UNITED ARCHITECTS OF THE PHILIPPINES

JOURNAL

Vol. 20 no. 1

20

BEYOND VISION

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DEDICATION

This book is dedicated to Arch. Guillermo "Guimo" Hisancha, the 25th National President of the United Architects of the Philippines (UAP), who has joined the Creator during the finishing days of this book.

Under his resolute leadership and guidance that the Committee on Publications, to which the UAP Journal and the UAP Post belongs to, was established. He then oversaw the successful annual publication of the UAP Journal after several years of hiatus.

He is best remembered as the first UAP National President, whose under his term that the Organization has reaped back-to-back Best Accredited Professional Organization Awards by the Professional Regulation Commission (PRC).

Our prayers and thoughts to the family, friends and loved ones of the man who made it through the rising challenges of the Organization and the Profession, despite all the pain and personal trials unbeknownst even to his closest friends and colleagues.

The men and women of the UAP Committee on Publications, the UAP Post, and the UAP Journal will surely miss you.

Until then, sir Guimo.

ABOUT THE JOURNAL

The **UAP Journal** is a publication that aims to promote unity and excellence in the professional arena by providing concerted forum and opportunities for architects in various practices, academics, researchers, as well as other professionals from all disciplines in the transformation, exchange, and criticism of inputs from research, analytical studies and other critical works related to Architecture and the building and design industry in general.

Published once per Fiscal Year, the UAP Journal is under the Committee on Publications of the Professional Development Commission (PDC).

STAFF

Arch. Melba T. Benavides, *Chairperson*

Arch. Edlee S. Tusi, *Editor-in-Chief*

Arch. Gloryrose D. Metilla, *Editor*

COVER DESIGN & LAYOUT

Edlee Tusi

PHOTO CREDIT

Cover photo of Aquatics Center courtesy of **Budji+Royal** Architecure + Design

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With boundless gratitude, I would like to express my sincere appreciation to the Committee on Publications headed by Arch. Melba T. Benavides, UAP and the UAP Journal Editor-In-Chief Arch. Edlee S. Tusi, UAP under the leadership of Professional Development Commission Executive Director Arch. Virgilio D. Andres, Jr., FUAP, for their unconditional support and commitment in making this UAP Journal year 2020 available despite the many difficulties we have experienced due to the global pandemic.

The past fiscal year has been an added milestone in the life of our Organization. Together, we take pride in as it shows the importance of our advocacies, active engagements, renewed partnerships, and services delivered over the past year.

One of the many significant projects of the past and current leadership is the completion and publication of this UAP Journal 2020 highlighting articles, innovative project case studies, compiled research projects, and monographs related to Architecture, Interior Architecture, Information Technology, Building Information Management, Building Science, materials and technology, Urban Planning, Housing and Real Estate Development, Landscape Architecture, Green Architecture, Heritage Architecture, Vernacular Architecture, Art and History, Disaster Resilient Design and or other related fields, which were carefully selected by the UAP Committee on Publications and UAP Journal Committee.

In this era of new normal, which leaves us to communicate virtually at the comforts of our homes, the advent of social media and virtual conferencing has opened new opportunities for all of us and the UAP envisioned to integrate these as part of its regular publications, activities and social gatherings.

The UAP Journal remains an essential part of the Organization. It is high time to focus on the future in keeping with our tradition of leadership in vision beyond 2020, and to capture our unique contributions and values as a community that embrace technological advancement and online collaboration platforms to stay dynamic and viable and become far more connected than our pre-COVID times.

Let us inspire our members and share our constant evolving stories through our UAP publications and member-centric programs because service is at the heart of everything we do.

Arch. RENATO A. HERAY, FUAP, ASEAN Ar., FRIA, PALA, IFLA

UAP NATIONAL PRESIDENT, FY 2020-21

I congratulate all of the contributors and the committee of the UAP Journal headed by Arch Edlee Tusi under the Commission on Professional Practice of Executive Director Virgilio Jun Andres Jr. for coming out with this issue, and our friends in the industry for believing and supporting this national administration for fiscal year 2019-2020. It has been quite a journey marked with a lot of milestones. .

The contributing articles of our members to this UAP Journal and the positions of the committee here in this organization is to make sure the OUTPUT IN THIS COMMITTEE WILL MAKE A DIFFERENCE in the lives of the architects. Here the Journal must educate well the readers and MOTIVATE ACTION TO PERFORM .

We should COLLECTIVELY WORK TIRELESSLY AND UNSELFISHLY FOR THE COMMON GOOD OF UAP.

Someone said before, "PRODUCTIVITY is never an accident. It is always the result of a

1) commitment to excellence,

2) intelligent planning, and

3) focused effort.

Therefore, do good and goodness will come back a *thousandfolds. Mabuhay po kayo.*

Arch. BENJAMIN K. PANGANIBAN, FUAP, ASEAN Ar., APEC Ar., ADFRIA

UAP NATIONAL PRESIDENT, FY 2018-20

MESSAGES

Across the world, I think we all can agree: We need a strong vision beyond 2020 more than ever.

The COVID-19 pandemic has globally changed the way we live. Many follow the updating coronavirus statistics daily and "flatten the curve" has become a slogan that describes the actions taken to control the increase of virus infections, which are often displayed in diagrams. The architecture profession was at a crossroads. Was this a time for quick, targeted, pragmatic responses to a built environment that no longer felt safe, or was this a revolutionary moment, a call to rethink everything?

And as the pandemic continues, we are emboldened by the growing realization that this is a transformational moment to remake the world. Our field is necessarily about proposing and imaging new things, what the world could be through making a part of it better. Definitely, this is one of our great existential moments in the built environment, as it is a critical part of pandemic solutions and emergency preparedness.

With the rapid worldwide spread of the COVID-19 virus, leveraging all forms of professional expertise and specialties is paramount to a rapid resolution of the crisis, avoiding unintended consequences in the short term, and embedding resilience in our health systems and built environment in the longer term.

As I believe that Architecture has to mediate between the perceived needs of the moment versus the unknowable needs of the future and the desire to create something that will outlast generations, I would like to welcome you to the premiere issue of the UAP Journal for Fiscal Year 2020-2021, a peer-reviewed and broad-scope journal to capture the contributions of Filipino architects as we design our cities differently to meet the unique needs of clients, owners, occupants, and, indeed, future generations of occupants, and ultimately, to manage risk in the face of future pandemics.

Mabuhay ang Arkitektong Filipino!

Arch. VIRGILIO D. ANDRES, Jr., FUAP
EXECUTIVE DIRECTOR
UAP PROFESSIONAL DEVELOPMENT COMMISSION

This UAP Journal bearing the theme "Vision Beyond 2020" promotes the exceptional architectural works from carefully selected individuals to represent the various sections in this publication, as they demonstrate the unique qualities of being diverse, creative and analytical thinkers. It is a platform that captures and emphasizes the concepts, designs and proposed programs that are expected to rise and meet the challenges for the future of our communities. Sustainable and resilient master-planned communities; Structures with respect to disaster preparedness including evacuation; Ideas with regards to booming industry and eco-tourism; Solutions addressing the needs of transport and data infrastructure – these are just some of the ideas from a wide-range of development concerns related to Architecture and the Building & Design industry that were integrated into this publication.

