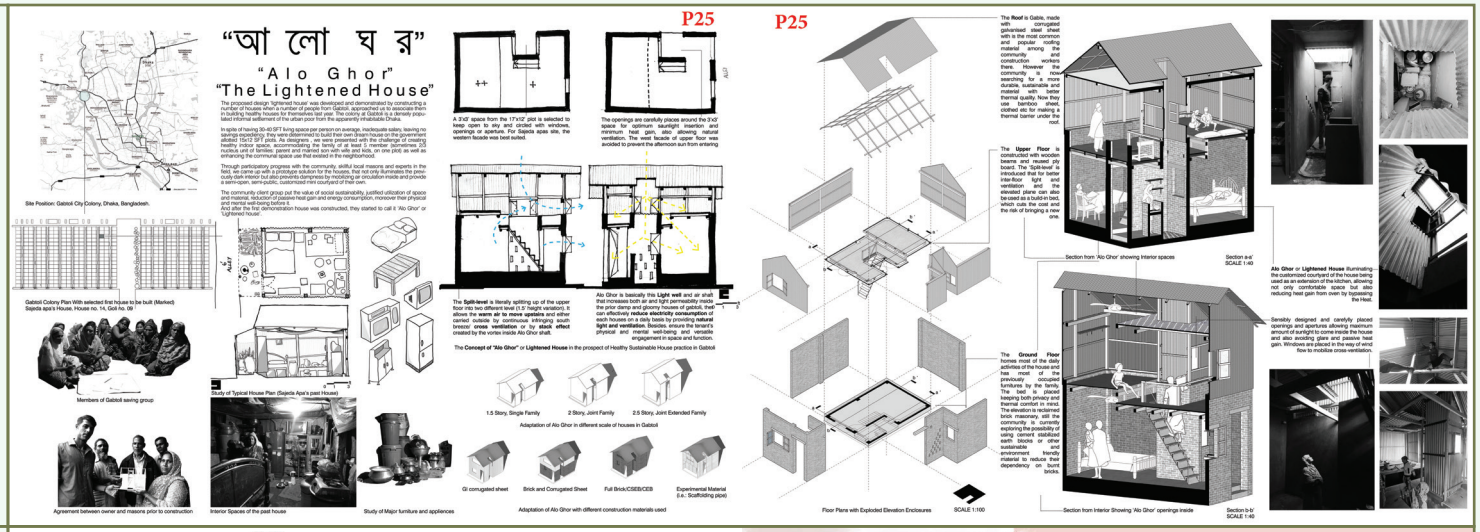
Design Competition :
“Design for Resilience to Changing Environment”

Contestant Projects

1st Place Award:

PROFESSIONAL

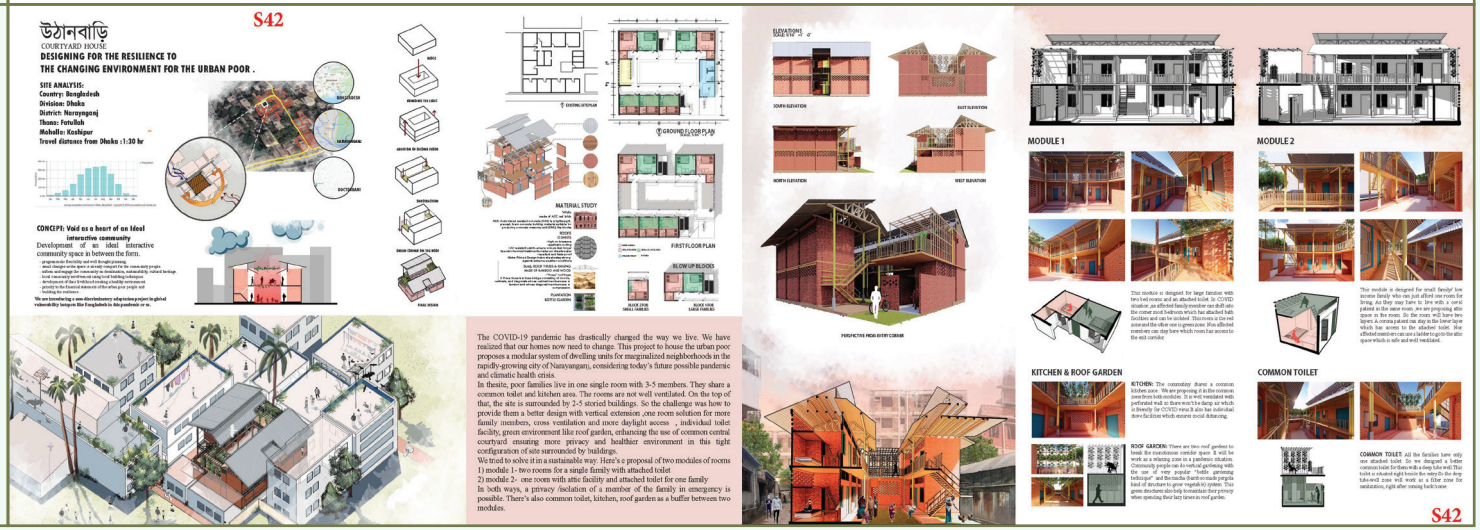
Shahreen Mukashafat Semontee,
Sabbir Ahmed, Asif Elahi Rocky
Raquibul Hassan Bhuiya
Bangladesh



1st Place Award:

STUDENT

Md. Ferdous Rahman
Fatema Tuz Zohora
Ashefa Washema Basure
Bangladesh



Shared Session : Award Ceremony

It is ACGSA's mission to outreach audience both students and professionals in architecture. This the organizing committee decided to host webinar to share lessons learned and to recognize the winners. SONA has kindly offered to host the webinar on behald of ACGSA and Thai Green Building Foundation sponsored awards to all winners.

CONTRIBUTORS

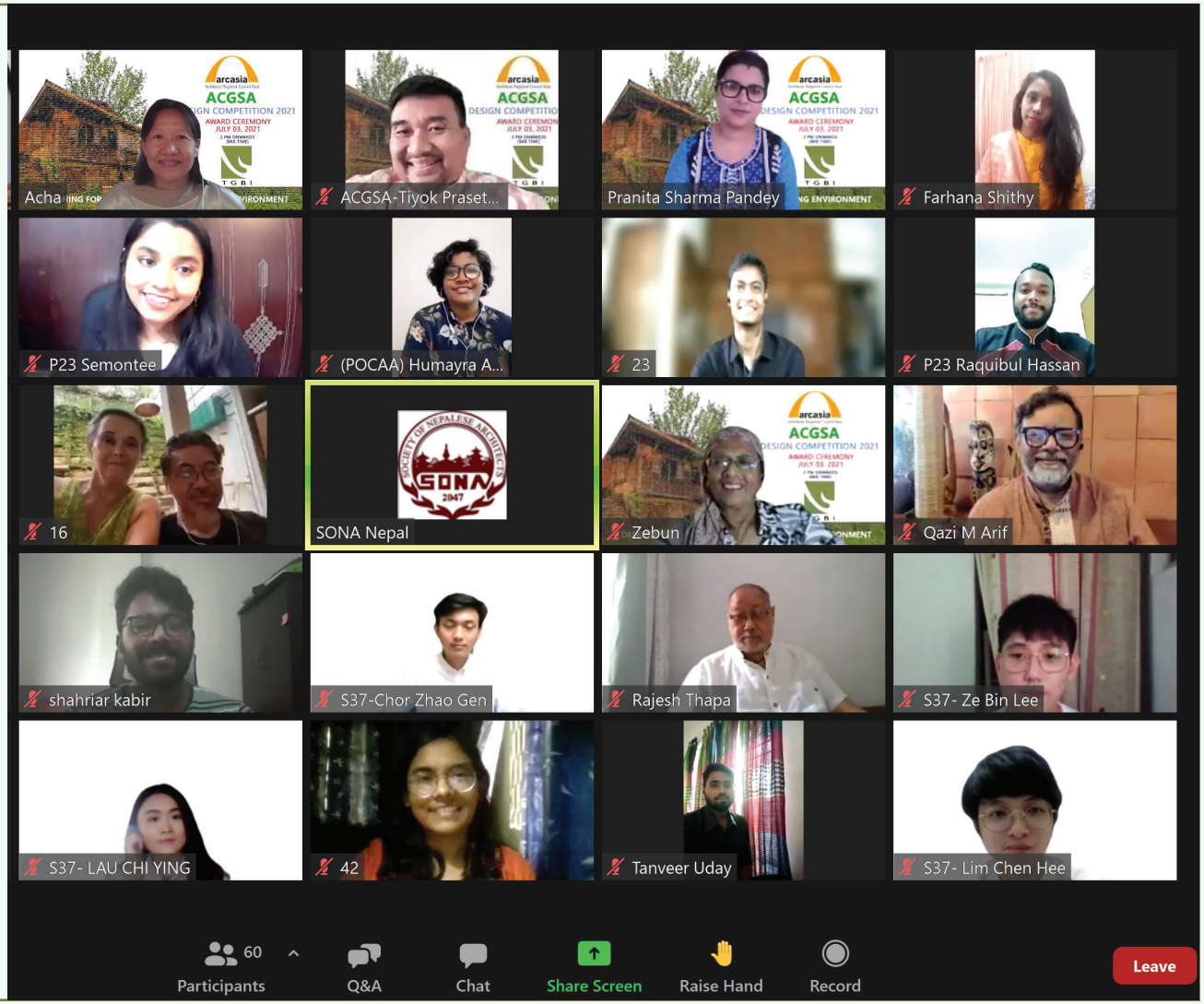
Professional	Student
Shahreen Mukashafat Semontee	Md. Ferdous Rahman
Sabbir Ahmed	Fatema Tuz Zohora
Asid Elahi Rocky	Ashefa Washema Basure
Raquibul Hassan Nhuiyan	
Mahmuda Alam	Lim Chen hee
Samia Anwar Rada	Chor Zhao GEn
Naheyan Islam	Lau Chi Ying
Nuuhash Akondo	Lee Ze Bin
Khairun	
Sisanne Zeidler	Shahriar Kabir
Huat Lim	Naila Alam
Kamen Lee	Md. Tanveer Bashar Uday
Lee Han Liang	Farhana Chowdhury
Bethany Lim	
Jarod Yap	
Gwan Sui Fei	
Terence Ong	