The entire preparation, process and ultimate completion of this UAP Journal has come to be depended on the joint efforts of fellow committee members and contributors. On behalf of the UAP Committee on Publications, I wish to acknowledge each and every one for all the time and effort they have shared. My special thanks to our Editor in Chief Arch. Edlee Tusi as working with him is worth looking forward to in the next fiscal year. Lastly, my sincerest thanks to the UAP National Officers and Board of Directors for their untiring support to the whole Committee on Publications with the UAP Post and the UAP Journal.

Let us remember… Limitations live only in our minds. But if we use our imaginations, our possibilities become limitless. –

-- Jamie Paolinetti

Arch. MELBA T. BENAVIDES, UAP
CHAIRPERSON, COMMITTEE ON PUBLICATIONS, FY 2019-21

MESSAGES

As the world is facing the greatest health emergency in modern history, which is the Coronavirus or Covid-19 pandemic, various innovative measures and considerations were brought in light of preparations for the so-called "New Normal". In order to win this ensuing battle, everyone should take his or her part, whether at the front lines or at the command center, for no one should be left behind.

Being a Filipino Architect, the ideas and researches could pave the way to solutions, not just for the current situation of our society, but for posterity as well. That is the thrust of the UAP Journal for the Fiscal Year 2019-2020.

Entitled, Vision 2020, this aims to promote unity and excellence in the professional arena by providing concerted forum and opportunities for architects in various practices for the transformation, exchange, and criticism of inputs from research, analytical studies and other critical works related to Architecture and the Build-and-Design industry in general.

Come hell or high water, in times of ordinary or special needs, creativity should never cease, in order to contribute to the improvement of well-being and of the society as a whole. Through this that the Architectural Profession can partake the objective of carrying out the societal developments by way of research, towards the overall rebuilding of our country.

Arch. EDLEE S. TUSI, UAP
EDITOR IN CHIEF,
UAP JOURNAL, FY 2019-21

FOREWORD

The onset push of the current government's plan to modernize transport and communities by investing heavily on infrastructure is on a rapid pace, seems unstoppable. From new roads to transport hubs, from huge government complexes to sprawling communities, we're delighted to see various proposals – some of which were dated decades back – finally being realized. Private entities are also working hand-in-hand with the State to develop key infrastructure and master planned projects, in a bid to decongest Metro Manila and thus bringing the developments to other regions. Indeed, our country is poised to achieve modern and industrialized society as the year 2020 approaches.

The influx of recent developments prompted each one of us to ponder: what would be the share of a Filipino Architect in keeping with this progress? Aside from the plans of the so-called 'traditional' buildings being laid out and executed with finality, what could be the Filipino Architect's role in pushing for sustainability for the years to come?

This prompted the UAP Publications to come up with this year's theme entitled' "Beyond Vision 2020", as we invite Architects to come up with their idea of sustainability by way of introducing concepts and research related to Architecture, Building Science, materials and technology, Urban Planning, Housing and Real Estate Development, Landscape Architecture, Green Architecture, Heritage Architecture, Vernacular Architecture, Art and History, Disaster Resilient Design and other related fields.

PEER REVIEWERS

Arch. CHONA E. PONCE, FUAP, PIEP

DEAN, COLLEGE OF ARCHITECTURE, NATIONAL UNIVERSITY

Chona Elvas Ponce is a registered Architect and Certified Berde Profession. She is the dean of the National University College of Architecture since November 2013. Prior to her appointment in NU, she taught at the University of Santo Tomas College of Architecture from 2001, then became the Acting Assistant Dean (June 2003 to May 2004), Assistant Dean (June 2004 to September 2004) and eventually the Acting Dean (October 2004 to October 2006) of the College. She also taught at the Far Eastern University Institute of Architecture and Fine Arts from 1994 to 2001, where she also served as College Secretary from 1995-1996. She finished her B.S. Architecture from University of Santo Tomas, her Master in Architecture major in Community Architecture from the University of the Philippines and her PhD in Education major in Curriculum Studies also from the University of the Philippines.

Aside from architecture education, Architect Ponce is a practicing architect and urban planner for more than 35 years now. She is the principal architect of Elvas Ponce+ Architects. Her recent practice was with Archion Architects, as one of the partners, CCB Architect, and Palafox Associates, one of the country's leading architectural, planning and design firm in the country, as Partner and head of Planning Department from 2006 to July 2011. Today she holds several positions in different organizations. She was recently appointed as one of the institutional members of National Committee on Architecture and Allied Arts (NCAAA), a sub-commission of NCCA. She is the current Vice President for Programs of the Council of Deans and Heads of Architecture Schools in the Philippines (CODHASP) where she had always been an officer from 2015 to present. She is one of the Directors of Council of Architectural Researchers and Educators (Archcare). She is also an active member of the Philippine Green Building Council (PhilGBC) where she sat in the Review Committee.

She is an active member of the United Architect of the Philippines (UAP) since 1982 holding various positions. She served as a Vice President for Area B (FY 2018-2019), president of Manila Centrum Chapter and held various positions at the Chapter level, and as the National Executive Director of the Commission on Education (FY 2005-2006) and the Professional Development Commission (FY 2006-2008) of the organization. Last April 2012, she became a Fellow of the UAP where she was elected as Scribe in 2016. She was the immediate past chairman of the Committee on Continuing Professional Education, and was appointed as the First Member of the PRBoA Continuing Professional Development (CPD) Council for Architects where she represents UAP until today.

MANILA CENTRVM

Arch. ANNIE C. PUGEDA, FUAP

MEMBER OF THE FACULTY,
NATIONAL UNIVERSITY

With the field of expertise on Building Utilities, Architectural Design and Feng Shui Consultancy, Arch. Annie has already carved herself a niche in the Architectural practice for thirty years.

Garnering 14th Place in June 1989 Architects Licensure Examination, she has embarked on the Academe being the Assistant Professor 3, Faculty Member of the National University (NU) College of Architecture, former Professor I - FEU Institute of Architecture & Fine Arts, and a former Adviser of the United Architects of the Philippines Student Auxiliary (UAPSA-FEU Chapter), the duly recognized architectural student organization of the United Architects of the Philippines (UAP).

Arch. Annie has also served as President of the Manila Centrum Chapter of the United Architects of the Philippines – the Integrated & Accredited Professional Organization for Architects (UAP – IAPOA), from Fiscal years 2004 – 2005, 2005 – 2006, 2006 – 2007. She also became Chairperson for various UAP National Committees, including the World Architecture Day (UAP WAD 2008), October 1, 2008 and of the Committee on *Balangkasan* (The Architects' Forum) for fiscal Year 2006 – 2007.

MANILA CENTRVM

Arch. CHRISTIAN R. VASQUEZ, UAP, LEED AP, INTL. ASSOC. AIA

PRESIDENT, UAP DUBAI CHAPTER

Christian is project architect and business development executive of National Engineering Bureau - NEB (a top architectural & engineering consultant based in Dubai). Born in Manila, he acquired his bachelor's degree in Architecture from Far Eastern University in 2004. But right after he graduated, he worked at Palafox Associates in Makati, where he was trained and mentored by the world renowned urban planner and architect Felino Palafox Jr.