Attendee

121 participants

Date

July 3rd, 2021



PILLAR 3 : Resilience

“The Evolution of Urban Resilience & Sustainable Future”

Webinar

Webinar :
“The Evolution of Urban Resilience & Sustainable Future”

Cities are facing increaseing environmental, social and economic challenges amplified by the effects of climate change that threaten the resilience of urban areas and their residents. The COVID-19 pandemic crisis has evidenced the need and showed the benefits of nature in cities and green spaces, since the contact with nature offers a way to deal with and counteract stressors of everyday life, while still allowing for socail distancing. Building resilience requires identifying and assessing harzard risks, reducing vulnerability and exposure, and lastly, increasing resistance, adaptive capacity, and emergency preparedness.

The purpose of this webinar is to share ideas from experts in urban resilience and sustainable architecture through the lens of ACGSA. Despite all speakers being from Asia, the diverse problems specific to region lead to the changing role of architectural profession that is beyond designing standing structures, but a social act. More information from each speakers can be found in the next page.

Special thank to sponsor AJIYA, who supported the event.

MODERATOR

Ar. Dr. Alice Leong (PAM)

LOCATION

Online

THEME

Sustainability & Resilience

DATE

3rd April 2021

ATTENDEES

110

Download full report by SOA+D, KMUTT

https://drive.google.com/file/d/1zMunEjJpQxzZUDKzIXYESxmcxqvg3p5Q/view?usp=sharing

arcasia
Architects Regional Council Asia

WEBINAR - ACGSA
ARCASIA COMMITTEE
ON GREEN AND SUSTAINABLE ARCHITECTURE

The Evolution of Urban Resilience & Sustainable Future

Date: 3 April 2021 (Saturday)
Time: 11am - 1pm (MYT, SGT)
9am (BST)10am (ICT)
12pm (JST, KST)

zoom https://us02web.zoom.us/webinar/register/WN_7v529szpR_-ekIWIX6wPQw

OPENING SESSION

Ar. Rita Soh
President
ARCASIA

Ar. Acharawan Chutarat
Chairman
ACGSA

Ar. Tushar Sogani
Deputy Chairman
ACGSA

MODERATOR

Ar. Alice Leong
Member of
PAM

Cities are facing increasing environmental, social and economic challenges amplified by the effects of climate change that threaten the resilience of urban areas and their residents. The COVID-19 pandemic crisis has evidenced the need and showed the benefits of nature in cities and green spaces, since the contact with nature offers a way to deal with and counteract stressors of everyday life, while still allowing for social distancing. Building resilience requires identifying and assessing hazard risks, reducing vulnerability and exposure, and lastly, increasing resistance, adaptive capacity, and emergency preparedness.

This webinar session will showcase the benefits of resilience planning with nature for a healthier urban future by displaying successful city cases around the world.

Sponsored by: AJIYA

Supported by: SoA+D School of Architecture and Design, KMUTT

SPEAKERS

Regional Perspectives: Build Back Better

Ar. Ishtiaque Zahir Titas
Member of
IAB

UN.SDG in ACTION

Ar. Joel Chan
Member of
HKIA

Resilience Design for Healthy Cities in the Post-Covid Era

Ar. Xiao Wei
Member of
ASC

Towards self-reliance of the region –seeking potentiality for the future

Ar. Terukazu Nii
Member of
JIA

Webinar :
“The Evolution of Urban Resilience & Sustainable Future”

Regional Perspectives: Build Back Better

Ar. Ishtique Titas reiterated the significance of the topic that the challenging intersection of culture, heritage, and innovation is critical to address sustainability in architecture. Underlying factors such as short-term political cycles and short-sighted economic motives would bring devastation to urban development and resilience. Efforts of all stakeholders are required to build better cities for the benefit of all people while conserving resources utilizing them wisely for sustainable solutions. The subject of sustainability often revolves around the 2030 Agenda: UN’s SDG goals, Sendai framework, and the Paris agreement, which Ar. Ishtique addressed that should be the core of actions.

Ar. Ishtiaque Zahir Titas
Member of IAB

Download full report by SOA+D, KMUTT

https://drive.google.com/file/d/1zMunEjJpQxzZUDKzIXYESxmcxqvg3p5Q/view?usp=sharing

UN.SDG in Action

Ar. Joel Chan discussed a critical issue in Hong Kong on density Tthere is a shortage, lack of affordable housing, and current situationon sky-rocketing housing prices, which offered a glimpse of what the housing market scene would be in 2030 when the Asian population reaches 5 billion. The Hong Kong housing crisis today heralds an imminent arrival of a social crisis not only in Asia but other developing regions of the world. He remarked that ‘Architects live by design and not only just numbers’, calling an urge for architects to come up with solutions through various aspects of design that is applicable in the world such as communal living, affordable housing design, modular construction, facilities design, outdoor room design, versatile design, multi-layer connectivity design, transitional (temporary) housing design and urban farm.

Ar. Joel Chan
Member of HKIA

Webinar :
“The Evolution of Urban Resilience & Sustainable Future”

Resilience Design for Healthy Cities in the Post COVID Era

Ar. Xiao Wei also addressed the situation in China that was perceived as the epicenter of the COVID pandemic when it began. Its goals are to provide a network for early prevention, quick recovery, and effective disposition; to focus on the well-being of individuals. Lessons learned from the pandemic lead to a definition of resilience that starts from a basic good healthcare system. Remarking that the ‘COVID-19 pandemic sounds an alarm in the field of urban and rural planning in China’, China focuses on careful urban planning and design for healthy cities, while developing a fast-paced economy. This reflects in Wuhan’s 3-year Post-Covid Revival Action plans. The action plans include Enhancement of Medicare and public health facilities; Build integrated facilities; Improvement of Environmental sanitation + Emergencies preparedness facilities; Ease of connectivity through Integrated transportation + Emergency logistic system; Enhancement of Quality of healthy urban space, ecological protection.

Ar. Xiao Wei
Member of ASC

Download full report by SOA+D, KMUTT

https://drive.google.com/file/d/1zMunEjJpQxzZUDKzIXYESxmcxqvg3p5Q/view?usp=sharing

Towards self-reliance of the Region-Seeking Potentiality for the Future

Ar. Terakazu Nii discussed natural threats in Japan they are preparing for major earthquakes & tsunami in the near future. In order to mitigate disasters, a regional approach enhancing local potentials could be appropriate for sustainable recovery and resilience for future generations, by understanding the topography, history, climate, and safety of the site. There is a need to rebuild an enriching relationship between Man and Nature, Man and Man within each region, for achieving support and cooperation. There should be an implementation of environmental awareness through a new form of education. The economic crisis brought on by the pandemic simulates the impact on lifestyle that reduced Carbon emissions. Thus, it indicated the urgency to use renewable energy, distributed network working style, utilization of local materials. Wood is encouraging in Japan, The pandemic will also result in increasing economic disparity in the future. In this context, reviewing past experiences in relation to emerging new values offer a philosophy for resilience for the future. The awareness and roles of mutual help systems like commons and community need to be developed for reducing disaster risk and its impact. This will lead to strengthening the self-sufficiency of local communities and regions.

Ar. Terukazu Nii
Member of JIA

Deputy Chair’s message

ACGSA Forward...

Some Areas for future works of ACGSA :

The Entire work of the ACGSA has been previously also based on the following domains on the main 3 pillars as follows :

- Heritage & Vernacular Wisdom of the built environment
- Urbanism : The challenges & Solution of it
- Resilience

We would like to take these forward and add up some new assignment as well, like harmonising the green rating systems & tools of the different countries.

Ar. Tushar Sagoni

APPENDIX Special Articles From ACGSA

Towards Resilience: Reflections based on Wuhan's Experience in Combating COVID-19

Xiao Wei, Song Yi (ASC)

Design for Social Ecological Resilience

Wilson, W.Y. YIK

BUILDING FOR BETTER HEALTH

By: Assoc. Prof. Dr. Zalina Shari

TOWARD RESILIENCE: REFLECTIONS BASED ON WHUHAN'S EXPERIENCE IN COMBATING COVID-19

Xiao Wei, Song Yi (ASC)

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

Abstract:

How to make our cities more “resilient” in face of major public health emergencies as Covid-19 pandemic? Based on Wuhan’s experience, this article tries to give answer to this question from three angles. While modular healthcare facilities ensure the architectural resilience and flexibility of various public facilities in a mode of wartime-peacetime conversion, importance should also be attached to the holistic approach of collaboration and sharing among different sectors as well as secured and resilient urban planning.

Keywords: Resilience, Wuhan, COVID-19

The word “resilience” could be studies on three dimensions when it’s used in talking about the resilience of cities in dealing with public health issues, both in such emergencies as Covid-19 pandemic and in the urban development in a long run. Firstly, it refers to the architectural resilience and flexibility, for example in the case of modular healthcare facilities which are resilient architecturally, in configuration and function, etc.; Secondly, safety and resilience could also be enhanced by means of sharing and collaboration among relevant stakeholders, sectors, disciplines, regions and countries; Thirdly, urban resilience in dealing with public health issues in a long run also calls for the implementation of resilient urban planning.

1. Resilience and Flexibility in Prefabricated Construction & Peacetime/wartime Dual-utilization: Modular Healthcare Facilities in Wuhan during the Pandemic

In late January 2020, facing the up-surging number of infections and the overloaded operation of local medical facilities, Wuhan local authority decided rapidly on the construction of two modular hospitals, namely Huoshenshan (literally Fire God Mountain) Hospital and Leishenshan Hospital (literally Thunder God Mountain), after the model of Xiaotangshan Hospital in Beijing for the SARS pandemic in 2003. Nevertheless, different from the Xiaotangshan prototype in 2003, prefabricated construction mode was adopted in Wuhan because of its high speed and flexibility. Both Huoshenshan and Leishenshan Hospitals adopted Intellectualized systems which are
modularized, platformized, extensible, easy to operate and maintain, and rapid to deploy. Besides, network platforms and 5G base stations were constructed for these hospitals, forming the advanced systems for internal information management as well as remote administration and communication. The use of BIM technologies contributed not only to the construction efficiency, but also to real-time monitoring of ward environment, excellent management of emergency facilities as well as adequate nosocomial infection control.

Xiao Wei, Song Yi (ASC)
Author

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

At the very beginning of its architectural design, the company which had carried out the design of Xiaotangshan Hospital in Beijing in 2003 sent the revised version of its original drawings to its counterpart in Wuhan for reference. The team of CITIC DESIGN launched the design in the evening of January 23, 2020 and finished the all-specialty drawings and relevant design documents for the new Huoshenshan Hospital in the morning of January 26. Due to the prefabricated construction mode, the construction of Huoshenshan Hospital and the Leishenshan Hospital was greatly shortened and the Huoshenshan Hospital which has a total floor area of 34,000m2 and 1000 beds was completed and handed over to its occupants in February 2, namely ten days after the design work launched on January 23.

After the completion, Huoshenshan Hospital was handed over to the military which transferred 1400 military medical personnel from different localities in the country to Wuhan to strengthen the local medical capacity, which displays the importance of the collaboration between the civilian and military spheres. The mode of “civilian/military sharing” and “peacetime/wartime dual-utilization” proved to be a solid foundation for the swift mobilization of military resources to serve civilian purposes in public security emergencies.

At the same time, the “civilian/military sharing” mode of resources sharing could also include the rapid conversion and utilization of those civilian large-scale facilities in wartime and epidemic emergencies. The emergence of makeshift (Fang Cang) hospitals is one example of this sharing mode. Makeshift hospitals take the example of field module hospitals in wartime and aim to receive large numbers of Covid-19 patients with mild symptoms for treatment. With the shortest schedule and minimal costs, makeshift hospitals take full advantage of the existent buildings. Makeshift hospitals could be constructed in a very short time and could be converted into the former condition with original functions after epidemic emergencies. With high speed, low cost and high efficiency, makeshift hospitals could fulfil the aims in infection source control and centralized treatment of Covid-19 patients.

CITIC DESIGN designed the first batch of makeshift hospitals in Wuhan, including the Wuhan Parlor Makeshift Hospital which was converted from the Chinese Culture Exposition Center with a total area of 84883m2. The original building had been an exhibition center consisting of four exhibition halls among which Hall A, B and C was converted into makeshift hospitals this time. The exhibition center has two squares in its south and north, and each exhibition hall is composed of a main hall and a lobby. During the conversion, the principle of “Three Areas and Two Passages” for epidemic hospitals was well observed.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

Considering the existent situation, the south square was used as the passage of the clean area for the rescue medical team and other medical staff. The lobby was used as semi-contaminated area with a buffer zone into the inner space of the makeshift hospital. The original exhibition hall was converted into contaminated area of wards with an exit leading to the north square which serves as the passageway for people and vehicles during the processes of admission and discharging, transferring as well as delivering temporary storage of waste, with absolute clean-dirt partition. In order to carry out the conversion efficiently, prefabricated modular containers were assembled on site for the construction of the buffer zones, patient entrances, transfer exits as well as bathrooms. The wards were equipped with TV sets, reading corners while the 10-meter-wide main passage was spared for recreational activities of patients and medical staff. Bed capacity of this make shift hospital is 1461 with an actual in-patient peak number of 1430.

Due to the professional and user-friendly design, this make shift hospital became a benchmark of this kind. The practice of makeshift hospitals construction means not only a lesson taken from the military medical system, but also an inspiration for the conversion and functional extension of large-scale civilian facilities in various public emergencies. Viewing from this perspective, one form of the resilience of healthy cities lies in the flexibility of hygiene and health functional potentials of public facilities. 13 makeshift hospitals have been constructed in Wuhan, providing 12 thousand beds totally.

At the same time, the municipal government has requisitioned urgently a batch of college dormitory buildings and converted them into medical centers for mild-symptom patients as well as quarantines for close contacts and suspected patients.

2. Resilience through sharing and collaboration

The concept of resilience has been recently talked about and studied across a wide range of sectors and disciplines worldwide, as a compliment to the concept of sustainability and considered as a key index for urban and rural sustainable development with the forethought on local ability to deal with all kinds of disasters, both natural and manmade. At the same time, the topic on collaboration, partnership as well as sharing of experience and expertise has been gaining more concern. It’s widely accepted that mutual aid means a lot for disaster relief and social safety and resilience could be enhanced by means of sharing and collaboration among relevant stakeholders, sectors, disciplines, regions and countries. Nevertheless, current researches in this regard pay a lot attention to the resilience after natural disasters and have not so far touched upon the field of public health emergencies with a commensurate intensity. That’s the case especially during global pandemics.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

The experience in past one year shows that anti-pandemic campaign is a cross-sector undertaking which calls for the deployment and configuration of all sorts of social resources within certain societies, and no single country could succeed completely on its own while only global sharing and collaboration could lead to the final extinction of Covid-19 and the resilience of the global society. Information, technologies, curing skills, good and bad practices, drugs and vaccines, are all subjects to be shared and the possibilities of collaboration exist among community members in risk, different sectors, regions as well as countries.

The design and construction of the Huoshenshan Hospital in Wuhan right after the outbreak of Covid-19 epitomizes the function of sharing and collaboration in building up the capacity for resilience after the major public health emergency. During the whole procedure of design and construction, a platform for multi-specialty cooperation was formed through which real-time communications and negotiations among consultants, design team, local functional departments (e.g. fire-fighting department and planning bureau), constructors, CDC experts and final medical occupants of the hospital were made possible and ensured the effective and successful advance of the whole process design and construction. After finishing the design, CITIC General Institute of Architectural Design & Research in Wuhan (CITIC DESIGN) which was responsible for the design of Huoshenshan Hospital in January 2020 publicly shared its design outputs voluntarily.

International sharing and collaboration proved to be crucial in coping with public health emergencies with infectious diseases, since pandemics are in no case local issues, and spread much faster in such a “big flow era” where the rapid development of modern transportation networks formed by high-speed railways, highways and aviation systems provides both the convenience for international movement of people and at the same time the threat of rampant pandemics. After the outbreak in Wuhan, new epicenters have been emerging later in different parts of the world and the pandemic is supposed to have enduring effect on human’s life in the whole world. With more and more countries closing borders, the fact is even more obvious that the rapid dissolution of boundaries and increasingly frequent cross-border flows are posing an unprecedented threat to the global public security with epidemics while the issue could never be addressed by any single country alone, instead, it necessitates global responses in a common course.

Shortly after the epidemic was officially identified in Wuhan, Chinese scientists constructed and reported the genomic sequences of Covid-19 to WHO for global sharing. Sustaining collaborations between Chinese scientists and their international counterparts fruited in academic articles in international journals with firsthand data and research findings which contributed to the global cooperation in finding the pathogenesis of Covid-19.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

In the pharmaceutical field, inspiring treatment cases with various existing drugs in other countries were shared worldwide and became valuable reference for Chinese doctors in finding remedies for Covid-19, especially in the early stage of the global pandemic.

When the Chinese domestic epidemic was curbed and the global pandemic loomed in the second half of February, China began to send medical teams to other countries. Information and experience against Covid-19 that has been shared also includes the drawings, design specs and technical requirements and other guidelines based on Chinese experience of constructing makeshift hospitals for Covid-19. For example, CITIC General Institute of Architectural Design & Research in Wuhan which was responsible for the design of Huoshenshan Hospital in January shared its design outputs voluntarily with counterparts not only in other Chinese provinces but also in other countries, under the coordination of regional and international organizations such as ARCASIA and UN Habitat.

One year has passed since the world was first exposed to one of the greatest pandemics in the human history, and the issue of vaccination has got onto the top agenda in the world’s pursuit of the ultimate terminator of this pandemic. In the research, testing, production and distribution of new vaccines, international sharing and collaboration are indispensable.

For example, the partnership between Indonesia and China on Covid-19 vaccines not only in procurement but also in research and development becomes a highlight in the anti-Covid collaboration between these two countries. At the same time, international sharing and collaboration is also called for to combat so-called vaccine nationalism and inequity of access to vaccines which really undermine the overall effectiveness of global campaign against Covid-19.