CTBUH Board of Trustees has named Christian as the first Country (U.A.E.) Representative at the Council on Tall Buildings and Urban Habitat. He is the first Filipino to represent MENA region in the council. CTBUH is an international body that serves the field of tall buildings and sustainable urban design. The world's leading resource for professionals focused on the inception, design, construction and operation of tall buildings and future cities, CTBUH welcomes Vasquez on July 2017 to its growing team, which includes representatives from all over the world. In the 18 years of his professional career, he has worked on hundreds of projects ranging from retail shops and housing projects to large scale towers and resorts as well as hotels and master-planned developments.

He has been crowned Future Cities' Young Architect of the Year in 2016. Christian was presented with the prestigious Crystal Trophy by Flip Flop Media at the annual awards ceremony at Grosvenor House, Dubai Marina. As the PR and Business Development Executive of NEB, he has been able to lead the firm in winning various projects, awards and responsible in gaining global recognition – placing NEB at the world's top 100 architectural firm.

Christian is currently the President of the organization with over 500 Filipino registered licensed architects from 486 companies in the UAE. Christian proudly declared that "UAP124 is the keeper of the best, upholds educational and professional standards, and is the voice of the profession." Indeed, through his leadership, the organization has made a big leap in advancing not only the Filipino architects but the architectural profession as a whole – not just in Dubai but in the whole Middle East as the "Global Filipino Architects".

Christian is also the first Filipino to serve as one of the board of directors at the American Institute of Architects Middle East Chapter with 500 members to date. In 2010, Christian founded *Architect Gives Back*, a charity program which helps to send less fortunate children to school in his home country, Philippines.

Arch. MARKEL CESAR A. LUNA,

M.Arch., FUAP

Ar. Markel Cesar A. Luna is an Architect, a Heritage Conservationist, and an Educator. He earned his Bachelor of Science in Architecture and Master of Architecture degrees at the University of the Philippines – Diliman College of Architecture where he is currently an Assistant Professor and the Student Relations Officer. A consistent University and College Scholar, he was inducted as a member of the International Honor Society of Phi Kappa Phi.

After being mentored and trained by the late Ar. Geronimo V. Manahan, FUAP, LIKHA Awardee, Ar. Luna has been able to maintain a private architectural practice, concentrating on residential and commercial design. Moreover, having majored in Architectural Heritage Conservation, he was involved in notable Conservation Projects, which include the production of a Conservation Management Plan for the Manila Metropolitan Theater and the restoration of the Paco Park and Cemetery.

Ar. Luna has done several Research Projects, and some of his works have been published in journals in the Philippines and abroad. With Heritage Conservation being his passion and advocacy, he imparts knowledge on the subject as a speaker and presenter at local and international conferences and symposia.

An active member of the United Architects of the Philippines (UAP), he has held the position of Chapter President of the UAP Diliman Chapter, and has headed various committees as director and chairperson. In 2017, he was elevated to Fellow, and served as the Program Director of UAP College of Fellows CPD Committee. In addition, he is affiliated with the International Council on Monuments and Sites (ICOMOS) Philippines and the Filipino Society of Composers, Authors and Publishers (FILSCAP).

Arch. SHEENA MARIE R. FRANCO,

UAP, RMP

Architect Sheena Marie R. Franco, who hails from North Cotabato in Mindanao, is also a registered Master Plumber. Graduated from the University of the Philippines – Mindanao, she was the recipient of Best Thesis Award in 2016. Currently, she also works as a part-time instructor in her Alma Mater, aside from being a freelance professional.

Arch. Franco is a member of the United Architects of the Philippines (UAP)-Davao Alpha Chapter from 2018. She was also a President of Mindanao Architecture Advocacy Network (MAAN) and a volunteer member of *Grupo Kalinangan,* Inc.

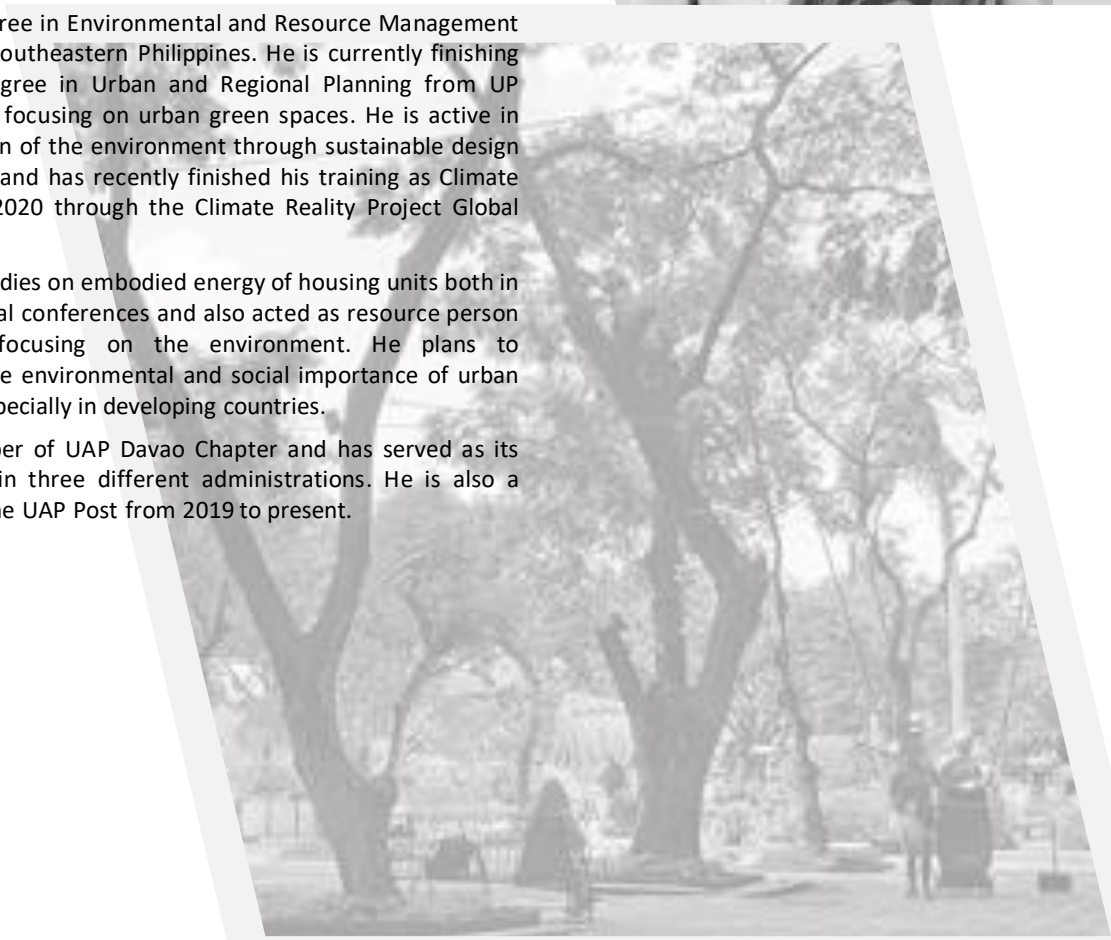
She was also a speaker/presenter to various Academic and Architectural fora such as ARCHtalk. "Historical Value of Architecture in the Philippines" at University of Mindanao; *Thesis Really It* Presentation Seminar at Ateneo de Davao University (ADDU); 1st Mindanao Studies Interdisciplinary Research Symposia at the University of the Philippines - Davao, and the "1st International Joint Conference on Biodiversity and Technology and Social Science" at the University of Mindanao (UM) in Davao City.

Arch. RYAN A. SONGCAYAUON,

UAP

Arch. Ryan Songcayauon is one of the twelve pioneering students of the BS Architecture Program in UP Mindanao way back in 1999. He was also one of the first four architecture alumni of the University who passed the Architecture Licensure Examination (ALE) on June 2007. He joined the faculty of the BS Architecture Program as lecturer in 2007 and as fulltime faculty on 2009 up to the present teaching architectural communication and presentation techniques and architectural design with emphasis to technology and the environment.

Ryan has a master's degree in Environmental and Resource Management from the University of Southeastern Philippines. He is currently finishing his second master's degree in Urban and Regional Planning from UP Mindanao with a thesis focusing on urban green spaces. He is active in promoting the protection of the environment through sustainable design and planning strategies and has recently finished his training as Climate Reality Leader on July 2020 through the Climate Reality Project Global Training.



He has presented his studies on embodied energy of housing units both in national and international conferences and also acted as resource person on several seminars focusing on the environment. He plans to concentrate more on the environmental and social importance of urban green spaces of cities especially in developing countries.

Ryan is an active member of UAP Davao Chapter and has served as its director and secretary in three different administrations. He is also a contributing author to the UAP Post from 2019 to present.

Arch. MARY JANESIE T. TUMAMBING,

UAP, PIEP

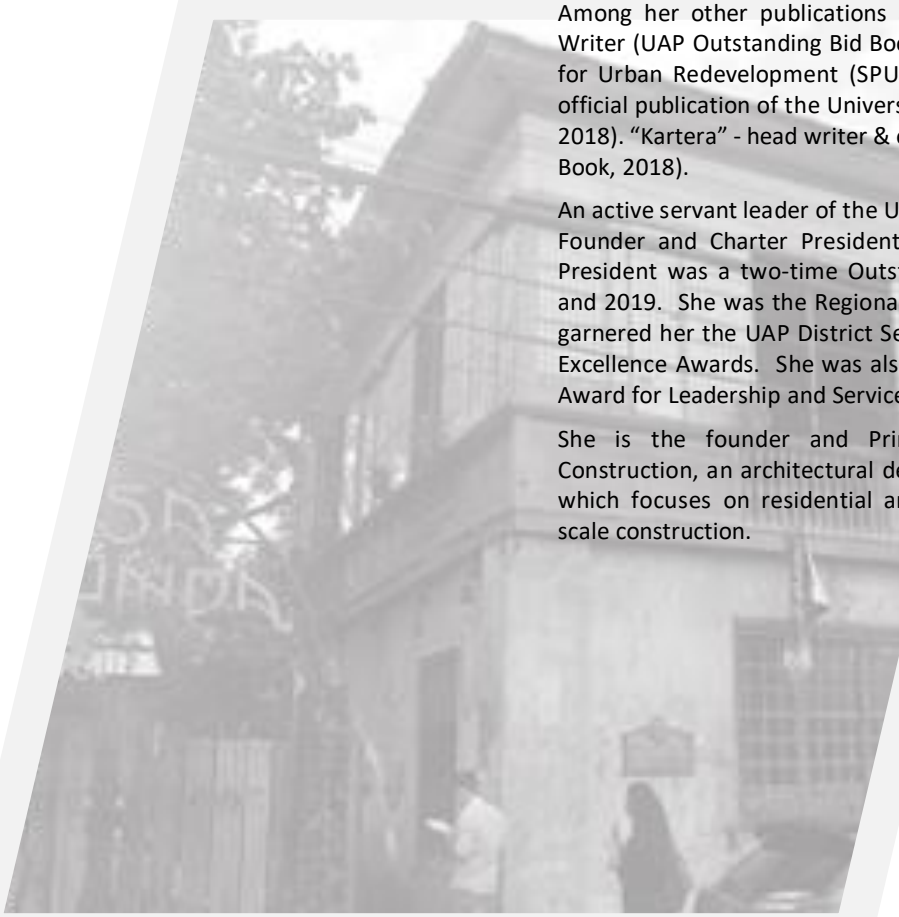
A registered and licensed Architect and Environmental Planner. MARY JANESSIE T. TUMAMBING took her Bachelor of Science in Architecture at the University of Santo Tomas and is currently finishing post graduate thesis at the University of the Philippines College of Architecture in Diliman to earn a degree in Masters of Science in Architecture Major in Urban Design.

A public speaker, biographer and writer. In the years of 2013 (October) up to 2017 (March) became a part time professor at Polytechnic University of the Philippines and the National University-Manila.

Among her other publications are: "Paghugpong" - Chairperson and Head Writer (UAP Outstanding Bid Book Manuscript, 2017). "The Special Precincts for Urban Redevelopment (SPURs) of Makati City" - co-author (Mujon, the official publication of the University of the Philippines College of Architecture, 2018). "Kartera" - head writer & editor-in-chief (UAP Lipa Chapter Coffee table Book, 2018).

An active servant leader of the United Architects of the Philippines. She is the Founder and Charter President of UAP Lipa Chapter 148. This Chapter President was a two-time Outstanding Chapter President Awardee in 2018 and 2019. She was the Regional District B4 Secretary in FY 2018-2019 which garnered her the UAP District Service Excellence and UAP District Leadership Excellence Awards. She was also a recipient of the highest UAP Presidential Award for Leadership and Service in 2017.

She is the founder and Principal Architect of RichMan Design and Construction, an architectural design consultancy and construction company which focuses on residential architecture, community planning and small-scale construction.