Generally speaking, the international anti-Covid engagement has proved that Interactive sharing of information and collaboration really helped us enhance the resilience of our respective societies within the international community. Efficient collaboration and information sharing among various regions, sectors and professions also accumulate experience for coping with future epidemics with a long-term public health resilience.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

3. Healthy Urban Planning and Design towards Resilience under Pandemic Disasters

There were early instances of considering public health as an important issue in urban planning in western countries where the practices in London, Paris and Chicago in late 19th century and early 20th century proofed the necessity to integrate public health consideration into urban planning. The history of the worldwide urban development in the past century shows that only early anticipation and preparation could effectively avoid the outbreak of major public health crisis. At the beginning of 21st Century, WHO initiated the people-centered concept of “healthy urban planning” which defines the health demands of people and communities as one of the foci of urban planning procedure, and takes full account of the influence of urban policy-making on human health and well-being. The academic concern of healthy urban planning has also grown in past decades. For example, Jason Corburn suggests the policy-making framework of “healthy urban planning” based on the case study combining urban planning and public healthy practice in San Francisco Bay area. Chinmoy Sarkar points out the importance of the urban planning coordinating such tasks as city layout, land use, infrastructure construction, service supply, etc. for urban health purposes.

In such a context of worldwide development of concept and practice on “healthy urban planning”, the past obsession with big scales and high speed in urban development has been reflected, and more and more planning outlines as well as assessment and regulation documents begin to mention this issue. In 2016, the Chinese government issued the 2030 Planning Outlines for Healthy China in which the development of a health emergency system has been given importance. Early prevention, timely discovery, quick reaction and effective disposition are among key priorities. It’s also proposed to build up an aero-amphibious three-dimensional emergency rescue system which incorporates the military medical facilities in order to enhance the medical rescue capacity during public emergencies. The current goal set in the outlines is to establish a nation-wide emergency medical rescue network by 2030 with the rescue capacity which is commensurate with that of developed countries. Besides, the concept of “Safe Urban Planning” was mentioned in the National Evaluation and Management Measures for Model Cities of Safe Development which was issued by the National Committee on Safe Production.

Nevertheless, those above-mentioned medical emergencies mainly concentrate in the establishment of rescue systems for natural disasters, accidents as well as other social security emergencies instead of large-scaled public health emergencies such as epidemics and pandemics. This weakness stood out during the early stage of the Covid-19 pandemic in Wuhan.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

For example, the difficulties and controversies during the siting of the Huoshenshan Hospital shows the lack of reserved land piece for disaster emergency purposes. At the same time, how to convert efficiently and orderly large-scale public facilities into quarantines and medical centers for pandemic poses another major issue for urban public safety planning. Besides, the initial spreading and ensuing joint anti-Covid mechanism within the 1+8 cities circle centered in Wuhan raises another issue of establishing intercity as well as urban-rural joint prevention and control mechanism in long-term urban public safety planning. Covid-19 pandemic sounds an alarm in the field of urban and rural planning in China: the delicate urban and rural development should not be oriented towards big scales and high speed. Instead, it should be people-centered and aim at a livable and sustainable environment as well as a mechanism which could cope with all kinds of disasters with great resilience. Nevertheless, the realization of this kind of delicate urban planning and design has a prerequisite that the national and local governments should integrate the construction of emergency system for public health risks including epidemics into the outlines of sustainable development in the top-level urban planning and design.

One of the big problems lies in the lack of enough space of makeshift functions for infectious emergencies in a large amount of comprehensive hospitals which then stayed incapable of contributing to dealing with Covid-19 and some of these hospitals even suffered from severe nosocomial infections while scrambling to deal with the emergency.

This situation indicates that “anti-pandemic design” became an unavoidable topic in the construction of medical facilities. How to make existent comprehensive and specialized hospitals well-prepared for epidemic emergencies through appropriate reservation of space in advance and convenient conversion, how to design and construct new specialized hospitals quickly, and how to supplement existent medical facilities and enhance quarantine capacity through conversion of large public facilities are those questions which stood out and on which some valuable experience for reflections was obtained during the Covid-19 pandemic.

On February 9, 2020, CITIC DESIGN was commissioned to design the emergency conversion of Wudong Branch of the Hubei Provincial Hospital of Traditional Chinese Medicine into a specialized hospital for Covid-19 critical patients, namely to transform a completed a normal inpatient ward building into a standard infectious disease hospital. In order to realize the conversion as quick as possible, the design team creatively adopted the “3D Three Areas and Two Passages” design concept. This kind of conversion alleviated to a great extent the pressure caused by Covid-19 on existent insufficient specialized anti-pandemic facilities. Nevertheless, a string of unprepared and hastily conversions in face of the pandemic also pose a question to the professionals who are engaged in the design of medical facilities. That is, how to take precautions and take the emergency conversion for major pandemics into account at the very beginning of medical facilities design.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

Currently, there are two types of hospitals which could play the role of intensive treatment centres during major public safety events, both in Wuhan and other big cities. One kind of them is the Infectious diseases sections in big comprehensive hospitals such as the Tongji Hospital and the other are those specialized infectious disease hospitals, such as the Wuhan Jinyintan Hospital. In both kinds of hospitals, nosocomial infection control is the key issue for successful operation during pandemics. It takes even priority over disease treatment. Since hospitals are spaces of both highly concentrated infectious sources and potential cross infection among patients as well as medical staff. Therefore, the overall anti-pandemic campaign will suffer a fatal blow if the nosocomial infection control falls.

Whether the two types of hospitals could succeed in anti-pandemic campaign depends largely upon their hardware facilities besides competent management. In current situation, specialized infectious disease hospitals are more likely to be given emphasis on nosocomial infection control during design. Therefore the construction of this type of hospitals should focus otherwise more on the enhancement of curing facility level aiming at integrated cure, especially for critical patients. In this way, this type of hospitals could serve as major specialized infectious disease hospitals during non-pandemic time and quickly assume the function of comprehensive hospitals in the epidemic area, providing secure and high quality treatment environment for local patients, reducing fatality rate and the risk of after effects.

As for the second type, namely the local large-scale comprehensive hospitals, the focus could be the addition of standby epidemic clinic areas with nosocomial infection control function besides normal wards during initial design as well as expansion design. The standby epidemic clinic areas could be used as normal wards during non-epidemic time and its good nosocomial infection control design could make them capable of being converted into independent infectious patient treatment areas within those comprehensive hospitals. The conversion during epidemics should meet the standards of “Three Areas and Two Passages” layout as well as air environment control. Anti-epidemic standards for comprehensive hospitals should be formulated for this type of hospitals. Considering the fact that the construction scale of hospitals is comparatively large in China, it is advisable to make some reservation of land at the initial planning stage.

Apart from these hospitals, the conversion of large-scale public facilities into makeshift hospitals as quarantines and medical centers is also an importance topic in anti-epidemic design and planning for urban resilience during pandemics. Currently most makeshift hospitals are changed from conference centers and gymnasiums which have convenient transportation, broad, open and easily convertible spaces, comparatively big distances to surrounding buildings and good supporting and fire-fighting facilities.

“Towards Resilience: Reflections based on Wuhan’s Experience in Combating COVID-19”

Judging from the experience of Wuhan, anti-epidemic design and planning should be well incorporated into the design standards of large-scale public facilities as well as the urban spatial planning which considers suitable large-scale public facilities as potential venues for anti-epidemic campaigns.

References

1. Liu Binghui, Xiong Wansheng, et al., “Pause Time” in the “Big Flow China” – A Chance for Collective Reflections, Cultural Crossing Wechat Platform, Jan.29,2020

2. Zou Liang, Reflections on Urban Safety Planning under Covid-19 Pandemic, China Urban Planning Wechat Platform, Feb.9,2020

3. Jason Corburn, Toward the Healthy City: People, Places, and the Politics of Urban Planning, The MIT Press, London, 2009

4. Chinmoy Sarkar, et al. Healthy Cities: Public Health through Urban Planning, Edward Elgar Pub, Cheltenham, 2014

5. Yoshiki Yamagata, Ayyoob Sharifi, Resilient Oriented Urban Planning, Theoretical and Empirical Insights, 2014

6. Bruce Even Goldstein, Collaborative Resilience, The MIT Press, Cambridge, Massachusetts, London, 2012

7. U.N. ESCAP, Building Community Resilience to natural Disasters through Partnership: Sharing Experience & Expertise in the Region, United Nations publication, 2008

DESIGN FOR SOCIAL ECOLOGICAL RESILIENCE

Wilson, W.Y. YIK (HKIA)

“Design for Social Ecological Resilience”

In the Anthropocene, the scale, speed and connectivity of human actions interact with the dynamics of the Earth system in new ways. Analyzing situations of incremental change or assuming a relatively stable environment is no longer fruitful in predicting building performances on the long timeframes. As design decisions made today would lock in potentials and impacts in decades to come, the need to explore appropriate forms of design thinking and design language has never been more imminent than any time before in our history. In this essay, the author summarizes his research findings on resilience theories, and how they are interconnected with the principles of ecosystems, systems thinking, and design practices.

Background

“Future climate change is not an abstract that might affect generations far off in the future. It is happening now, and … much faster than anyone had expected” (Hay 2013). The rapidly changing climate challenges the conventional ways of building design. Firstly, self-reinforcing feedbacks could push the Earth System toward a planetary threshold that, if crossed, could prevent stabilization of the climate and cause continued warming on a “Hothouse Earth” pathway (Steffen 2018). Collective human action is required to steer the Earth System away from a potential threshold and stabilize it in habitable states. Such action entails stewardship of the entire Earth System through de-carbonization, enhancement of biosphere carbon sinks, behavioral changes, technological innovations and transformed social values.