Arch. GLORYROSE D. METILLA,

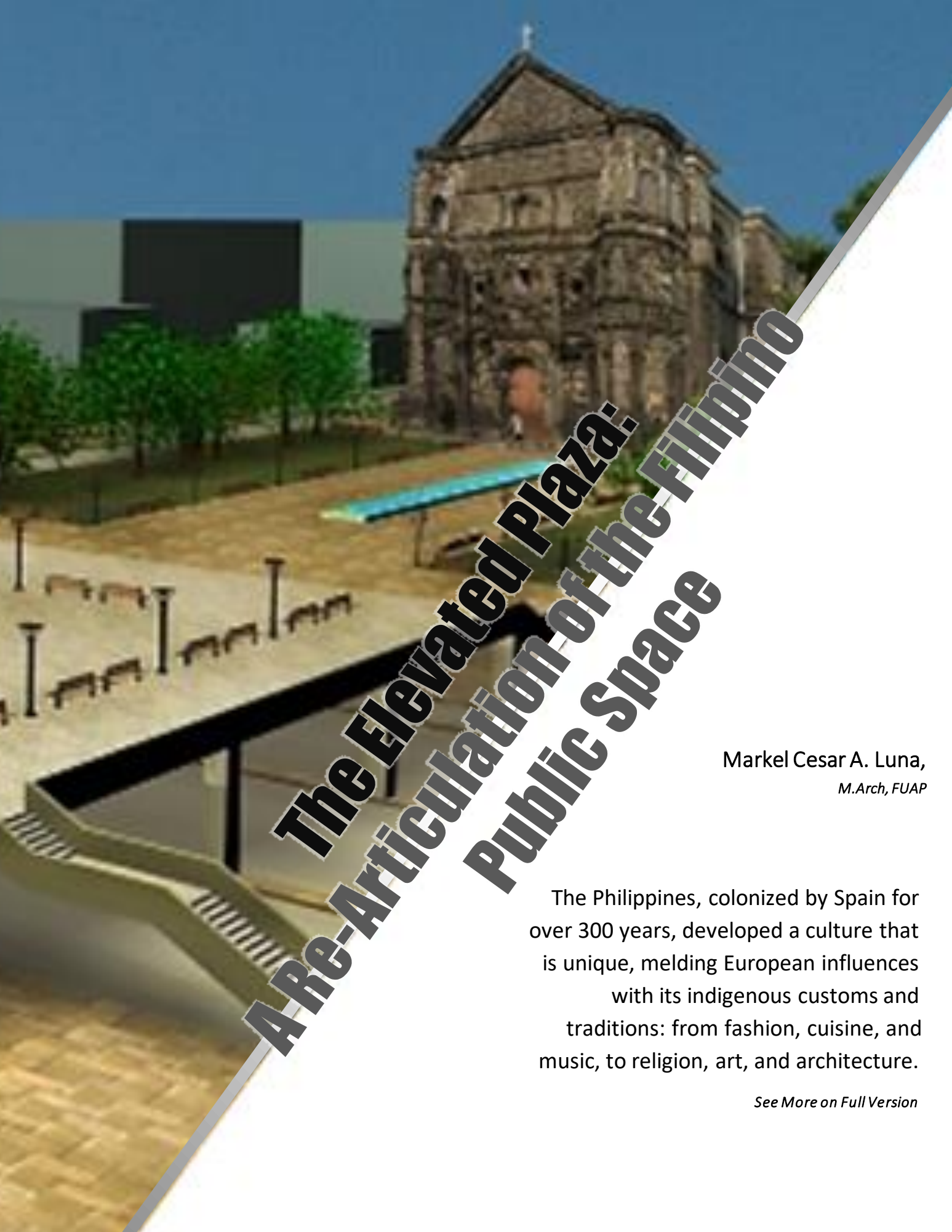
UAP

Graduated her Bachelors of Science in Architecture from the University of the Philippines in Mindanao in 2009 wherein she garnered the Best Thesis Award and shortly after she won the Red Point National Thesis Award, an award given to exemplary undergraduate Architecture thesis in the Philippines. In 2018, she finished the Design Summerschool from the College of Architecture and Urban Planning in Tongji University , Shanghai, China and then her Masters in Urban and Cultural Heritage from the Melbourne School of Design, University of Melbourne, Australia with an Australia Awards Scholarship. She has been a United Architects of the Philippines North Davao Chapter President 2015 - 2016, Balangkasan Chair for Area D in 2016 and Editor of Area D Committee of UAP Journal under the Commission on Professional Development 2019 -2020.

After college, she became technical officer of TAO Pilipinas Inc,a firm working on the urban poor communities of Metro Manila and then as a Design officer for SM Engineering and Design where she was part of the in house design team for new malls such as SM Lanang Premier, SM Annex Ecoland, SM SRP Cebu and Cinemas of SM Southmall and SM Gensan.

She has worked in several heritage architecture fields while studying her masters specifically on the Adaptive reuse of heritage railway stations in Victoria, the stone restoration drawings for RMIT Romanesque buildings in Melbourne and the Design Proposal for the Rehabilitation of Circum-Taihu Lake Heritage, China, a government competition where her team garnered finalist.

Currently, she is the founding partner of Swito Designs Architects. The studio is instrumental in the redesign of Tibolo Cultural VIllage for Bagobo Tribe in Kapatagan, design of Panuluanan Culural Village of Ata Paquibato Tribe, design of Coffee for Peace Bistro, design of Central Visayas Maritime Training Center in Carcar Cebu and currently working on the Department of Tourism Region XI Cultural Complex and Bangsamoro Ministry of Interior and Local Government Infrastructure Projects.



The Elevated Plaza: A Re-Articulation of the Filipino Public Space

Markel Cesar A. Luna,
M.Arch, FUAP

The Philippines, colonized by Spain for over 300 years, developed a culture that is unique, melding European influences with its indigenous customs and traditions: from fashion, cuisine, and music, to religion, art, and architecture.

See More on Full Version

A Comparative Visual Analysis of the Architectural Elements of Ancestral and Vernacular Houses in Glan, Sarangani Province, Philippines

Sheena Marie R. Franco
UAP, RMP

The persistent architectural elements over the years were determined and the relationships between their attributes were done through visual analysis including comparative documentation using photo reference based on the design and form using timeline.

See More on Full Version

Between Buildings and Streets: Understanding the Four Major Urban Green Spaces [UGS] in Davao City, Philippines

Ryan C. Songcayauon
UAP

Urban green spaces (UGS) are major contributors to the quality of life of a city. They support the citizens' well-being through climate regulations, capture of pollutants, flood control and at the same time help in the social interactions of neighborhoods and communities.

See More on Full Version

Retracing and Interpreting Prehistoric Maritime Cultural Heritage: The Case of the Ancient Balangay Ship Reconstruction and Voyages in Philippines , Southeast Asia and China

Gloryrose D. Metilla,
UAP

Maritime cultural heritage is a global heritage that is less talked about it the heritage field. This is because the interest of maritime cultural assessment has been on biodiversity and the environment in the past rather than the interest on cultural, visual and built heritage significance.