Secondly, the discipline of architecture has long isolated its technological interests and agency from broader systems, presupposing a building as object rather than its attachments or engenderment. Misguided notions of energy efficiency fit in instead of overall efficacy, or power of the system. Not mentioning that buildings and cities are always non-isolated, or open, thermodynamic systems where matters and energy constantly exchange with their surroundings (Moe 2014). Thirdly, although autonomous or zero energy buildings or the like have been on a promising rise, self-sufficiency in building level is considered not the simple solution to environmental crisis, and such a condition is not possible even if it were desirable, due to the interdependence of all humans (Olkowski & Javits 1979) and complexity of societal needs.

Resilience Theories

Disciplines of environmental science, ecology and psychology have by far dominated the academic discourse on resilience. While engineering discipline has a lesser proportion of publications, it is still the largest representation of the fields engaged in the built environment (Laboy & Fannon 2016) by notions of stability and permanence. Recent severe disasters natural or manmade have clearly demonstrated the limitations of conventional risk management in the built environment, leading to growing interest in the term resilience to characterize the response to inevitable disruption.

Wilson, W.Y. YIK
Author

“Design for Social Ecological Resilience”

The discourse of the built environment has also been essentially practice-driven and reactionary. In light of this, organizations like Fockefeller Foundation (2016) adopts a broader view and define resilience as “the capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it.” Resilience becomes a perspective for the analysis of social-ecological systems that emphasizes the need to understand and manage change (Biggs, Schluter & Schoon 2015).

Engineering, Ecological & Social-ecological Resilience

Engineering resilience is best understood by the four R model proposed by Bruneau et al. (2003) – robustness, redundancy, resourcefulness and rapidity. They respectively represent the strength of systems and elements to withstand or resist stress, the spare or excess capacity that enables continued function should one or more elements or systems fail, the organizational capacity to detect problems and respond to them, and the speed with which responses can occur to either limit or recover from a shock. The major limitation of the model is, during unexpected disturbances of greater magnitude or over longer time scales, the normal stable context no longer exists, forcing the system to jump to a new normal. Systems can be brittle as such in the face of a variable and unpredictable world. When applied to the built environment, this means a lack of interoperability and integration of diverse disciplines, producing local optimization but global fragility.

Differ from the previous model, ecological resilience demonstrates system states that are far from a single equilibrium and thus the system can flip from one local equilibrium to another. How far away can the system get before it flips into a new stability regime matter. Ecological resilience was first articulated for natural systems by Holling (1973) who distinguished stability as the ability of a system to return to an equilibrium state after a temporary disturbance, with maintaining existence of functions and relationships between systems as focus, instead of efficiency of functions in engineering resilience. Ecological resilience is frequently used to describe cities, which, similar to ecosystems, are complex, dynamic, interconnected, constantly changing yet increasingly vulnerable. While the technical domain of buildings is more prominent in the realm of architecture practice, a critical discourse on resilience must understand and engage with multiple domains as well as scales in the built environment. Resilience in the built environment has tended to focus on acute rather than chronic conditions, while adaptation activities like preparedness and learning tend to organize around particular critical scenario, so that both repair and restoration are carried out to return to the pre-stock state which ultimately recreate identical vulnerabilities. Missing an opportunity during the reconstruction period and suggesting the importance of agency in the discussion about resilience (Laboy 2016).

“Design for Social Ecological Resilience”

Limitations of both models have led the discourse to a model that consider critically about the interplay between resilience qualities in short as well as long time frames, and rethink the possible roles of social actors that are lacking in the domain of ecological resilience – Social-ecological Resilience. In the long term, the critical qualities are the learning capacity of social actors coupled with the transformability of technical components, and the amount of change a system can tolerate (which is measure by the term ‘latitude’). Beyond resilience defined as simply bouncing back, Zolli & Healy (2012) also offer patterns of resilient design that emerge from biology and complexity theories, where resilient systems are characterized by feedback, reorganization, decoupling, modularity, clustering and considering failure options. Gunderson (2000) identified another attribute of adaptive management in ecosystems on top of learning which enables long-term resilience in a dynamic world – novelty. It is “a unique property of human systems in response to uncertainty”. Novelty is critical to enhance capacity with new approaches and in this way, not only built robustness, redundancy or resistance to shocks and disruptions, but also organize and enable future learning. It is only in this social-ecological model that the creative opportunity presented by the variability of buildings and their contexts can be fully realized. This model adapts to change but anticipates, accepts, and celebrates it (Laboy 2016). Thus, the critical call for the architecture practice is to intend to learn, plan and create in ways that enable adaptation in the long-term, as well as how to define acceptable thresholds of change and forms of resistance that enable a culturally desired stability in the short-term. Resilience thus deals with the tension between persistence and change, with an end goal of sustaining human wellbeing in the face of change (Biggs, Schluter & Schoon 2015).

It can be seen that ecosystems left to themselves create novelty only on the slow scale of mutation and evolution over millennia while human-involved systems uniquely produce novelty over much shorter time scale, although with equal of greater risks of unfitness, creative opportunity presented by the variability of buildings and their contexts can only be realized in the social-ecological model, which not only adapt to but also anticipates and even celebrate changes.

A summary of key attributes under different models is illustrated in Fig. 1.

Design for Resilience

Architects are natural design and systems thinkers, trained to see parts and wholes together and to imagine multiple scenarios during the iterative design process. But that training is rooted in spatial arrangements and Euclidian geometry, while their approach to energy, growth, and transformation remains largely descriptive and typological. The profession has too readily accepted the formula of technological sustainability based solely on more efficient buildings rather than the sustainability agenda of a broader system. To create change in systems and in our philosophy, Meadow (2008) talked about the most influential leverage points being paradigms & transcending paradigms. According to Dorst (2012) who conceptualized design thinking, the challenge of dealing with open and complex problems, like Climate Change, leads to particular interest in how we may frame an architectural problem. All these call for, first and foremost, paradigm shifts in our understanding of the interactions between natural and social systems, and the imminent status of climate change.

“Design for Social Ecological Resilience”

Sustained life is a property of an ecological system rather than a single organism or species. The natural ecological systems have the resilience to experience wide change and still maintain the integrity of their functions. That robustness comes from functional diversity and spatial heterogeneity in the species and physical variables that mediate the key processes that structure and organize patterns in ecosystems (Gunderson & Holling 2002). With that, the author concurs with Zari who demonstrated in her paper (Zari 2011) that the greatest potential of biomimicry to assist in the mitigation of anthropogenic GHG emissions and to adapt to climate change impacts is in the mimicry of ecosystems. To design for resilience, it is imperative to learn from ecosystems through the lens of systems thinking.

Miller proposed a general theory of living systems, identifying living system as open, concrete, energy/matter/information processing systems located in particular places. Capra, in his writing from the Center for Ecoliteracy, defines the principles of ecosystems (DeKay 1996). While building on the work of Prigogine and others, he goes further to develop a theory for the organizational patterns of living systems. These characteristics are summarized in Figure 2, illustrating here the corresponding concepts, principles and perceptual shifts.

Building on the work of Capra and DeKay, and based on systems thinking on principles of ecosystems and ecosystem organization, approaches towards social-ecological resilience in the built environment are developed by the author and summarized in Figure 2.

Of all the approaches, consideration of wholeness and enabling self-organization emerge as the ultimate means and goals. Quoting Meadows (2008), “the most marvelous characteristic of some complex systems is their ability to learn, diversify, complexify, evolve. The ability to self-organize is the strongest form of system resilience.”

Conclusion

Architects must be critically aware of the social and technical binary of building where a confluence and convergence of disparate subjects are integrated. Form matters, but not so much the forms of things as the forms between things. They should ask environmental questions shifting from the efficiency goals of individuals concerned about scarcity to the productivity sought by the overall ecosystem. In building resilience, design shall gear towards the creation of conditions that enable self-organization and emergene of novelty in the face of change. The facilitating and imaginative capacity of architectural design shall remain relevant as such.

What the future holds amid all forms of climate anomaly we are seeing today is a total unknown. Perhaps what we, as the collective designer of our physical environment can persevere, is no more than a conviction to act sensibly and proactively, particularly at critical junctures in the course of our evolution.