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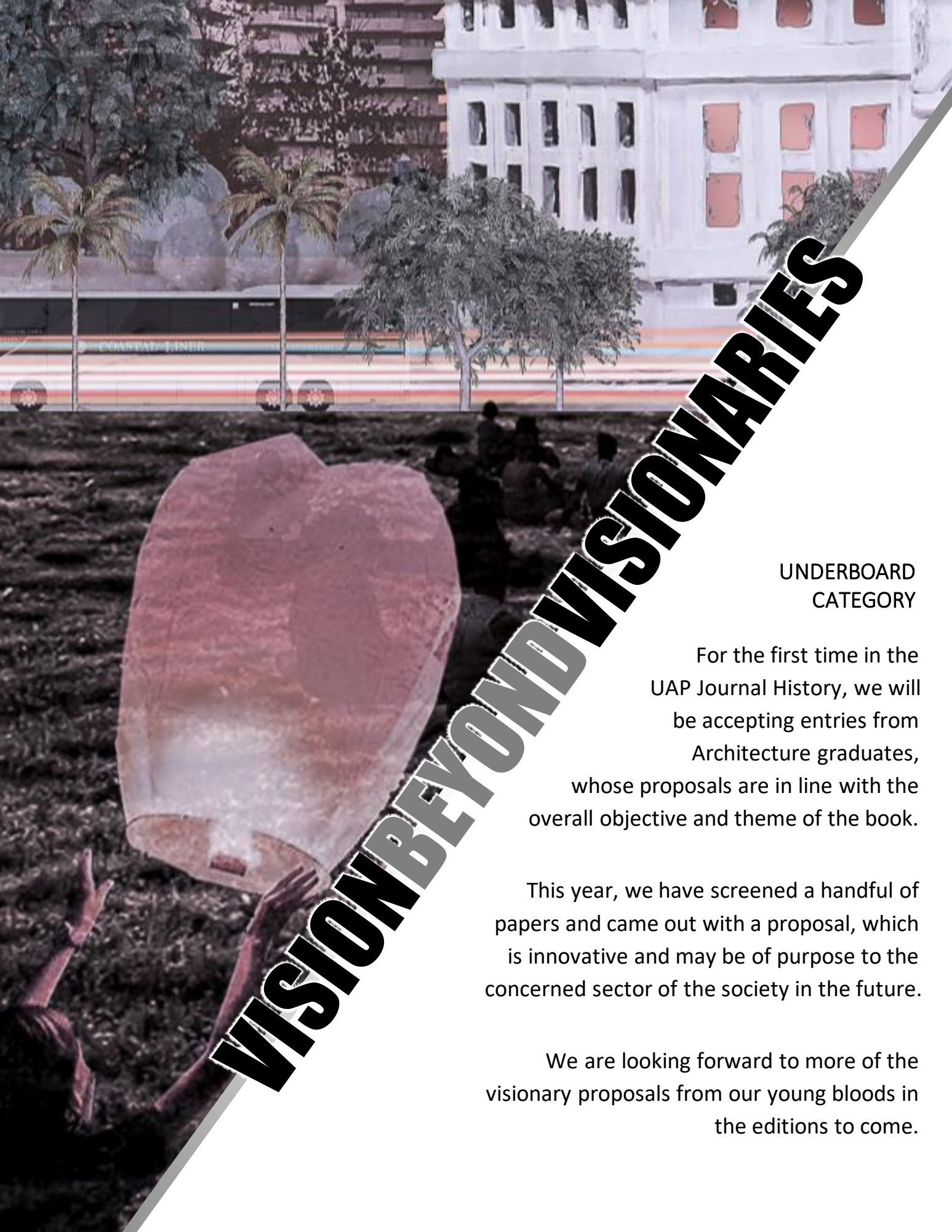
Segunda Mana
Historical Conservation Management Plan
Casa de Segunda, Lipa City

Mary Janessie T. Tumambing,
UAP, PIEP

Beneath the seeming decline of its structure and the relentless attempts to preserve and maintain the heritage structure as a living testimony of the past, the need to take calculated action is relevant so as to ensure the safety and integrity of this 140-year old heritage house.

See More on Full Version



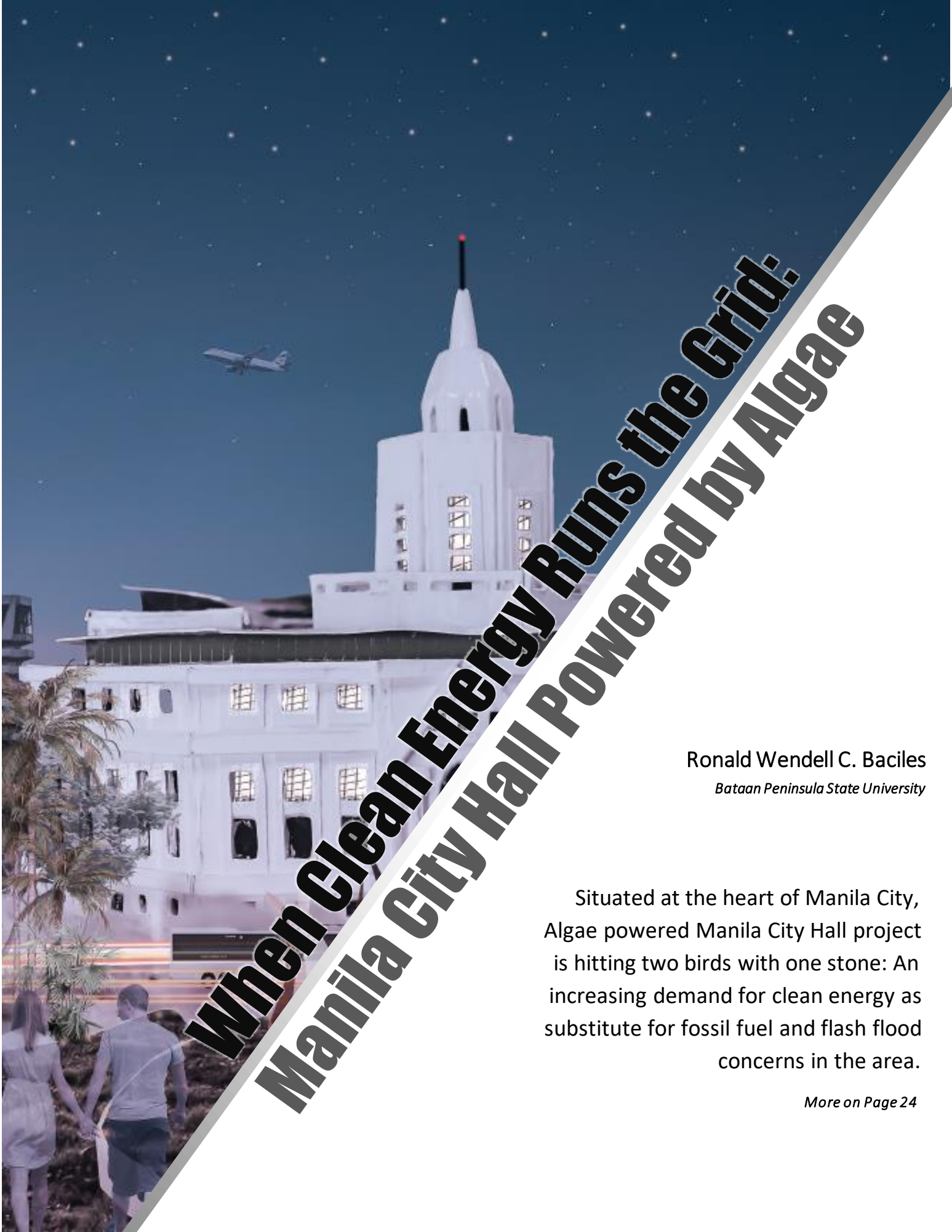
VISIONBEYONDVISIONARIES

UNDERBOARD
CATEGORY

For the first time in the UAP Journal History, we will be accepting entries from Architecture graduates, whose proposals are in line with the overall objective and theme of the book.

This year, we have screened a handful of papers and came out with a proposal, which is innovative and may be of purpose to the concerned sector of the society in the future.

We are looking forward to more of the visionary proposals from our young bloods in the editions to come.



When Clean Energy Runs the Grid: Manila City Hall Powered by Algae

Ronald Wendell C. Baciles
Bataan Peninsula State University

Situated at the heart of Manila City, Algae powered Manila City Hall project is hitting two birds with one stone: An increasing demand for clean energy as substitute for fossil fuel and flash flood concerns in the area.

More on Page 24

ABSTRACT

Harnessing biomass from microalgae is both innovative and new approach for biogas production, that through architectural design the industrial looked Photobioreactors (PBRs) can now use as building façade while helping the environment in lessening Green-house Gas emissions. Located at the roof top of city hall, the new design of PBRs are composed of 435 modules of photobioreactors that are sandwiched in an aluminum frame system with a *Maynilad* flower inspired patterns. And with the use of natural and living elements such as green algae and storm water, through glass containers called photobioreactors with its system we are able to harvest biogas that could provide right amount of kilowatt per hour monthly and save for up to 50% of total monthly energy consumed of Manila City Hall while the waste of algae production could be an animal food and plant fertilizers. But also through photosynthesis microalgae absorbs carbon dioxide (CO2) and produces oxygen (O2) that we can use as a resilient and sustainable solution beyond 2020.