“Design for Social Ecological Resilience”

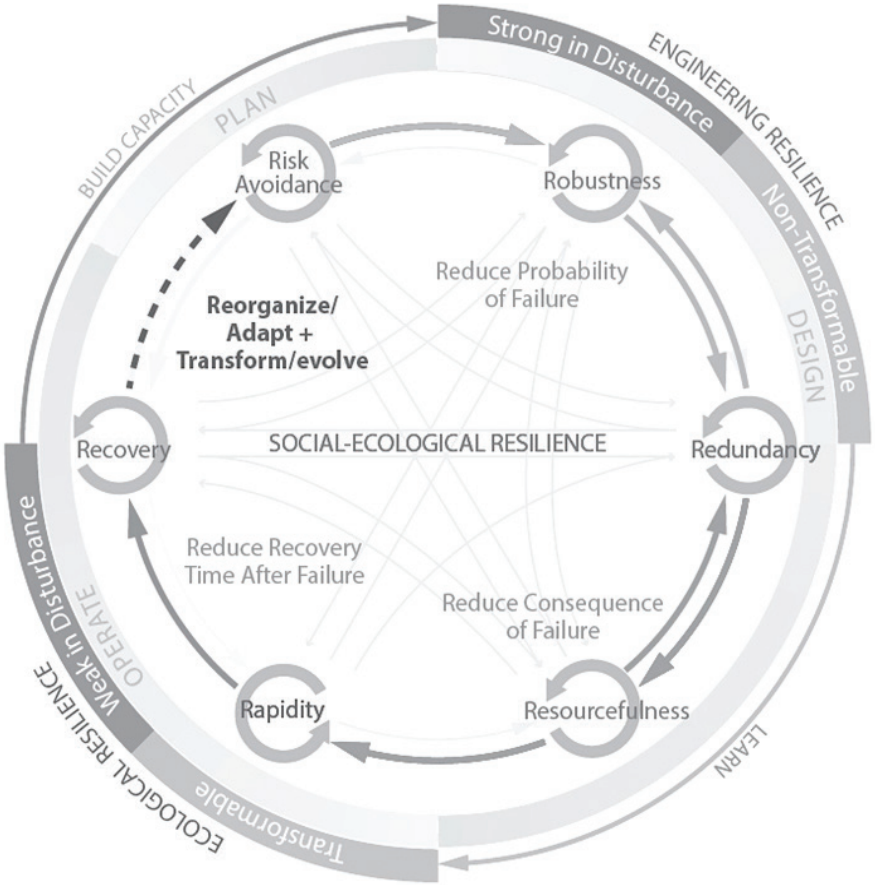


Fig. 1 Resilience attributes: Social-ecological resilience involves both the physical capacity to resist short-term disruptions, and the built-in social capacity for adaptation and transformation in the long-term.

Source: Author. Adapted from Lee & Yik 2018; (Also refer Laboy & Fannon 2015 for details of the six attributes from risk avoidance to recovery)

“The kind of hope that I often think about…I understand above all as a state of mind, not a state of the world. Either we have hope within us or we don’t; it is a dimension of the soul, and it’s not essentially dependent on some particular observation of the world or estimate of the situation…[Hope] is not the conviction that something will turn out well, but the certainty that something makes sense, regardless of how it turns out.”

- Vaclav Havel (1990)

“Design for Social Ecological Resilience”

LIVING SYSTEMS CHARACTERISTICS ECOSYSTEM/ ECOSYSTEM ORGANIZING PRINCIPLES Derived concepts & prinicples1	PERCEPTUAL SHIFTS	APPROACH TO SOCIAL-ECOLOGICAL RESILIENCE
INTERDEPENDENCE community, niche, network, synergy	from Object to Relationship	**COMPATIBILITY** *Organisms within ecosystems operate in an interdependent framework. A living system relates to its environment structurally through recurrent interactions. Such coupling and drifting with that of its environment through time correlates to the notion of adaptation and compatibility – the basic mechanisms of evolution.*
DIVERSITY richness, variety, beauty, stability, complementarity	from Efficiency to Redundancy	**COMPLEMENTARITY** *Complementarity of diverse elements is a characteristic of interdependent natural systems. Variety, balance, disparity and redundancy allow for possibility of substitution among elements and can enhance adaptability. Design systems that enable variety of elements and modeled on diverse, richly connected ecosystems.*
PARTNERSHIP cooperation, symbiosis, collaboration	from Competition to Cooperation	**INCLUSIVITY** *Ecosystems coordinate resources and create redundant, distributed life-support systems while symbiosis provides opportunities to find mutual benefits. Design space and structures that foster social interaction among diverse groups, encourage cooperation, and create a well-functioning, resilient system or community.*
ENERGY FLOWS photosynthesis, solar energy, soft technologies	from Structure to Process	**OPERABILITY** *In living systems, structure arises from underlying processes. The relationship between form & process, structure & function, become the basic design inquiry through process thinking. Shape form to guide flow and manifest process.*
FLEXIBILITY fluctuations, dynamic balance, tolerance limits, stress	from Rigidity to Resilience	**FLUIDITY** *Natural processes are dynamic and ecosystem structures often are fluid. The flexibility of an ecosystem is a consequence of its multiple feedback loops, which tend to bring the system back into balance. Space & program shall maintain flexibility & adaptability.*
CYCLES feedback loops, information flow, recycling, conservation	from Vector to Rhythm	**PERMEABILITY** *Information coded in biological genes involves very small amounts of material but exerts tremendous influence over the living systems. It flows in cyclical exchanges between systems & inhabitants to enable learning, diversification and evolution of more complex systems. Simply designed elements can be repetitive in leveraging cyclic processes.*
SUSTAINABILITY Carrying capacity, longevity, health, bioregion, ecological accounting	from Consumption to Metabolism	**RENEWABILITY** *Eco-systemic order is the order of sustainability. Materials used in the built environments should be benign, and made from materials that are not rare or difficult to extract, should be locally attuned and responsive, and are renewable unless they can be recycled indefinitely.*

“Design for Social Ecological Resilience”

PATTERNS recurring events, rituals, web, network, open systems	from Materiality to Configuration	**MODULARITY** *Forms are considered as patterns of relationships within an organized whole, and patterns are the notions of order, organization, and relationships, which are inductive to flexibility and adaptability in designing for resilience. Design shall be guided by patterns and principles of nature and to fit building systems with ecosystem.*
SELF-SIMILARITY fractals, underlying process, geometry, Chaos	from Scale- Distinction to Scale-Linking	**SCALABILITY** *Living organisms that make up ecosystems are typically made from commonly occurring elements. Use shape, themes and ideas on multiple scales to strengthen effect or reduce the impact of disturbance.*
NESTED NETWORKS nodes, democracy, markets, irregular change, decentralization	from Hierarchy to Network	**NESTEDNESS** *Systems are integrated wholes that are also part of larger wholes, and contain a network of smaller wholes within them. The purpose of design is to create environments of networked wholeness. This also calls for re-examination of disciplines of the built environment to such co-creation.*
MULTIPLE MEMBERSHIP family, neighborhood, species, race, gender, profession	from Artifact to Institution	**MULTI-FUNCTIONALITY** *Living systems abound in nature with all of them share a set of common properties and principles of organization. Implying that systems thinking is inherently multidisciplinary. Multi-functionality of the relationship builds response diversity, enhance system dynamics, enables better adaptation and survival.*
FEEDBACK information, cybernetics, regulation, connectivity, overshoot	from Linear to Web Causality	**SIMPLICITY** *Ecosystems function through the use of complex feedback loops or cascades of information. The impossible task of explaining and understanding all the interconnected elements requires formulation of approximate but effective models, theories & problem-framing.*
SELF-REGULATION dynamic stability, adaptation, balancing	from Homeostasis to Dynamic Fluctuation	**RESPONSIVITY** *Living systems maintain their form while energy, information, and material move through it. Design building systems that are attuned and adapted to resource flows, capturing resources at opportune times and using a variety of methods.*
SELF-ORGANIZATION freedom, learning, choice, positive feedback	from Extrinsic to Intrinsic Motivation	**THRIVABILITY** *A key characteristic of life is the spontaneous emergence of new order. Design shall create conditions that enable the building or people to respond to changing conditions; Allow for adaptable and diverse user control; Buildings and communities shall respond and evolve to changing social conditions on top of environmental conditions.*
WHOLENESS aliveness, emergent quality, distributed being, holism, gestalt	from Parts to Whole	**VIBRANCY** *Ecosystems and the organisms within them optimize the whole system rather than maximize components. Architecture to become valuable through creation of meaningful, memorable, adaptable and fluid connections with its context.*

Fig. 2 Evolution of Approaches for Social-Ecological Resilience based on Principles of Ecosystems
Adapted from Capra (1994) & DeKay (1996); 2Adapted from Clark (1993) & DeKay (1996)

“Design for Social Ecological Resilience”

References

[1] Holling, C. S. (1973). “Resilience and Stability of Ecological Systems.” Annual Review of Ecology and Systematics 4 (January): 1–23. https:// doi.org/10.1146/annurev.es.04.110173.000245

[2] Laboy, M. & Fannon D. (2016) - “Resilience Theory and Praxis: A Critical Framework for Architecture”

[3] Laboy, M. & Fannon D. (2015) – “Learning Comprehensive. Building Design through a. Resilience Framework”

[4] Moe, K& Smith, R. E. 2012, Building systems: design, technology, and society, Routledge, London; NY

[5] Ray, B., & Shaw, R. (2018). Changing built form and implications on urban resilience: Loss of climate responsive and socially interactive spaces. Procedia Engineering, 212, 117–124. https://-doi.org/10.1016/j.proeng.2018.01.016

[6] Steffen et al, 2018. Trajectories of the Earth System in the Anthropocene

[7] MOE, 2014. Insulating Modernism: Isolated and Non-isolated Thermodynamics in Architecture

[8] Van der Ryn & Cowan (1996) - Ecological Design, Island Press, Washington DC

[9] [online] URL http://www.stockhom=lmresilience.org/research/whatisresiliece

[10] B. Walker and D. Salt (2006) – Resilience thinking – Sustaining Ecosystems and People in a Changing World. Island Press, Washington DC

[11] F. Capra and P. Luisi (2014) – The Systems View of Life. Cambridge University Press, NY

[12] D. Meadows (2008) – Thinking in Systems. Chelsea Green, USA

[13] A. Winston (2014) – A Big Pivot. Harvard Business School, Boston

[14] W. Mchonough and M. Braungart (2013) – The Upcycle. North Point Press, NY

[15] W. Mchonough and M. Braungart (2002) – Cradle to Cradle. North Point Press, NY

[16] M. Bilow et al (2012) – The Future of Building: Perspectives, Methods, Objectives, Prospects. Detail, Regensburg

[17] S. Ryn and S. Cowan (1996) - Ecological Design. Island Press, Washington DC

[18] W. Hay (2013) – Experimenting on a Small Planet. Springer, NY

[19] R. Biggs et al (2015) - Principles for Building Resilience – Sustaining Ecosystem Services in Social-ecological Systems. Cambridge University Press, UK

[20] B Cody (2017) - Form Floows Energy – Using natural forces to maximize performance. Birkhauser, Basel

[21] K. Moe and R. Smith (2012) - Building Systems – Design, Technology and Society. Routledge, Abingdon

[22] W Braham (2016) - Architecture and Systems Ecology – Thermodynamic principles of environmental building design, in three parts. Routledge, Abingdon

[24] Olkowski et al (1979) - The Integral Urban House: Self-reliant Living in the City. Sierra Club Books, US

[25] Lenz et al (2011) - Sustainable Building Services – Principles, Systems, Concepts. Detail, Munich

[26] Oliver et al (2013) - Resilient and regenerative design in New Orleans: the case of the Make It Right project

[27] Capra, Fritjof (1994) - “From Parts to Whole, Systems Thinking in Ecology and Education,” Seminar Text, Center for Ecoliteracy, Berkeley, CA

[28] Clark, Ed (1993) - “How Do You Design an Ecoliteracy Curriculum?”, Guide to Ecoliteracy, a new context for school restructuring, Elmwood Institute, Berkeley, CA

[29] Krautheim et al (2014) – City and Wind – Climate as an Architectural Instrucment, DOM Publication, Berlin.

[30] Neutra, Richard. (1954) – Survival Through Design. Oxford University Press, NY

[31] Frascari, M. (1991) – Monsters of Architecture: Anthropromorphism in Architectural Theory, Rowman & Littlefield, Savage, MD.

[32] Lyle, John Tillman (1994) – Regenerative Design for Sustainable Development, John Wiley & Sons, NY

[33] Braham, William (2003) – Biotechniques: Form follows Flow, Departmental papers (Architecture)

[34] Yik & Lee (2016) – A Conceptual Model of Integral Sustainable Design Framework, presented in WSBE17, HK

[35] Lee & Yik (2018) - Building Adaptive Resilience: A Conceptual Framework for Greater Bay Area Sustainable Development, presented in ICBR 2018, Lisbon

[36] Zolli, A and Healy, A.M. (2012) – Resilience: Why things bounce back, Free Press, NY

[37] DeKay, Mark (1996) – Systems Thinking as the Basis for an Ecological Design Education.

[38] Miller, James Grier (1978) – Living Systems, McGraw Hill, NY.

[39] Morowitz, H (1992) – Beginnings of Cellular Life. Yale University Press, New Have, CT.

[40] Wiener, N. (1950) – The Human Use of Human Beings, Houghton Mifflin, NY.

[41] Orr, D. (2002) – The Nature of Design, Oxford University Press, NY

[42] Zar, Maibritt Pedersen (2011) – Biomimetic design for climate change adaptation, Architectural Science Review

[43] Janssen, M., Schoon, M., Ke, W., & Borner, K. (2006) – Scholarly networks on resilience, vulnerability and adaptation within the human dimensions of global environmental change.

[44] Trombetta, C. (2018) – The Regenerative Design Experience in the Built Environment and Resilience Discussion.

BUILDING FOR BETTER HEALTH

Assoc. Prof. Dr. Zalina Shari (PAM)

“BUILDING FOR BETTER HEALTH”

Background

Dr Zalina Shari is an Associate Professor at the Faculty of Design and Architecture, University Putra Malaysia. She received her PhD in Architecture (specializing in building sustainability assessment) in 2011 from the University of Adelaide, South Australia. She has been the author and national correspondent for FuturArc magazine (The Voice of Green Architecture in Asia-Pacific) since 2015. She served as a board member of the Malaysia Green Building Council for five years (2014-2018) and chaired the Education and Research Committee. She is passionate about green building and sustainability education as understanding and experiencing solutions will help build a critical mass of people that can make the difference our world needs.

Professional Obligation

Health and well-being are fundamental to human survival and foundational to comfort and sustainability. The Preamble to the World Health Organization Constitution defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” [1]. In general, health is a status of an absence of disease, well physiological and psychological conditions, happiness, comfort and well-being.

Many contemporary chronic health issues trace their origin to the failing of the built environment. Every detail and aspect of the built environment affects us physically, psychologically, and subconsciously. It also affects energy performance, the quality of our social interactions, the surrounding community, and the ecosystem. As sustainable designers, we have the opportunity to consciously designing the built environment on every level to reduce stress, improve health, and be beautiful. By doing so, we show empathy and respect for all populations, socioeconomic levels, and racial groups since it is a form of equity that allows everyone accesses to good design benefits. Just as a chain is only as strong as its weakest link, so too, a society only prospers when all its members prosper. We also know that satisfaction with life transfers to how we treat others which has enormous social implications.

Assoc. Prof. Dr. Zalina Shari
Author

“BUILDING FOR BETTER HEALTH”

Health and Well-being at Scales

Understanding that all our design choices have long term effects on the occupants, society and environment is crucial for integral sustainable design. Understanding the basic principles of personal health and well-being should inform all our choices at every scale. At an urban scale, creating an environment that is inherently healthy, physically, mentally, and emotionally requires considering how to make urban areas more walkable and aesthetically diverse. Studies have shown that people are more willing to walk if their cities have a greater variety of finishes, materials, landscape types, and routes to the same destination. At the neighbourhood and site scale, allowing residents to live close to where they work and shop with easy access to restaurants and entertainment allows people to walk rather than drive. Having amenities conveniently located is essential and saves on emissions. It also promotes physical, mental, and emotional health.

Strategies employed at the building scale have great potential to increase health and well-being. Thirty years of public health science and building science have demonstrated that buildings play a crucial role in shaping our health. For example, buildings can create conditions that are harmful to health or conducive to health in the following ways:

- They determine our exposure to outdoor pollutants, by either facilitating entry of particles of outdoor origin indoors, or acting as a barrier and removing them through enhanced filtration
- They govern exposure to chemicals of concern, such as volatile organic compounds (VOCs), flame retardants and polyfluorinated compounds, which can be ubiquitous or nonexistent, depending on the decisions we make regarding building materials and products;
- Buildings either protect us from noise or contribute to the problem through the introduction of indoor sources, poor noise insulation, or poor acoustical design;
- They can induce eye strain or improve alertness through impacts on circadian rhythm, depending on the lighting system;
- Buildings can protect us during heat events, or create environments that magnify the problem through solar heat gain; and
- Buildings can either wall us off from nature or connect us to it.

Studies document increased employee health, well-being and productivity closely tied to the quality of a building’s interior environment [2,3]. According to a study on buildings and health, “The indoor built environment plays a critical role in our overall well-being because of both the amount of time we spend indoors (~90%) and the ability of buildings to positively or negatively influence our health” [4]. When looking at the overall business operational costs, 90% of the costs are related to employees’ salaries, benefits, and healthcare [5]. Browning et al. [6] verified that human costs are 112 times greater than energy costs in the workplace.

"BUILDING FOR BETTER HEALTH"

The fact that employees are the most significant expense in a workplace operation has compelled organisations to concern about human factors in green building development. Green buildings have focused on energy efficiency and environmental stewardship. More recently, human health and wellness are becoming core considerations. Besides minimising environmental impacts, green buildings aim to improve health, well-being, and productivity via optimisation of workplace environments: daylighting, natural ventilation, thermal comfort, natural view, open space, places of respite, and other comforts. Green buildings influence human health at two critically important scales: directly at the individual level through providing optimised indoor environments, and indirectly on a population level through reductions in energy use and thus reductions in air pollutants that cause premature death, cardiovascular disease, exacerbate asthma conditions and contribute to global climate change, itself associated with a cascade of adverse human health impacts.

Green vs Non-Green Buildings

The literature suggests that indoor environmental quality (IEQ) credits in SRSs translate into improved IEQ. A study by the Harvard T.H. Chan School of Public Health [7] that reviewed 17 studies on green buildings and health revealed that overall, occupants report better IEQ and fewer health problems in these buildings than non-green buildings. These reviewed studies found lower VOCs, formaldehyde, allergens, nitrogen dioxide, and particulate matter in green buildings, which have been separately shown to impact health. Six of the reviewed studies tracked occupants' health in addition to IEQ, and all six found improvements in the green buildings. These include reduced asthma and allergy symptoms in offices; reduced respiratory symptoms, fewer sick building symptoms, better self-reported well-being in public housing; and fewer medical errors and decreased mortality in hospitals.

[8] found an improvement in IEQ, a reduction in symptoms, and better sleep quality in the green buildings. A follow-up paper by Colton et al. [9] found that in addition to fewer asthma symptoms, hospital visits and school absences were reduced in the green-certified public housing development.

The Center for the Built Environment at the University of California, Berkeley reviewed more than 33,000 surveys of occupant satisfaction in more than 200 buildings, including 16 green-certified buildings [10]. The study showed a statistically significant gain in certified green buildings, compared with those that were not certified, considering air quality and thermal comfort. In the words of the researchers: "Our results suggest that on average, the strategies commonly employed in green buildings have been effective in improving occupant satisfaction with air quality and thermal comfort" [10]. Building operators should then ask themselves: What could higher occupant satisfaction do to improve productivity, reduce health costs, lower employee turnover, and improve morale in any organization?