ARTICLE

One of the current environmental issues that we are facing today is the Greenhouse-Gas (GhG) emissions. Do you think a new type of energy harvesting could be a solution to lessen its impact for the survival of humanity?

Biomass harvesting from microalgae is sustainable, efficient, and both an innovative and new approach for energy harnessing. From the reports, compared to other biodiesel crops, microalgae have a production rate ranges from 2000 to 5000 gallon per acre a year, according to NASA's Offshore Membrane Enclosure for Growing Algae (OMEGA) project headed by Jonathan Trent. Using an enclosed glass container called photobioreactors (PBRs) the microalgae will inject inside of it, and while the algae is growing like any other plants through photosynthesis it transforms solar energy into chemical energy while absorbing carbon dioxide (CO2) and releases oxygen (O2) at the same time. And also, aside from biodiesel, microalgae could be transformed into fertilizers, fish foods, and even for cosmetics.

Figure 1. *Conceptual perspective of Manila City Hall (Front)*

However, the concept of adapting the algae photobioreactor design – seeks to provide clean energy to Manila City Hall with the use of natural and living elements such as green algae and water in architectural way without sacrificing the integrity and aesthetics of the building. Through the adaptation of "Bio-intelligent Quotient" (BIQ) project of Spitterwerk Architects in collaboration with Strategic Science Consult of Germany, ARUP and Colt International, a five storey apartment building that runs by a microalgae since 2013, the designer creates a new design of harnessing energy through PBR system; and the focused of the project are about the sustainability of an algae PBR in terms of its effectiveness, safety, and efficiency; and how the design will work to a heritage building like Manila City Hall.

Located at the roof top of city hall, the new design is composed of 435 modules of photobioreactors that are sandwiched in an aluminum frame system with a Maynilad flower inspired patterns. Moreover, each module is consisting of 3 PBRs made of glass panels with a dimension of 1.80m x 0.41m x 0.41m per panel with a total volume of 0.303 cubic meter each, the same volume as in the BIQ project in Hamburg, Germany in new architectural design approach. Since algae volume determines the energy that can produce, with the new design it has a six times volume compared to the existing design. And in terms of its architectural design, it is designed to be in a modular type construction like pre-cast wall for a fast and resilient installation for the city hall and also for other types of projects that seeks to use algae PBR system. Along with the design, the designer also considered the natural elements that are going to use to the system.

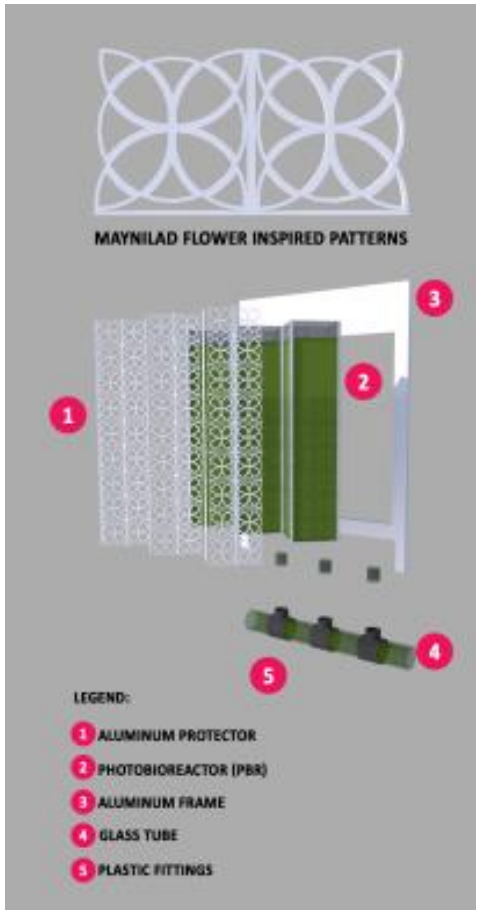


Figure 2. *Details of a Photobioreactor inspired Maynilad flower.*

***Figure 3**. Storm water storage diagram*

First the water, clean water is important for both plants and human, to be able to not use potable water for the system. Using the Storm Trap system it paves a way to design and create a flood water storage that minimizing the projects footprint and maximizing the water volume, and it will be located below the ground of Bonifacio Shrine that can carries up to 300,000 liters but it will limits to 270,000 liters of water inside the 3m x 10 m x 10 m storm water storage. But before the water will enter to the storage, *Upflo* filters will be installed around the drainage system of the shrine to filter fine sediments and pollutants to separate those from water. And secondly, microalgae is one of the main ingredients in harvesting biomass, after the water was filtered it will pump up to a mixing tank where algae and plant fertilizer are also combined and pump up to PBRs. The kind of algae is going use is green algae (Chlorophyta), because this type of microalgae is the most common where we can be found in wet areas such as rivers, pools, fall, and even in stocked water containers; and abundant in tropical countries.

Along with this, in order for the proponent to understand the process of growing an alga with our tropical climate, last October 2017 we conducted an experiment. With 4 grams of microalgae and 500 ml of potable water in glass jar to imitate the actual photobioreactor, in the result we found out that it can multiply and grow within 7 to 8 days depending on weather condition. On February 25, 2020, the designer continues the experimentation process with the different components such as 2 rectangular plastics containers, 1 plastic bottle, and fish food (red pellet) and filled with 500 ml of water and monitored WITHIN 15 days which resulted to a different outcome. As the conclusion for this experiment that with the use of wrong ingredients for algae production may create a different bacteria that we cannot apply in the production but causing an unwanted odor, and comparing the glass and plastic photobioreactors; glass PBR is more efficient and effective in harnessing energy from algae based on the experiment result while plastic PBR may eventually cause chemical reaction due to high heat temperature.

In the process of this project some professionals ask question like “How does the new design will work to the iconic city hall?”, and “It is safe for people and environment?”.

Last 2017, 125,400 KWH are consumed by the manila city hall from December 25, 2016 to January 25, 2017; from February to March they consumed 119,789 KWH; 163,800 KWH for the month of March to April; and one of the highest KWH was 181,800 for the month of May to June; and lastly, from June to July was 172,200 KWH.

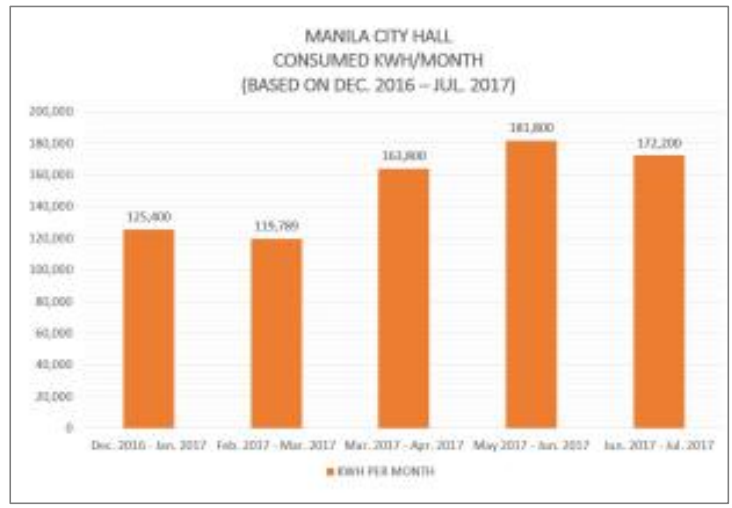


***Figure 4**. Manila City Hall Electricity consumption (Dec. 2016 – July 2017)*

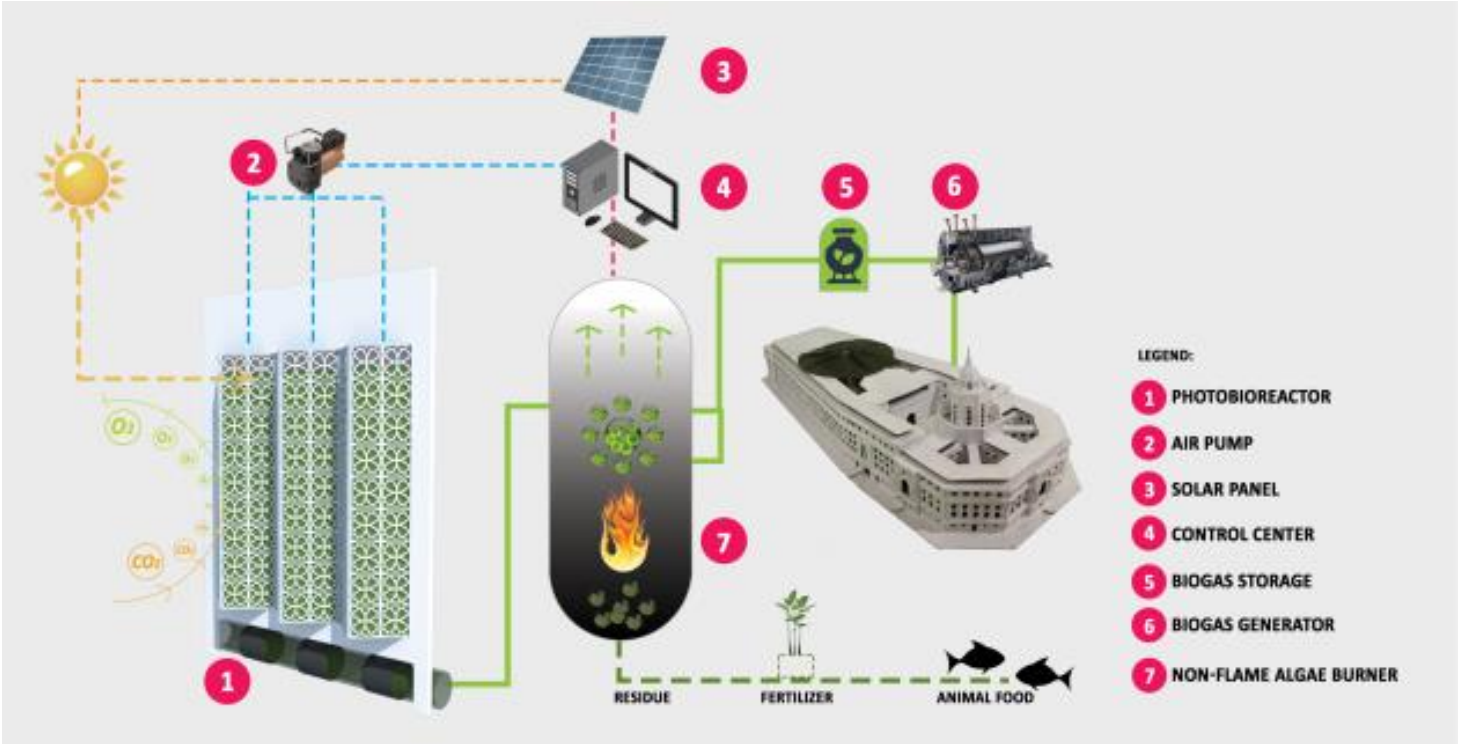


Figure 5. *PBR Diagram*

To provide clean energy to the city hall using the microalgae photobioreactor system and after the algae grow inside the PBR in several days, the algae particles will push down to a non-flame algae burner to extract biodiesel. With the help of the existing BIQ project, the designer enables to have an idea regarding on its kWh computation that the algae can produce. According to the article of BUILD UP (The European Portal For Energy Efficiency In Buildings) entitled: The BIQ House: First algae-powered building in the world, there are 129 photobioreactors that are installed on its façade which is equivalent to 200 square meter in total; in fact, they harvested 30 kWh per square meter a year with a total of 600 kwh a year. In addition, each panel of BIQ house has 70 cm (0.70 m) wide x 270 cm (2.70 m) high x 8 cm (0.08 m) thick with a total volume of 0.151 cubic meter that can produce 46.512 kWh a year based on the 600 kWh a year of 129 PBRs' computation.

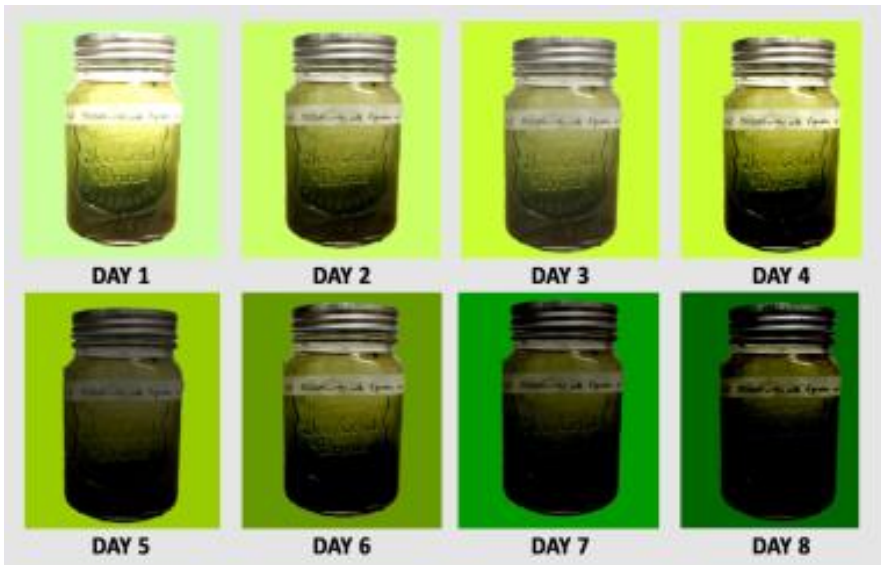


Figure 6. *Algae experiment done in glass containers for 8 days.*

Since the new design of PBR is 6x more volume with 0.909 cubic meter per module, the photobioreactor can produce a monthly Kw per hour of 7.752 kWh per panel; 23.256 kWh per module multi by 435 modules equivalent to 10,116.36 kWh per month and a total of 121,396.32 kWh annually. As a result, with this new design of PBRs it can provide up to 50% of clean energy to the City Hall, and in fact during the process there are some excess particles that can use as animal food, and plant fertilizers. In general, both the system and process have no harm for the people and environment but it can be lessening the effect of greenhouse gas emissions, and flood around the area and use it into a resilient and sustainable solutions through architectural design beyond the year 2020.

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