Google and other large corporations are using well-designed buildings to attract and keep the best talent. Hospitals are doing the same thing because employees are frequently in high-stress situations. The trend towards making hospitals more aesthetically attractive, the introduction of outdoor garden spaces, the improved interior design of spaces, and private rooms with more daylight, is made not just as a marketing strategy to get more patients, but it also helps people heal faster and retain staff. These do provide an economic benefit to the hospital, but they also address, experience, and connect with nature; create equity; and promote the health and well-being of patients and staff. Health and well-being are something that should be considered in every project, not just healthcare projects.

“BUILDING FOR BETTER HEALTH”

Third-party Rating Systems

In buildings, sustainability has been driven primarily by sustainability rating systems (SRSs). The presence of green buildings now extends to more than 160 countries, assessed with more than 40 SRSs, as reported by the World Green Building Council. Examples of SRS include LEED (U.S.), BREEAM (U.K.), Green Mark (Singapore), BEAM Plus (Hongkong), DGNB (Germany), Green Star (Australia) and Green Building Index (Malaysia), to name a few. In principle, SRSs share a similar approach: a performance evaluation of a building on domains such as site, energy and water consumption, use of natural resources, and IEQ.

Apart from assessing the effects on the environment, most SRSs also address humans’ health and well-being within the building to some extent. Increased attention and focus on a healthy interior environment are seen in the expanding role of human health and wellness in these SRSs. Illankoon et al. [11] identified that in the often-used SRSs, energy remains the most important criterion, followed by IEQ and Water. Notably, the IEQ key credit assesses many topics connected with the occupants’ health and well-being. However, the vast extent of different topics that are covered in the SRSs that evaluate the sustainability of buildings omits certain topics related to health and well-being.

In contrast to the SRSs mentioned above, unique rating systems have been developed, focusing only on topics related to health and well-being aspects due to increasing attention to building-related health problems. These are referred to as “wellness rating systems” as they were developed to promote occupant health and wellness as their primary motivator, which contrasts with SRSs that were developed to promote environmental sustainability as their primary motivator.

These dedicated rating systems were developed not to replace the existing SRSs that evaluate the sustainability of buildings but to emphasize that within a building, special attention is needed to ensure the occupants’ health and well-being. However, among them, WELL is the most well-known certification system that has very carefully developed specific topics and criteria for evaluating building and extended the scope beyond the physical building’s boundaries. It is claimed to be the leading certification scheme for assessing buildings’ health and sustainability [12].

McArthur and Powell [15] conducted a systematic review of 11 rating systems (i.e. Fitwel, WELL, Living Building Challenge, BEAM Plus, BREEAM, DGNB, Green Globes, Green Mark, Green Star, HQE, and LEED) and suggest eight themes (and their respective sub-themes) for a healthy building, as shown in Table 1. They concluded that overall, SBSs consider a significant and differing breadth of credits that have a positive physical, social, and/or psychological benefit to building occupants. The extent to which this is true varies significantly both between standards and based on the degree of overlap between human health and environmental benefits. However, they acknowledged that WELL is more comprehensive in scope than SRSs, addressing most health-related indoor environmental issues highlighted in the academic literature [15]. This is expected as it was developed specifically to address building occupant health. HQE and DGNB have been found to be significant in their coverage for IEQ and social well-being requirements, respectively. LEED has a smaller number of credits focused on health and well-being than WELL, but these credits have been found to be consistent with WELL.

“BUILDING FOR BETTER HEALTH”

There has been a significant shift towards incorporating requirements for occupant health and well-being in newer versions of SBSs, showing the increasing interest in this area by building designers and end-users. Given this, a review of Malaysia’s Green Building Index rating system from a health and well-being perspective will likely be of great value to the local building industry.

Table 1: Eight themes (and sub-themes) for a healthy building. Adapted from McArthur and Powell (2020)

Indoor Air Quality (IAQ) · Limiting toxic chemicals · Limiting the impact of outdoor pollution · Ventilation and outdoor air provisions · Pest and pathogen control · IAQ evaluation and planning	Acoustic Comfort · Design for acoustic comfort · Maintain acoustic privacy · Limit indoor ambient noise levels · Minimize reverberation · Minimize vibration
Visual Comfort and Light Quality · Artificial light · Natural lighting/daylighting and views · Glare mitigation · Occupant control	Thermal Comfort · Temperature and humidity control and monitoring · Other factors
Ergonomics and Physical Activity · Promote active commuting · Promote indoor physical activity · Promote outdoor physical activity · Promote movement within the building · Provide ergonomic and adjustable workstations	Safe Water Supplies and Diet · High water quality standards · Drinking water promotion · Promote healthy eating · Integrate on-site food production
Psychological Well-being · Biophilic design · Circadian rhythm/daylight · Other psychologically beneficial elements	Social Well-being · Community building (private) · Community building (public) · Safety and security

“BUILDING FOR BETTER HEALTH”

Conclusion

Building for health is the future paradigm that focuses on ecosystem health (green buildings) and indoor health (healthy buildings). Today, the challenge lies in accomplishing a healthy, comfortable, convenient and safe built environment with low resource consumption. In Malaysia, it is recommended to create greater public awareness of buildings’ health impacts and encourage building codes to place increased emphasis on healthier building practices. Concentrating on energy alone would pose a danger of neglecting the real purpose of architecture, which is to provide for people’s well-being. A balance between these requirements is necessary.

Finally, a word or two on perspective. The famous poet, Wendell Berry, wrote that “No place can be considered healthy until all places are healthy.” This phrase serves to remind us of the interconnectedness of these things and the fallacy of describing a building as ‘healthy’, particularly when we cannot control how a building will be used.

References

[1] World Health Organization [WHO] (2021). Constitution. Retrieved February 2, 2021, from https://www.who.int/about/who-we-are/constitution

[2] Singh, A. & Syal, M. (2010). Effects of green buildings on employee health and productivity. American Journal of Public Health, 100, 1665-1669.

[3] Xue, F., Gou, Z., Siu, S. & Lau, Y. (2016). Human factors in green office building design: The impact of workplace green features on health perceptions in high-rise high-density Asian cities. Sustainability, 8, 1095.

[4] Allen, J.G., MacNaughton, P., Satish, U., Santanam, S., Vallarino, J. & Spengler, J.D. (2016). Associations of cognitive function scores with carbon dioxide, ventilation, and volatile organic compound exposures in office workers: A controlled exposure study of green and conventional office environments. Environmental Health Perspectives, 124 (6), 805-12.

[5] World Green Building Council [WGBC] (2014). Health, Wellbeing & Productivity in Offices: The Next Chapter for Green Building. Retrieved September 25, 2019, from https://www.worldgbc.org/sites/default/files/compressed_WorldGBC_Health_Wellbeing__Productivity_Full_Report_Dbl_Med_Res_Feb_2015.pdf

[6] Browning, W., Labruto, L. Kallianpurkar, N., Ryan, C. Watson, S., & Knop, T. (2012). The economics of biophilia: Why designing with nature in mind makes financial sense. Terrapin Bright Green LLC. Retrieved February 1, 2021, from https://www.terrapinbrightgreen.com/wp-content/uploads/2012/06/The-Economics-of-Biophilia_Terrapin-Bright-Green-2012e.pdf

[7] Allen, J.G., MacNaughton, P., Laurent, J.G.C., Flanigan, S.S., Eitland, E.S. & Spengler, J.D. (2015). Green buildings and health, Current Environmental Health Reports, 2 (3), 250-258.

[8] Newsham, G., Birt, B., Arsenault, C., Thompson, L., Veitch, J., Mancini, S., Galasiu, A., Gover, B., Macdonald, I. & Burns, G. (2012). Do green buildings outperform conventional buildings? Indoor environment and energy performance in North American offices, in National Research Council Canada. Research Report; No. RR-329, National Research Council Canada.

[9] Colton, M., Laurent, J.G., MacNaughton, P., Kane, J., Bennett-Fripp, M., Spengler, J. & Adamkiewicz, G. (2015). Health Benefits of Green Public Housing: Associations with Asthma Morbidity and Building-related Symptoms, American Journal of Public Health, 105 (12), 2452-9.

[10] Abbaszadeh, S., Zagreus, L., Lehrer, D. & Huizenga, C. (2006). Occupant satisfaction with indoor environmental quality in green buildings. Proceedings, Healthy Buildings, Vol. III, 365-370, Lisbon, Portugal. June. http://escholarship.org/uc/item/9rf7p4bs

[11] Illankoon, I.M.C.S., Tam, V.W.Y., Le, K.N., & Shen, L. (2017). Key credit criteria among international green building rating tools. Journal of Cleaner Production, 164, 209–220.

[12] International WELL Building Institute [IWBI] (2020). WELL v2. Retrieved February 6, 2021, from https://www.wellcertified.com/

[13] International Living Future Institute [ILFI] (2021). Living Building Challenge 4.0. Retrieved February 6, 2021, from http://living-future.org/lbc

[14] U.S. General Services Administration [USGSA] (2019). Fitwel. Retrieved February 6, 2021, from https://www.gsa.gov/real-estate/facilities-management/tenant-services/cafeterias-and-vending-facilities/health-and-wellness/fitwel

[15] McArthur, J.J. & Powell, C. (2020). Health and wellness in commercial buildings: Systematic review of sustainable building rating systems and alignment with contemporary research. Building and Environment, 171, 106635.